Ciencia Latina Internacional

Ciencia Latina Revista Científica Multidisciplinar, Ciudad de México, México.
ISSN 2707-2207 / ISSN 2707-2215 (en línea), enero-febrero 2024,
Volumen 8, Número 1.

https://doi.org/10.37811/cl_rcm.v8i1

DEMOSTRACIÓN DEL ESPECTRO HAMILTONIANO PARA UN CAMPO DE YANG-MILLS NO ABELIANO QUE POSEEN UNA BRECHA DE MASA FINITA CON RESPECTO AL ESTADO DE VACÍO

DEMONSTRATION OF THE HAMILTONIAN SPECTRUM FOR A NON-ABELIAN YANG-MILLS FIELD POSSESSING A FINITE MASS GAP WITH RESPECT TO THE VACUUM STATE

Manuel Ignacio Albuja Bustamante
Investigador Independiente

DOI: https://doi.org/10.37811/cl_rcm.v8i1.9738

Demostración del Espectro Hamiltoniano para un Campo de Yang-Mills no Abeliano que Poseen una Brecha de Masa Finita con Respecto al Estado de Vacío

Manuel Ignacio Albuja Bustamante[1]
ignaciomanuelalbujabustamante@gmail.com
https://orcid.org/0009-0005-0115-767X
Investigador Independiente
Ecuador

RESUMEN

El presente artículo científico, tiene como propósito, demostrar, a través de la conjugación estructurada de distintos componentes interaccionados, que conforman el sistema de campos de Yang-Mills, **(i)** la conjetura de que las excitaciones más bajas de una teoría pura de Yang-Mills (es decir, sin campos de materia) tienen una brecha de masa finita con respecto al estado de vacío; **(ii)** la propiedad de confinamiento en presencia de partículas adicionales; y, **(iii)** que, dado un *hamiltoniano cuántico* para un campo de Yang-Mills no abeliano, existe un valor positivo mínimo de la energía. La solución de los problemas antes descritos, requiere tanto la comprensión de uno de los profundos misterios de la física sin resolver, esto es, la existencia de una brecha de masa, como la producción de un ejemplo matemáticamente completo de la teoría cuántica de campos gauge en el espacio-tiempo de cuatro dimensiones, lo que se aborda rigurosamente en el presente artículo científico.

Palabras clave: física cuántica, escala subatómica, campos de yang-mills, teorías de gauge, brecha de masa

[1] Autor principal.
Correspondencia: ignaciomanuelalbujabustamante@gmail.com

Demonstration of the Hamiltonian Spectrum for a Non-Abelian Yang-Mills Field Possessing a Finite Mass Gap With Respect to the Vacuum State

ABSTRACT

The purpose of this scientific article is to demonstrate, through the structured conjugation of different interacted components that make up the Yang-Mills field system, **(i)** the conjecture that the lowest excitations of a pure Yang-Mills theory (i.e., without matter fields) have a finite mass gap with respect to the vacuum state; **(ii)** the property of confinement in the presence of additional particles; and, **(iii)** that, given a quantum Hamiltonian for a non-abelian Yang-Mills field, there is a minimum positive value of energy. The solution of the problems described above requires both the understanding of one of the profound unsolved mysteries of physics, that is, the existence of a mass gap, and the production of a mathematically complete example of the quantum theory of gauge fields in four-dimensional spacetime, which is rigorously addressed in the present work.

***Keywords*:** quantum physics, subatomic scale, yang-mills fields, gauge theories, mass gap

Artículo recibido 27 diciembre 2023
Aceptado para publicación: 30 enero 2024

INTRODUCCIÓN

Ciertamente, la descripción de la naturaleza a escala subatómica requiere de la física cuántica. En la física cuántica, la posición y la velocidad de una partícula se tienen como operadores no conmutadores que interactúan en un espacio de Hilbert. Es así, donde muchos aspectos de la naturaleza se describen en forma de campos. Dado que los campos interactúan con las partículas, deviene en indispensable, incorporar conceptos cuánticos tanto para describir campos como para describir partículas. En los campos convencionales, existe una partícula y por regla general, una antipartícula, con la misma masa y carga, pero opuesta, verbigracia, el campo cuantizado de los electrones.

Siguiendo este mismo orden de cosas, se tiene que, las teorías de gauge (teorías cuánticas de campos [QFT]), es una de las más importantes en cuanto a física de partículas se refiere. Un ejemplo claro de ello, es la teoría del electromagnetismo de Maxwell que comporta un grupo de simetría gauge en un grupo abeliano U(1). Sin embargo, la teoría de Yang – Mills, en este contexto, califica una teoría gauge no abeliana.

La ecuación clásica y variacional central del lagrangiano Yang-Mills, se escribe así:

$$L = \frac{1}{4g^2} \int \mathrm{Tr}\ F \wedge *F,$$

donde Tr denota una forma cuadrática invariante en el álgebra de Lie de G. Las ecuaciones de Yang-Mills no son lineales, por lo que, no existen soluciones exactas de la ecuación clásica antes referida, y es lo que se propone resolver este trabajo a través de un riguroso cálculo matemático, desde la óptica del hamiltoniano cuántico. En consecuencia, este trabajo, pretende demostrar, que la teoría gauge no abeliana de Yang – Mills, describe otras fuerzas en la naturaleza, especialmente la fuerza débil (responsable, entre otras cosas, de ciertas formas de radiactividad) y la fuerza fuerte o nuclear (responsable, entre otras cosas, de la unión de protones y neutrones en núcleos), pero sin perder las premisas esenciales de la teoría de campos de Yang – Mills, esto es, por fuera de la teoría electrodébil de Glashow-Salam-Weinberg o la teoría del "campo de Higgs".

Si bien es cierto, constituyese en una propiedad notable de la teoría cuántica de Yang-Mills, la nominada "libertad asintótica", la misma que supone, que a distancias cortas, el campo muestra un comportamiento cuántico muy similar a su comportamiento clásico; sin embargo, a largas distancias, la teoría de Yang – Mills, fracasa en la descripción del campo. Otros componentes paralelos, que se abordan y resuelven en el presente trabajo, refieren a que: **(i)** existe una "*brecha de masa*" Δ > constante, tal que cada excitación del vacío tiene energía de al menos Δ; **(ii)** existe un confinamiento de quarks, partiendo de la premisa de que, los estados físicos de las partículas, como el protón, el neutrón y el pión, son invariantes en SU(3); y, **(iii)** existe una "*ruptura de simetría quiral*", lo que significa que el vacío es potencialmente invariante solo bajo un cierto subgrupo de simetría completa que actúa sobre los campos de quarks.

METODOLOGÍA

El enfoque es cualitativo. El tipo de investigación es predictivo. El diseño utilizado es constructivista. No existe población de estudio toda vez que el presente artículo científico no es de carácter sociológico o social. Tampoco se han implementado técnicas de recolección de información tales como encuestas, etc, salvo revisión bibliográfica. Finalmente, el material de apoyo es meramente bibliográfico.

RESULTADOS Y DISCUSIÓN

Marco Praxeológico

a. Formulación matemática primaria (línea base):

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \mathcal{L}_{gf} = -1/2\ tr\ (F_{\nu\rho}^{\mu\sigma}) = 1/4 F^{a\mu\nu} F_{a\mu\nu} F_{\mu\nu}^{a} F_{a}^{\mu\nu} F^{c} F_{c}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \mathcal{L}_{fg} = -1/2\ tr\ (F_{\mu\sigma}^{\nu\rho}) = 1/4 F^{\nu\mu b} F_{\nu\mu b} F_{b}^{\mu\nu} F_{\mu\nu}^{b}\ F^{c} F_{c}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle tr(T^{a} T_{b} T^{a} T_{b}) = 1\delta_{b}^{a}\ , [T^{a} T_{b} T^{a} T_{b}] = i\ f^{abc} f_{abc}\ T^{c} T_{c}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle tr(T^{b} T_{a} T^{b} T_{a}) = 1\delta_{a}^{b}\ , [T^{b} T_{a} T^{b} T_{a}] = i\ f^{abc} f_{abc}\ T^{c} T_{c}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle tr(T^{a} T_{b} T^{b} T_{a}) = 1\delta_{ba}^{ab}\ , [T^{b} T_{a} T^{b} T_{a}] = i\ f^{abc} f_{abc}\ T^{c} T_{c}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \mathrm{D}_{\mu} = I\partial_{u} - ig\ T^{a}\ A_{\nu}^{\mu}\ , \mathrm{D}_{\nu} = I\partial_{\nu} - ig\ T^{b}\ A_{\mu}^{\nu}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle F_{\mu\nu}^{a} = \partial_{\mu} A_{\nu}^{a} - \partial_{\nu} A_{\mu}^{a} + g\ f^{abc} f_{abc}\ A_{\mu}^{b} A_{\mu}^{c}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle F_{v\mu}^{a} = \partial_{v} A_{\mu}^{a} - \partial_{\mu} A_{v}^{a} + g\, f_{abc}\, f^{abc}\, A_{v}^{b} A_{v}^{c}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle [\mathrm{D}_{\mu} D^{\mu} \mathrm{D}_{v} D^{v}] = \; ig\, T^{a}\, F_{\mu v}^{a}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle [\mathrm{D}_{\mu} D^{v} \mathrm{D}_{v} D^{\mu}] = \; ig\, T^{abc} T_{abc}\, F_{\mu v}^{abc} F_{v\mu}^{abc}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \partial^{\mu} F_{\mu v}^{a} F_{a}^{\mu v} + g\, f^{abc} f_{abc} + A^{\mu b} A_{\mu b} F_{\mu v}^{c} F_{c}^{\mu v} = \xi_{\lambda\Omega\psi}^{\sigma\varsigma\zeta} \sum ⨌ \text{ħфѬǮҖДҞѱӜѪ}\zeta\pi m c^{\mathbb{R}4}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \partial^{v} F_{v\mu}^{a} F_{a}^{v\mu} + g\, f^{abc} f_{abc} + A^{vb} A_{vb} F_{v\mu}^{c} F_{c}^{v\mu} = \xi_{\lambda\Omega\psi}^{\sigma\varsigma\zeta} \sum ⨌ \text{ħфѬǮҖДҞѱӜѪ}\zeta\pi m c^{\mathbb{R}4}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle (\mathrm{D}_{\mu} \mathrm{D}^{v} F^{\mu k} F_{vk} F^{vk} F_{\mu k})\, exp^{a} + (\mathrm{D}_{k} \mathrm{D}^{k} F^{\mu v} F_{v\mu} F^{v\mu} F_{\mu v})\, exp^{b}$$
$$+ \; + (\mathrm{D}_{v} \mathrm{D}^{\mu} F^{k\mu v} F_{kv\mu} F^{kv\mu} F_{k\mu v}) exp^{c}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle [\mathrm{D}_{\mu} [\mathrm{D}_{v} \mathrm{D}_{k}] + \rangle [\mathrm{D}_{k} [\mathrm{D}_{\mu} \mathrm{D}_{v}] + \rangle [\mathrm{D}_{v} [\mathrm{D}_{\mu} \mathrm{D}_{k}]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle [\mathrm{D}_{v} [\mathrm{D}_{\mu} \mathrm{D}_{k}] + \rangle [\mathrm{D}_{k} [\mathrm{D}_{v} \mathrm{D}_{\mu}] + \rangle [\mathrm{D}_{\mu} [\mathrm{D}_{v} \mathrm{D}_{k}]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle Z[ijk]$$
$$= \oint\!\!\!\iiint_{v}^{\mu} [dA] \exp\,[-\frac{ijk}{2} \oint\!\!\!\iiint_{\mu}^{v} d_{v\mu}^{\mu v} d_{\rho}^{\sigma}\, tr\, (F^{\mu v} F_{v\mu} F^{v\mu} F_{\mu v})$$
$$+ \; ijk \oint\!\!\!\iiint_{\rho}^{\sigma} d_{v\mu}^{\mu v} d_{\rho}^{\sigma}\, ijk_{\mu}^{a} ijk_{v}^{b} ijk_{\mu v}^{c} ijk_{v}^{\mu} ijk_{\mu}^{v} (xyz \ldots n) + ijk]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle Z[ijk, \varepsilon, \xi]$$
$$= \oint\!\!\!\iiint_{v}^{\mu} [d\, A][d\, \varsigma][d\, c] \exp\{ijk\, S^{F} S_{F}\, [\partial A, A] + ijk S^{gf} S_{gf} [\partial A]$$
$$+ ijk S^{g} S_{g} [\partial c, \partial\varsigma, c, \varsigma, A]\}\, exp\,\{ijk \oint\!\!\!\iiint_{\rho}^{\sigma} d_{v\mu}^{\mu v} d_{\rho}^{\sigma}\, ijk_{\mu}^{a} ijk_{v}^{b} ijk_{\mu v}^{c} ijk_{v}^{\mu} ijk_{\mu}^{v} A^{abc\mu} A_{abcv} (xyz \ldots n)$$
$$+ ijk \oint\!\!\!\iiint_{\mu}^{v} d_{v\mu}^{\mu v} d_{\rho}^{\sigma}\, (xyz \ldots n)\, [c^{-abc} c_{abc} (xyz \ldots n)\, \varepsilon^{-abc} \varepsilon_{abc} (xyz \ldots n) \xi^{-abc} \xi_{abc} (xyz \ldots n)]]\}$$

Propagador de gluón:

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle D_{\mu v}^{abc} D_{v\mu}^{abc} (p, q)$$
$$= ijk \delta^{abc} \delta_{abc} / p_{\rho}^{\sigma} \Omega_{\sigma}^{\rho} + ijk \Delta\theta\varphi\omega\eta\lambda\phi\psi [\eta^{\mu v} \eta_{v\mu} - (1 - \; \xi) p^{\mu} p_{v} p^{v} p_{\mu} / p_{\sigma}^{\rho} \Omega_{\rho}^{\sigma}$$
$$+ ijk \Delta\theta\varphi\omega\eta\lambda\phi\psi$$

Vértice de gluón -3:

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \boldsymbol{\Gamma}^{abc}_{\mu\nu\lambda}\boldsymbol{\Gamma}^{abc}_{\nu\mu\lambda}(p,q,r) = gf^{abc}gf_{abc}[(p-q)^{\mu\nu}{}_{\lambda}\eta\eta^{\lambda}_{\nu\mu} + (q-r)\,{}^{\mu\nu}{}_{\lambda}\eta\eta^{\lambda}_{\nu\mu} + (r-p)\,{}^{\mu\nu}{}_{\lambda}\eta\eta^{\lambda}_{\nu\mu}]$$

Vértice de gluón -4:

$$\begin{aligned}\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \boldsymbol{\Gamma}^{abc\rho}_{\mu\nu\lambda\sigma}\boldsymbol{\Gamma}^{abc\rho}_{\nu\mu\lambda\sigma} \\ &= ijkg^{\mu\nu\rho\sigma}ijkg_{\nu\mu\rho\sigma}\,f^{abcde}f_{abcde}(\eta^{\mu\lambda}\eta_{\nu\sigma} - \eta^{\nu\lambda}\eta_{\mu\sigma}) \\ &- ijkg^{\mu\nu\rho\sigma}ijkg_{\nu\mu\rho\sigma}\,f^{abcde}f_{abcde}(\eta^{\mu\sigma}\eta_{\nu\lambda} - \eta^{\nu\sigma}\eta_{\mu\lambda}) \\ &- ijkg^{\mu\nu\rho\sigma}ijkg_{\nu\mu\rho\sigma}\,f^{abcde}f_{abcde}(\eta^{\mu\nu\lambda\sigma}\eta_{\mu\nu\sigma\lambda} - \eta^{\nu\mu\lambda\sigma}\eta_{\mu\nu\lambda\sigma})\end{aligned}$$

Propagador Ghost:

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle C^{ab}C_{ba}\delta^{\mu\nu}\delta_{\nu\mu}(p,q) = ijk\delta^{ba}\delta_{ab}\delta^{\nu\mu}\delta_{\mu\nu}\rho\sigma\lambda\Omega/\omega\eta\xi\varepsilon\varphi\phi\boldsymbol{\psi}$$

Vértice $\boldsymbol{c\varsigma g}$:

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \boldsymbol{\Gamma}^{ab}\boldsymbol{\Gamma}_{ba}\boldsymbol{\Gamma}^{\mu\nu}\boldsymbol{\Gamma}_{\nu\mu}\delta^{\mu\nu}\delta_{\nu\mu}(p,q,r) = gf^{abc}gf_{abc}ijk\delta^{ba}\delta_{ab}\delta^{\nu\mu}\delta_{\mu\nu}\rho^{\mu\nu}\rho_{\nu\mu}\sigma\lambda\Omega/\omega\eta\xi\varepsilon\varphi\phi\boldsymbol{\psi}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle Z[ijk,\boldsymbol{\varepsilon},\boldsymbol{\xi}]$$

$$= \boldsymbol{exp(ijk\ g \oiiint_{v}^{\mu} d^{\sigma}_{\rho}\lambda\, xyz \ldots n\ \delta/ijk\xi^{abcd}\xi_{abcd}(xyz \ldots n)\ f\lambda^{abcd}_{\mu\nu\rho\sigma}f\mathcal{L}^{abcd}_{\mu\nu\rho\sigma}f\lambda^{\mu\nu\rho\sigma}_{abcd}f\mathcal{L}^{\mu\nu\rho\sigma}_{abcd}\partial\theta^{\mu\nu}\partial\theta_{\mu\nu}\ ijk\delta}$$

$$\boldsymbol{/\delta ijk^{abc}_{\mu\nu}(xyz \ldots n)ijk\delta}$$

$$\boldsymbol{/\delta\epsilon^{abc}_{\mu\nu}(xyz \ldots n)\ x\ exp\ (\frac{\dfrac{ijk\ g \oiiint_{v}^{\mu} d^{\sigma}_{\rho}\lambda\, xyz \ldots n \dfrac{\delta\varepsilon^{abc}\epsilon_{abc}(xyz \ldots n)}{ijk\xi^{abcd}\xi_{abcd}(xyz \ldots n)\partial\theta^{\mu\nu}\partial\theta_{\mu\nu}f\lambda^{abcd}_{\mu\nu\rho\sigma}f\mathcal{L}^{abcd}_{\mu\nu\rho\sigma}f\lambda^{\mu\nu\rho\sigma}_{abcd}f\mathcal{L}^{\mu\nu\rho\sigma}_{abcd}}\ ijk\delta}{\delta ijk^{abc}_{\mu\nu}(xyz \ldots n)ijk\delta}}{\delta ijk^{abc}_{\mu\nu}(xyz \ldots n)\delta ijk^{abc}_{\nu\mu}(xyz \ldots n)}}$$

$$* \boldsymbol{Z_0}[ijk,\boldsymbol{\varepsilon},\boldsymbol{\xi}]$$

$$= \boldsymbol{exp(-\oiiint_{v}^{\mu} d^{\mu\nu\rho\sigma}_{abcd}\ d^{abcd}_{\mu\nu\rho\sigma}\Delta\lambda\nabla\Omega\ (xyz \ldots n)C^{abcd}C_{\mu\nu\rho\sigma}C^{\mu\nu\rho\sigma}C_{abcd}\ \theta\lambda\Omega\ (x}$$

$$\boldsymbol{-\ y)\varepsilon^{abcd}_{\mu\nu\rho\sigma}\epsilon^{\mu\nu\rho\sigma}_{abcd}(xyz \ldots n)exp\ (\frac{1}{2\oiiint_{v}^{\mu} d^{\mu\nu\rho\sigma}_{abcd}\ d^{abcd}_{\mu\nu\rho\sigma}\Delta\lambda\nabla\Omega}(xyz \ldots n)\partial\Delta ijk^{abcd}_{\mu\nu\rho\sigma}\partial\nabla^{\mu\nu\rho\sigma}_{abcd}C^{abcd}C_{\mu\nu\rho\sigma}C^{\mu\nu\rho\sigma}C_{abcd}\ \theta\lambda\Omega\ (x}$$

$$\boldsymbol{-\ y)\varepsilon^{abcd}_{\mu\nu\rho\sigma}\epsilon^{\mu\nu\rho\sigma}_{abcd}(xyz \ldots n)}$$

b. Estructuras constantes antisimétricas.

$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\ [T^{a}, T^{b} = if^{abc}T^{c} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\ [T^{b}, T^{a} = if^{abc}T^{c} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\ [T^{c}, T^{a} = if^{abc}T^{b} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\ [T^{c}, T^{b} = if^{abc}T^{a} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\ [T^{a}, T^{c} = if^{abc}T^{b} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\ [T^{b}, T^{c} = if^{abc}T^{a} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\ [T^{a}, T^{b} = if^{bac}T^{c} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\ [T^{b}, T^{a} = if^{bac}T^{c} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\ [T^{c}, T^{a} = if^{bac}T^{b} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\ [T^{c}, T^{b} = if^{bac}T^{a} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\ [T^{a}, T^{c} = if^{bac}T^{b} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\ [T^{b}, T^{c} = if^{bac}T^{a} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\ [T^{a}, T^{b} = if^{cba}T^{c} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\ [T^{b}, T^{a} = if^{cba}T^{c} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\ [T^{c}, T^{a} = if^{cba}T^{b} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\ [T^{c}, T^{b} = if^{cba}T^{a} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\ [T^{a}, T^{c} = if^{cba}T^{b} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\ [T^{b}, T^{c} = if^{cba}T^{a} = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\sum\iiiint$ħȸѬǯҖДҞփӜѪ$\zeta\pi mc^{\mathbb{R}4}$

$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle trT^{a}T^{b} = \frac{1}{2}\delta^{ab} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle trT^{b}T^{a} = \frac{1}{2}\delta^{ba} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle trT^{a}T^{b} = \frac{1}{2}\delta^{ba} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle trT^{b}T^{a} = \frac{1}{2}\delta^{ab} = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\sum\iiiint$ħȸѬǯҖДҞփӜѪ$\zeta\pi mc^{\mathbb{R}4}$

c. Campo de Gauge.

$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle A_{\mu} = A^{a}_{\mu}T^{a} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle A_{\mu} = A^{b}_{\mu}T^{b} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle A_{\mu} = A^{c}_{\mu}T^{c} + \hat{H} \mid \psi\rangle$
$= E_{\psi} \mid \psi\rangle A_{\mu} = A^{abc}_{\mu}T^{abc} = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\sum\iiiint$ħȸѬǯҖДҞփӜѪ$\zeta\pi mc^{\mathbb{R}4}$

$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle F_{\mu\nu} = \partial_{\mu}A_{\nu} - \partial_{\nu}A_{\mu} - i[A_{\mu}, A_{\nu}] + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle F_{\nu\mu} = \partial_{\nu}A_{\mu} - \partial_{\mu}A_{\nu} - i[A_{\nu}, A_{\mu}] = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\sum\iiiint$ȸѬǯҖДҞփӜѪ$\zeta\pi mc^{\mathbb{R}4}$

d. Covariante Derivada.

$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\ D_{\mu}\,\psi = \partial_{\mu}\psi - iA_{\mu}\psi + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\ D_{\nu}\,\psi = \partial_{\nu}\psi - iA_{\nu}\psi + \hat{H} \mid \psi\rangle = E_{\psi}$
$\mid \psi\rangle\ D_{\mu\nu}\,\psi = \partial_{\mu\nu}\psi - iA_{\mu\nu}\psi + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\ D_{\nu\mu}\,\psi = \partial_{\nu\mu}\psi - iA_{\nu\mu}\psi$
$= \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\sum\iiiint$ȸѬǯҖДҞփӜѪ$\zeta\pi mc^{\mathbb{R}4}$

$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\ D_{\mu}\psi^{i} = \partial_{\nu}\psi^{i} - iA^{a}_{\mu}T^{a}(R)^{i}_{j}\psi^{j}i, j + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\ D_{\nu}\psi^{i}$
$= \partial_{\mu}\psi^{i} - iA^{a}_{\nu}T^{a}(R)^{i}_{j}\psi^{j}i, j + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\ D_{\mu\nu}\psi^{ij}$
$= \partial_{\nu\mu}\psi^{ij} - ijA^{abc}_{\mu\nu}T^{abc}(R)^{j}_{i}\psi^{j}j, i + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\ D_{\nu\mu}\psi^{ji}$
$= \partial_{\mu\nu}\psi^{ji} - jiA^{abc}_{\nu\mu}T^{abc}(R)^{i}_{j}\psi^{i}i, j + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\ D_{\mu\nu\nu\mu}\psi^{ijji}$
$= \partial_{\nu\mu\mu\nu}\psi^{jiij} - jiijA^{abcbcacabbac}_{\mu\nu}T^{abcbcacabbac}(R)^{ijji}_{jiij}\psi^{jiij}ijji, jiij$
$= \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\sum\iiiint$ħȸѬǯҖДҞփӜѪ$\zeta\pi mc^{\mathbb{R}4}$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle D_\mu\phi = \partial_\mu\phi - i[A_\mu, \phi] + \hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle D_v\phi = \partial_v\phi - i[A_v, \phi] + \hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle D_{\mu v}\phi = \partial_{\mu v}\phi - ij[A_{\mu v}, \phi] + \hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle D_{v\mu}\phi = \partial_{v\mu}\phi - ji[A_{v\mu}, \phi] + \hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle D_{\mu v v\mu}\phi = \partial_{\mu v v\mu}\phi - ijji[A_{\mu v v\mu}, \phi] = \xi_{\lambda\Omega\psi}^{\sigma\varsigma\zeta}\sum\iiiint \text{ħɸѬǮҖДҞѱӜѪ}\zeta\pi mc^{\mathbb{R}4}$$

e. Dinámicas de Yang – Mills.

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle S_{YM} = \frac{1}{2g^2}\int d^4x\, tr\, F^{\mu v} F_{\mu v} + \hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle S_{YM} = \frac{1}{2g^2}\int d^4x\, tr\, F^{v\mu} F_{v\mu} + \hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle S_{YM} = \frac{n^\infty}{ng^\infty}\iiint_{v\mu}^{\mu v} \mu v v\mu\, d^\infty x\, tr\, F^{\mu v v\mu} F_{\mu v v} = \xi_{\lambda\Omega\psi}^{\sigma\varsigma\zeta}\sum\iiiint \text{ħɸѬǮҖДҞѱӜѪ}\zeta\pi mc^{\mathbb{R}4}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle * F^{\mu v} = \frac{1}{2}\epsilon^{\mu v p\sigma}F_{p\sigma} + \hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle * F^{v\mu} = \frac{1}{2}\epsilon^{v\mu p\sigma}F_{p\sigma} + \hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle * F^{\mu v} = \frac{1}{2}\epsilon^{\mu v\sigma p}F_{\sigma p} + \hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle * F^{v\mu} = \frac{1}{2}\epsilon^{v\mu\sigma p}F_{\sigma p} = \xi_{\lambda\Omega\psi}^{\sigma\varsigma\zeta}\sum\iiiint \text{ħɸѬǮҖДҞѱӜѪ}\zeta\pi mc^{\mathbb{R}4}$$

f. Rescaling.

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle \tilde{A}_\mu = \frac{1}{g}A_\mu + \hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle \tilde{A}_v = \frac{1}{g}A_v + \hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle \tilde{A}_{\mu v} = \frac{1}{g}A_{\mu v} + \hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle \tilde{A}_{v\mu} = \frac{1}{g}A_{v\mu} + \mathbf{F}_{\mu v} = \partial_u\tilde{A}_v - \partial_v\tilde{A}_u - ig[\tilde{A}_u, \tilde{A}_v] + \mathbf{F}_{v\mu} = \partial_v\tilde{A}_\mu - \partial_\mu\tilde{A}_v - ig[\tilde{A}_v, \tilde{A}_u] = \xi_{\lambda\Omega\psi}^{\sigma\varsigma\zeta}\sum\iiiint \text{ħɸѬǮҖДҞѱӜѪ}\zeta\pi mc^{\mathbb{R}4}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle S_{YM} = \frac{1}{2g^2}\int d^4x\, tr\, F^{\mu v} F_{\mu v} = -\frac{1}{2}\int d^4x\, tr\, F^{\mu v} F_{\mu v}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle S_{YM} = \frac{1}{2g^2}\int d^4x\, tr\, F^{v\mu} F_{v\mu} = -\frac{1}{2}\int d^4x\, tr\, F^{v\mu} F_{v\mu}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle S_{YM} = \frac{n}{ng^\infty}\int d^\infty x\, tr\, F^{v\mu} F_{v\mu} = -\frac{n}{n-1}\int d^\infty x\, tr\, F^{v\mu} F_{v\mu}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle S_{YM} = \frac{n}{ng^\infty}\int d^\infty x\, tr\, F^{\mu v} F_{\mu v} = -\frac{n}{n-1}\int d^\infty x\, tr\, F^{\mu v} F_{\mu v}$$

g. Simetría de Gauge.

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle\ A_\mu \rightarrow \Omega(x)A_\mu\Omega^{-1}(x)\ i\Omega(x)\partial_\mu\Omega^{-1}(x)$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle\ A_v \rightarrow \Omega(x)A_v\Omega^{-1}(x)\ i\Omega(x)\partial_v\Omega^{-1}(x)$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle\ A_{\mu v} \rightarrow \Omega(x)A_{\mu v}\Omega^{-1}(x)\ i\Omega(x)\partial_{\mu v}\Omega^{-1}(x)$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle\ A_{v\mu} \rightarrow \Omega(x)A_{v\mu}\Omega^{-1}(x)\ i\Omega(x)\partial_{v\mu}\Omega^{-1}(x)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{\mu} \rightarrow \Omega(y)A_{\mu}\Omega^{-1}(y)\ i\Omega(y)\partial_{\mu}\Omega^{-1}(y)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{v} \rightarrow \Omega(y)A_{v}\Omega^{-1}(y)\ i\Omega(y)\partial_{v}\Omega^{-1}(y)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{\mu v} \rightarrow \Omega(y)A_{\mu v}\Omega^{-1}(y)\ i\Omega(y)\partial_{\mu v}\Omega^{-1}(y)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{v\mu} \rightarrow \Omega(y)A_{v\mu}\Omega^{-1}(y)\ i\Omega(y)\partial_{v\mu}\Omega^{-1}(y)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{\mu} \rightarrow \Omega(z)A_{\mu}\Omega^{-1}(z)\ i\Omega(z)\partial_{\mu}\Omega^{-1}(z)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{v} \rightarrow \Omega(z)A_{v}\Omega^{-1}(z)\ i\Omega(z)\partial_{v}\Omega^{-1}(z)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{\mu v} \rightarrow \Omega(z)A_{\mu v}\Omega^{-1}(z)\ i\Omega(z)\partial_{\mu v}\Omega^{-1}(z)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{v\mu} \rightarrow \Omega(z)A_{v\mu}\Omega^{-1}(z)\ i\Omega(z)\partial_{v\mu}\Omega^{-1}(z)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{\mu} \rightarrow \Omega(\infty)A_{\mu}\Omega^{-1}(\infty)\ i\Omega(\infty)\partial_{\mu}\Omega^{-1}(\infty)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{v} \rightarrow \Omega(\infty)A_{v}\Omega^{-1}(\infty)\ i\Omega(\infty)\partial_{v}\Omega^{-1}(\infty)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{\mu v} \rightarrow \Omega(\infty)A_{\mu v}\Omega^{-1}(\infty)\ i\Omega(\infty)\partial_{\mu v}\Omega^{-1}(\infty)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{v\mu} \rightarrow \Omega(\infty)A_{v\mu}\Omega^{-1}(\infty)\ i\Omega(\infty)\partial_{v\mu}\Omega^{-1}(\infty)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{\mu} \rightarrow \Omega(x)A_{\mu}\Omega^{-1}(x)\ j\Omega(x)\partial_{\mu}\Omega^{-1}(x)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{v} \rightarrow \Omega(x)A_{v}\Omega^{-1}(x)\ j\Omega(x)\partial_{v}\Omega^{-1}(x)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{\mu v} \rightarrow \Omega(x)A_{\mu v}\Omega^{-1}(x)\ j\Omega(x)\partial_{\mu v}\Omega^{-1}(x)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{v\mu} \rightarrow \Omega(x)A_{v\mu}\Omega^{-1}(x)\ j\Omega(x)\partial_{v\mu}\Omega^{-1}(x)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{\mu} \rightarrow \Omega(y)A_{\mu}\Omega^{-1}(y)\ j\Omega(y)\partial_{\mu}\Omega^{-1}(y)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{v} \rightarrow \Omega(y)A_{v}\Omega^{-1}(y)\ j\Omega(y)\partial_{v}\Omega^{-1}(y)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{\mu v} \rightarrow \Omega(y)A_{\mu v}\Omega^{-1}(y)\ j\Omega(y)\partial_{\mu v}\Omega^{-1}(y)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{v\mu} \rightarrow \Omega(y)A_{v\mu}\Omega^{-1}(y)\ j\Omega(y)\partial_{v\mu}\Omega^{-1}(y)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{\mu} \rightarrow \Omega(z)A_{\mu}\Omega^{-1}(z)\ j\Omega(z)\partial_{\mu}\Omega^{-1}(z)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{v} \rightarrow \Omega(z)A_{v}\Omega^{-1}(z)\ j\Omega(z)\partial_{v}\Omega^{-1}(z)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{\mu\nu} \rightarrow \Omega(z)A_{\mu\nu}\Omega^{-1}(z)\; j\Omega(z)\partial_{\mu\nu}\Omega^{-1}(z)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{\nu\mu} \rightarrow \Omega(z)A_{\nu\mu}\Omega^{-1}(z)\; j\Omega(z)\partial_{\nu\mu}\Omega^{-1}(z)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{\mu} \rightarrow \Omega(\infty)A_{\mu}\Omega^{-1}(\infty)\; j\Omega(\infty)\partial_{\mu}\Omega^{-1}(\infty)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{\nu} \rightarrow \Omega(\infty)A_{\nu}\Omega^{-1}(\infty)\; j\Omega(\infty)\partial_{\nu}\Omega^{-1}(\infty)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{\mu\nu} \rightarrow \Omega(\infty)A_{\mu\nu}\Omega^{-1}(\infty)\; j\Omega(\infty)\partial_{\mu\nu}\Omega^{-1}(\infty)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{\nu\mu} \rightarrow \Omega(\infty)A_{\nu\mu}\Omega^{-1}(\infty)\; j\Omega(\infty)\partial_{\nu\mu}\Omega^{-1}(\infty)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle F_{\mu\nu} \rightarrow \Omega(x)\, F_{\mu\nu}\, \Omega^{-1}(x)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle F_{\nu\mu} \rightarrow \Omega(x)\, F_{\nu\mu}\, \Omega^{-1}(x)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle F_{\mu\nu} \rightarrow \Omega(y)\, F_{\mu\nu}\, \Omega^{-1}(y)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle F_{\nu\mu} \rightarrow \Omega(y)\, F_{\nu\mu}\, \Omega^{-1}(y)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle F_{\mu\nu} \rightarrow \Omega(z)\, F_{\mu\nu}\, \Omega^{-1}(z)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle F_{\nu\mu} \rightarrow \Omega(z)\, F_{\nu\mu}\, \Omega^{-1}(z)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle F_{\mu\nu} \rightarrow \Omega(\infty)\, F_{\mu\nu}\, \Omega^{-1}(\infty)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle F_{\nu\mu} \rightarrow \Omega(\infty)\, F_{\nu\mu}\, \Omega^{-1}(\infty)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{\mu} \rightarrow \mho(x)A_{\mu}\mho^{-1}(x)\; i\mho(x)\partial_{\mu}\mho^{-1}(x)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{\nu} \rightarrow \mho(x)A_{\nu}\mho^{-1}(x)\; i\mho(x)\partial_{\nu}\mho^{-1}(x)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{\mu\nu} \rightarrow \mho(x)A_{\mu\nu}\mho^{-1}(x)\; i\mho(x)\partial_{\mu\nu}\mho^{-1}(x)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{\nu\mu} \rightarrow \mho(x)A_{\nu\mu}\mho^{-1}(x)\; i\mho(x)\partial_{\nu\mu}\mho^{-1}(x)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{\mu} \rightarrow \mho(y)A_{\mu}\mho^{-1}(y)\; i\mho(y)\partial_{\mu}\mho^{-1}(y)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{\nu} \rightarrow \mho(y)A_{\nu}\Omega^{-1}(y)\; i\mho(y)\partial_{\nu}\mho^{-1}(y)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{\mu\nu} \rightarrow \mho(y)A_{\mu\nu}\mho^{-1}(y)\; i\mho(y)\partial_{\mu\nu}\mho^{-1}(y)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{\nu\mu} \rightarrow \mho(y)A_{\nu\mu}\mho^{-1}(y)\; i\mho(y)\partial_{\nu\mu}\mho^{-1}(y)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \; A_{\mu} \rightarrow \mho(z)A_{\mu}\mho^{-1}(z) \; i\mho(z)\partial_{\mu}\mho^{-1}(z)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \; A_{v} \rightarrow \mho(z)A_{v}\mho^{-1}(z) \; i\mho(z)\partial_{v}\mho^{-1}(z)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \; A_{\mu v} \rightarrow \mho(z)A_{\mu v}\mho^{-1}(z) \; i\mho(z)\partial_{\mu v}\mho^{-1}(z)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \; A_{v\mu} \rightarrow \mho(z)A_{v\mu}\mho^{-1}(z) \; i\mho(z)\partial_{v\mu}\mho^{-1}(z)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \; A_{\mu} \rightarrow \mho(\infty)A_{\mu}\mho^{-1}(\infty) \; i\mho(\infty)\partial_{\mu}\mho^{-1}(\infty)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \; A_{v} \rightarrow \Omega(\infty)A_{v}\mho^{-1}(\infty) \; i\mho(\infty)\partial_{v}\mho^{-1}(\infty)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \; A_{\mu v} \rightarrow \Omega(\infty)A_{\mu v}\mho^{-1}(\infty) \; i\mho(\infty)\partial_{\mu v}\mho^{-1}(\infty)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \; A_{v\mu} \rightarrow \Omega(\infty)A_{v\mu}\mho^{-1}(\infty) \; i\mho(\infty)\partial_{v\mu}\mho^{-1}(\infty)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \; A_{\mu} \rightarrow \mho(x)A_{\mu}\mho^{-1}(x) \; j\mho(x)\partial_{\mu}\mho^{-1}(x)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \; A_{v} \rightarrow \mho(x)A_{v}\mho^{-1}(x) \; j\mho(x)\partial_{v}\mho^{-1}(x)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \; A_{\mu v} \rightarrow \mho(x)A_{\mu v}\mho^{-1}(x) \; j\mho(x)\partial_{\mu v}\mho^{-1}(x)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \; A_{v\mu} \rightarrow \mho(x)A_{v\mu}\mho^{-1}(x) \; j\mho(x)\partial_{v\mu}\mho^{-1}(x)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \; A_{\mu} \rightarrow \mho(y)A_{\mu}\mho^{-1}(y) \; j\mho(y)\partial_{\mu}\mho^{-1}(y)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \; A_{v} \rightarrow \mho(y)A_{v}\mho^{-1}(y) \; j\mho(y)\partial_{v}\mho^{-1}(y)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \; A_{\mu v} \rightarrow \mho(y)A_{\mu v}\mho^{-1}(y) \; j\mho(y)\partial_{\mu v}\mho^{-1}(y)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \; A_{v\mu} \rightarrow \mho(y)A_{v\mu}\mho^{-1}(y) \; j\mho(y)\partial_{v\mu}\mho^{-1}(y)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \; A_{\mu} \rightarrow \mho(z)A_{\mu}\mho^{-1}(z) \; j\mho(z)\partial_{\mu}\mho^{-1}(z)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \; A_{v} \rightarrow \mho(z)A_{v}\mho^{-1}(z) \; j\mho(z)\partial_{v}\mho^{-1}(z)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \; A_{\mu v} \rightarrow \mho(z)A_{\mu v}\mho^{-1}(z) \; j\mho(z)\partial_{\mu v}\mho^{-1}(z)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \; A_{v\mu} \rightarrow \mho(z)A_{v\mu}\mho^{-1}(z) \; j\mho(z)\partial_{v\mu}\mho^{-1}(z)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \; A_{\mu} \rightarrow \mho(\infty)A_{\mu}\mho^{-1}(\infty) \; j\mho(\infty)\partial_{\mu}\mho^{-1}(\infty)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \; A_{v} \rightarrow \mho(\infty)A_{v}\mho^{-1}(\infty) \; j\mho(\infty)\partial_{v}\mho^{-1}(\infty)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{\mu v} \rightarrow \mho(\infty) A_{\mu v} \mho^{-1}(\infty)\; j\mho(\infty)\partial_{\mu v}\mho^{-1}(\infty)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\, A_{v\mu} \rightarrow \mho(\infty) A_{v\mu} \mho^{-1}(\infty)\; j\mho(\infty)\partial_{v\mu}\mho^{-1}(\infty)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle F_{\mu v} \rightarrow \mho(x)\, F_{\mu v}\, \mho^{-1}(x)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle F_{v\mu} \rightarrow \mho(x)\, F_{v\mu}\, \mho^{-1}(x)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle F_{\mu v} \rightarrow \mho(y)\, F_{\mu v}\, \mho^{-1}(y)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle F_{v\mu} \rightarrow \mho(y)\, F_{v\mu}\, \mho^{-1}(y)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle F_{\mu v} \rightarrow \mho(z)\, F_{\mu v}\, \mho^{-1}(z)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle F_{v\mu} \rightarrow \mho(z)\, F_{v\mu}\, \mho^{-1}(z)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle F_{\mu v} \rightarrow \mho(\infty)\, F_{\mu v}\, \mho^{-1}(\infty)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle F_{v\mu} \rightarrow \mho(\infty)\, F_{v\mu}\, \mho^{-1}(\infty)$$

h. Ecuaciones de Transportación Paralela.

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{dx^{\mu}}{d\tau} A_{\mu}(x)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{dx^{\mu}}{d\tau} A_{\mu}(x)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{dy^{\mu}}{d\tau} A_{\mu}(y)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{dy^{\mu}}{d\tau} A_{\mu}(y)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{dz^{\mu}}{d\tau} A_{\mu}(z)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{dz^{\mu}}{d\tau} A_{\mu}(z)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{d\infty^{\mu}}{d\tau} A_{\mu}(\infty)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{d\infty^{\mu}}{d\tau} A_{\mu}(\infty)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{dx^{v}}{d\tau} A_{v}(x)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{dx^{v}}{d\tau} A_{v}(x)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{dy^{v}}{d\tau} A_{v}(y)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{dy^{v}}{d\tau} A_{v}(y)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{dz^{v}}{d\tau} A_{v}(z)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{dz^{v}}{d\tau} A_{v}(z)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{d\infty^{v}}{d\tau} A_{v}(\infty)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{d\infty^{v}}{d\tau} A_{v}(\infty)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{dx^{\mu v}}{d\tau}A_{\mu v}(x)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{dx^{\mu v}}{d\tau}A_{\mu v}(x)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{dy^{\mu v}}{d\tau}A_{\mu v}(y)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{dy^{\mu v}}{d\tau}A_{\mu v}(y)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{dz^{\mu v}}{d\tau}A_{\mu v}(z)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{dz^{\mu v}}{d\tau}A_{\mu v}(z)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{d\infty^{\mu v}}{d\tau}A_{\mu v}(\infty)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{d\infty^{\mu v}}{d\tau}A_{\mu v}(\infty)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{dx^{v\mu}}{d\tau}A_{v\mu}(x)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{dx^{v\mu}}{d\tau}A_{v\mu}(x)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{dy^{v\mu}}{d\tau}A_{v\mu}(y)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{dy^{v\mu}}{d\tau}A_{v\mu}(y)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{dz^{v\mu}}{d\tau}A_{v\mu}(z)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{dz^{v\mu}}{d\tau}A_{v\mu}(z)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{d\infty^{v\mu}}{d\tau}A_{v\mu}(\infty)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{d\infty^{v\mu}}{d\tau}A_{v\mu}(\infty)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{dx^{\mu}}{d\tau}A_{\mu}(x)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{dx^{\mu}}{d\tau}A_{\mu}(x)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{dy^{\mu}}{d\tau}A_{\mu}(y)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{dy^{\mu}}{d\tau}A_{\mu}(y)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{dz^{\mu}}{d\tau}A_{\mu}(z)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{dz^{\mu}}{d\tau}A_{\mu}(z)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{d\infty^{\mu}}{d\tau}A_{\mu}(\infty)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{d\infty^{\mu}}{d\tau}A_{\mu}(\infty)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{dx^{v}}{d\tau}A_{v}(x)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{dx^{v}}{d\tau}A_{v}(x)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{dy^{v}}{d\tau}A_{v}(y)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{dy^{v}}{d\tau}A_{v}(y)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{dz^{v}}{d\tau}A_{v}(z)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{dz^{v}}{d\tau}A_{v}(z)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{d\infty^{v}}{d\tau}A_{v}(\infty)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{d\infty^{v}}{d\tau}A_{v}(\infty)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{dx^{\mu v}}{d\tau}A_{\mu v}(x)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{dx^{\mu v}}{d\tau}A_{\mu v}(x)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{dy^{\mu v}}{d\tau}A_{\mu v}(y)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{dy^{\mu v}}{d\tau}A_{\mu v}(y)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{dz^{\mu v}}{d\tau}A_{\mu v}(z)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{dz^{\mu v}}{d\tau}A_{\mu v}(z)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{d\infty^{\mu v}}{d\tau}A_{\mu v}(\infty)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{d\infty^{\mu v}}{d\tau}A_{\mu v}(\infty)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{dx^{v\mu}}{d\tau}A_{v\mu}(x)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{dx^{v\mu}}{d\tau}A_{v\mu}(x)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{dy^{v\mu}}{d\tau}A_{v\mu}(y)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{dy^{v\mu}}{d\tau}A_{v\mu}(y)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{dz^{v\mu}}{d\tau}A_{v\mu}(z)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{dz^{v\mu}}{d\tau}A_{v\mu}(z)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j\frac{d\omega}{d\tau} = \frac{d\infty^{v\mu}}{d\tau}A_{v\mu}(\infty)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i\frac{d\omega}{d\tau} = \frac{d\infty^{v\mu}}{d\tau}A_{v\mu}(\infty)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{dx^{\mu}}{d\tau}A_{\mu}(x)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{dx^{\mu}}{d\tau}A_{\mu}(x)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{dy^{\mu}}{d\tau}A_{\mu}(y)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{dy^{\mu}}{d\tau}A_{\mu}(y)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{dz^{\mu}}{d\tau}A_{\mu}(z)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{dz^{\mu}}{d\tau}A_{\mu}(z)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{d\infty^{\mu}}{d\tau}A_{\mu}(\infty)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{d\infty^{\mu}}{d\tau}A_{\mu}(\infty)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{dx^{v}}{d\tau}A_{v}(x)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{dx^{v}}{d\tau}A_{v}(x)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{dy^{v}}{d\tau}A_{v}(y)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{dy^{v}}{d\tau}A_{v}(y)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{dz^{v}}{d\tau}A_{v}(z)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{dz^{v}}{d\tau}A_{v}(z)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{d\infty^{v}}{d\tau}A_{v}(\infty)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{d\infty^{v}}{d\tau}A_{v}(\infty)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i, j \frac{d\omega}{d\tau} = \frac{dx^{\mu v}}{d\tau} A_{\mu v}(x)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i, j \frac{d\omega}{d\tau} = \frac{dx^{\mu v}}{d\tau} A_{\mu v}(x)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i, j \frac{d\omega}{d\tau} = \frac{dy^{\mu v}}{d\tau} A_{\mu v}(y)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i, j \frac{d\omega}{d\tau} = \frac{dy^{\mu v}}{d\tau} A_{\mu v}(y)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i, j \frac{d\omega}{d\tau} = \frac{dz^{\mu v}}{d\tau} A_{\mu v}(z)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i, j \frac{d\omega}{d\tau} = \frac{dz^{\mu v}}{d\tau} A_{\mu v}(z)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i, j \frac{d\omega}{d\tau} = \frac{d\infty^{\mu v}}{d\tau} A_{\mu v}(\infty)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i, j \frac{d\omega}{d\tau} = \frac{d\infty^{\mu v}}{d\tau} A_{\mu v}(\infty)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i, j \frac{d\omega}{d\tau} = \frac{dx^{v\mu}}{d\tau} A_{v\mu}(x)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i, j \frac{d\omega}{d\tau} = \frac{dx^{v\mu}}{d\tau} A_{v\mu}(x)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i, j \frac{d\omega}{d\tau} = \frac{dy^{v\mu}}{d\tau} A_{v\mu}(y)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i, j \frac{d\omega}{d\tau} = \frac{dy^{v\mu}}{d\tau} A_{v\mu}(y)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i, j \frac{d\omega}{d\tau} = \frac{dz^{v\mu}}{d\tau} A_{v\mu}(z)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i, j \frac{d\omega}{d\tau} = \frac{dz^{v\mu}}{d\tau} A_{v\mu}(z)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i, j \frac{d\omega}{d\tau} = \frac{d\infty^{v\mu}}{d\tau} A_{v\mu}(\infty)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i, j \frac{d\omega}{d\tau} = \frac{d\infty^{v\mu}}{d\tau} A_{v\mu}(\infty)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i \frac{d\omega}{d\tau} = \frac{dx^{\mu}}{d\tau} A_{\mu}(x)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i \frac{d\omega}{d\tau} = \frac{dx^{\mu}}{d\tau} A_{\mu}(x)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i \frac{d\omega}{d\tau} = \frac{dy^{\mu}}{d\tau} A_{\mu}(y)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i \frac{d\omega}{d\tau} = \frac{dy^{\mu}}{d\tau} A_{\mu}(y)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i \frac{d\omega}{d\tau} = \frac{dz^{\mu}}{d\tau} A_{\mu}(z)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i \frac{d\omega}{d\tau} = \frac{dz^{\mu}}{d\tau} A_{\mu}(z)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i \frac{d\omega}{d\tau} = \frac{d\infty^{\mu}}{d\tau} A_{\mu}(\infty)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i \frac{d\omega}{d\tau} = \frac{d\infty^{\mu}}{d\tau} A_{\mu}(\infty)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i \frac{d\omega}{d\tau} = \frac{dx^{v}}{d\tau} A_{v}(x)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i \frac{d\omega}{d\tau} = \frac{dx^{v}}{d\tau} A_{v}(x)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i \frac{d\omega}{d\tau} = \frac{dy^{v}}{d\tau} A_{v}(y)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i \frac{d\omega}{d\tau} = \frac{dy^{v}}{d\tau} A_{v}(y)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i \frac{d\omega}{d\tau} = \frac{dz^{v}}{d\tau} A_{v}(z)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i \frac{d\omega}{d\tau} = \frac{dz^{v}}{d\tau} A_{v}(z)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i \frac{d\omega}{d\tau} = \frac{d\infty^{v}}{d\tau} A_{v}(\infty)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i \frac{d\omega}{d\tau} = \frac{d\infty^{v}}{d\tau} A_{v}(\infty)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{dx^{\mu v}}{d\tau}A_{\mu v}(x)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{dx^{\mu v}}{d\tau}A_{\mu v}(x)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{dy^{\mu v}}{d\tau}A_{\mu v}(y)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{dy^{\mu v}}{d\tau}A_{\mu v}(y)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{dz^{\mu v}}{d\tau}A_{\mu v}(z)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{dz^{\mu v}}{d\tau}A_{\mu v}(z)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{d\infty^{\mu v}}{d\tau}A_{\mu v}(\infty)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{d\infty^{\mu v}}{d\tau}A_{\mu v}(\infty)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{dx^{v\mu}}{d\tau}A_{v\mu}(x)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{dx^{v\mu}}{d\tau}A_{v\mu}(x)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{dy^{v\mu}}{d\tau}A_{v\mu}(y)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{dy^{v\mu}}{d\tau}A_{v\mu}(y)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{dz^{v\mu}}{d\tau}A_{v\mu}(z)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{dz^{v\mu}}{d\tau}A_{v\mu}(z)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{d\infty^{v\mu}}{d\tau}A_{v\mu}(\infty)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{d\infty^{v\mu}}{d\tau}A_{v\mu}(\infty)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i, j\frac{d\omega}{d\tau} = \frac{dx^{\mu}}{d\tau}A_{\mu}(x)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{dx^{\mu}}{d\tau}A_{\mu}(x)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i, j\frac{d\omega}{d\tau} = \frac{dy^{\mu}}{d\tau}A_{\mu}(y)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{dy^{\mu}}{d\tau}A_{\mu}(y)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i, j\frac{d\omega}{d\tau} = \frac{dz^{\mu}}{d\tau}A_{\mu}(z)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{dz^{\mu}}{d\tau}A_{\mu}(z)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i, j\frac{d\omega}{d\tau} = \frac{d\infty^{\mu}}{d\tau}A_{\mu}(\infty)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{d\infty^{\mu}}{d\tau}A_{\mu}(\infty)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i, j\frac{d\omega}{d\tau} = \frac{dx^{v}}{d\tau}A_{v}(x)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{dx^{v}}{d\tau}A_{v}(x)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i, j\frac{d\omega}{d\tau} = \frac{dy^{v}}{d\tau}A_{v}(y)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{dy^{v}}{d\tau}A_{v}(y)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i, j\frac{d\omega}{d\tau} = \frac{dz^{v}}{d\tau}A_{v}(z)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{dz^{v}}{d\tau}A_{v}(z)\omega$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle i, j\frac{d\omega}{d\tau} = \frac{d\infty^{v}}{d\tau}A_{v}(\infty)\omega + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{d\infty^{v}}{d\tau}A_{v}(\infty)\omega$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{dx^{\mu v}}{d\tau}A_{\mu v}(x)\omega + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle j,i\frac{d\omega}{d\tau} = \frac{dx^{\mu v}}{d\tau}A_{\mu v}(x)\omega$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{dy^{\mu v}}{d\tau}A_{\mu v}(y)\omega + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle j,i\frac{d\omega}{d\tau} = \frac{dy^{\mu v}}{d\tau}A_{\mu v}(y)\omega$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{dz^{\mu v}}{d\tau}A_{\mu v}(z)\omega + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle j,i\frac{d\omega}{d\tau} = \frac{dz^{\mu v}}{d\tau}A_{\mu v}(z)\omega$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{d\infty^{\mu v}}{d\tau}A_{\mu v}(\infty)\omega + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle j,i\frac{d\omega}{d\tau} = \frac{d\infty^{\mu v}}{d\tau}A_{\mu v}(\infty)\omega$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{dx^{v\mu}}{d\tau}A_{v\mu}(x)\omega + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle j,i\frac{d\omega}{d\tau} = \frac{dx^{v\mu}}{d\tau}A_{v\mu}(x)\omega$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{dy^{v\mu}}{d\tau}A_{v\mu}(y)\omega + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle j,i\frac{d\omega}{d\tau} = \frac{dy^{v\mu}}{d\tau}A_{v\mu}(y)\omega$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{dz^{v\mu}}{d\tau}A_{v\mu}(z)\omega + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle j,i\frac{d\omega}{d\tau} = \frac{dz^{v\mu}}{d\tau}A_{v\mu}(z)\omega$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{d\infty^{v\mu}}{d\tau}A_{v\mu}(\infty)\omega + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle j,i\frac{d\omega}{d\tau} = \frac{d\infty^{v\mu}}{d\tau}A_{v\mu}(\infty)\omega$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle j,i\frac{d\omega}{d\tau} = \frac{dx^{\mu}}{d\tau}A_{\mu}(x)\omega + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{dx^{\mu}}{d\tau}A_{\mu}(x)\omega$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle j,i\frac{d\omega}{d\tau} = \frac{dy^{\mu}}{d\tau}A_{\mu}(y)\omega + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{dy^{\mu}}{d\tau}A_{\mu}(y)\omega$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle j,i\frac{d\omega}{d\tau} = \frac{dz^{\mu}}{d\tau}A_{\mu}(z)\omega + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{dz^{\mu}}{d\tau}A_{\mu}(z)\omega$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle j,i\frac{d\omega}{d\tau} = \frac{d\infty^{\mu}}{d\tau}A_{\mu}(\infty)\omega + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{d\infty^{\mu}}{d\tau}A_{\mu}(\infty)\omega$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle j,i\frac{d\omega}{d\tau} = \frac{dx^{v}}{d\tau}A_{v}(x)\omega + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{dx^{v}}{d\tau}A_{v}(x)\omega$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle j,i\frac{d\omega}{d\tau} = \frac{dy^{v}}{d\tau}A_{v}(y)\omega + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{dy^{v}}{d\tau}A_{v}(y)\omega$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle j,i\frac{d\omega}{d\tau} = \frac{dz^{v}}{d\tau}A_{v}(z)\omega + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{dz^{v}}{d\tau}A_{v}(z)\omega$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle j,i\frac{d\omega}{d\tau} = \frac{d\infty^{v}}{d\tau}A_{v}(\infty)\omega + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle i,j\frac{d\omega}{d\tau} = \frac{d\infty^{v}}{d\tau}A_{v}(\infty)\omega$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{dx^{\mu\nu}}{d\tau}A_{\mu\nu}(x)\omega + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle i, j\frac{d\omega}{d\tau} = \frac{dx^{\mu\nu}}{d\tau}A_{\mu\nu}(x)\omega$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{dy^{\mu\nu}}{d\tau}A_{\mu\nu}(y)\omega + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle i, j\frac{d\omega}{d\tau} = \frac{dy^{\mu\nu}}{d\tau}A_{\mu\nu}(y)\omega$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{dz^{\mu\nu}}{d\tau}A_{\mu\nu}(z)\omega + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle i, j\frac{d\omega}{d\tau} = \frac{dz^{\mu\nu}}{d\tau}A_{\mu\nu}(z)\omega$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{d\infty^{\mu\nu}}{d\tau}A_{\mu\nu}(\infty)\omega + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle i, j\frac{d\omega}{d\tau} = \frac{d\infty^{\mu\nu}}{d\tau}A_{\mu\nu}(\infty)\omega$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{dx^{\nu\mu}}{d\tau}A_{\nu\mu}(x)\omega + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle i, j\frac{d\omega}{d\tau} = \frac{dx^{\nu\mu}}{d\tau}A_{\nu\mu}(x)\omega$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{dy^{\nu\mu}}{d\tau}A_{\nu\mu}(y)\omega + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle i, j\frac{d\omega}{d\tau} = \frac{dy^{\nu\mu}}{d\tau}A_{\nu\mu}(y)\omega$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{dz^{\nu\mu}}{d\tau}A_{\nu\mu}(z)\omega + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle i, j\frac{d\omega}{d\tau} = \frac{dz^{\nu\mu}}{d\tau}A_{\nu\mu}(z)\omega$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle j, i\frac{d\omega}{d\tau} = \frac{d\infty^{\nu\mu}}{d\tau}A_{\nu\mu}(\infty)\omega + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle i, j\frac{d\omega}{d\tau} = \frac{d\infty^{\nu\mu}}{d\tau}A_{\nu\mu}(\infty)\omega$$

h. Movimiento de partículas.

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle U[xyz_i, xyz_f; C] = Pexp(i\int_{\tau i}^{\tau f} d\tau \frac{dxyz^\mu}{d\tau}A_\mu(xyz(\tau))) = Pexp(i\int_{xyzi}^{xyzf} A)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle U[xyz_f, xyz_i; C] = Pexp(i\int_{\tau f}^{\tau i} d\tau \frac{dxyz^\mu}{d\tau}A_\mu(xyz(\tau))) = Pexp(i\int_{xyzf}^{xyzi} A)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle U[xyz_i, xyz_f; C] = Pexp(j\int_{\tau i}^{\tau f} d\tau \frac{dx^\mu}{d\tau}A_\mu(xyz(\tau))) = Pexp(j\int_{xyzi}^{xyzf} A)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle U[xyz_f, xyz_i; C] = Pexp(j\int_{\tau f}^{\tau i} d\tau \frac{dxyz^\mu}{d\tau}A_\mu(xyz(\tau))) = Pexp(j\int_{xyzf}^{xyzi} A)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle U[xyz_i, xyz_f; C] = Pexp(i\int_{\tau i}^{\tau f} d\tau \frac{dxyz^\nu}{d\tau}A_\nu(xyz(\tau))) = Pexp(i\int_{xyzi}^{xyzf} A)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle U[xyz_f, xyz_i; C] = Pexp(i\int_{\tau f}^{\tau i} d\tau \frac{dxyz^\nu}{d\tau}A_\nu(xyz(\tau))) = Pexp(i\int_{xyzf}^{xyzi} A)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle U[xyz_i, xyz_f; C] = Pexp(j \int_{\tau i}^{\tau f} d\tau \frac{dxyz^{v}}{d\tau} A_{v}(xyz(\tau))) = Pexp(j \int_{xyzi}^{xyzf} A)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle U[xyz_f, xyz_i; C] = Pexp(j \int_{\tau f}^{\tau i} d\tau \frac{dxyz^{v}}{d\tau} A_{v}(xyz(\tau))) = Pexp(j \int_{xyzf}^{xyzi} A)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle U[xyz_i, xyz_f; C] = Pexp(i \int_{\tau i}^{\tau f} d\tau \frac{dxyz^{\mu v}}{d\tau} A_{\mu v}(xyz(\tau))) = Pexp(i \int_{xyzi}^{xyzf} A)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle U[xyz_f, xyz_i; C] = Pexp(i \int_{\tau f}^{\tau i} d\tau \frac{dxyz^{\mu v}}{d\tau} A_{\mu v}(xyz(\tau))) = Pexp(i \int_{xyzf}^{xyzi} A)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle U[xyz_i, xyz_f; C] = Pexp(j \int_{\tau i}^{\tau f} d\tau \frac{dxyz^{\mu v}}{d\tau} A_{\mu v}(xyz(\tau))) = Pexp(j \int_{xyzi}^{xyzf} A)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle U[xyz_f, xyz_i; C] = Pexp(j \int_{\tau f}^{\tau i} d\tau \frac{dxyz^{\mu v}}{d\tau} A_{\mu v}(xyz(\tau))) = Pexp(j \int_{xyzf}^{xyzi} A)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle U[xyz_i, xyz_f; C] = Pexp(i \int_{\tau i}^{\tau f} d\tau \frac{dxyz^{v\mu}}{d\tau} A_{v\mu}(xyz(\tau))) = Pexp(i \int_{xyzi}^{xyzf} A)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle U[xyz_f, xyz_i; C] = Pexp(i \int_{\tau f}^{\tau i} d\tau \frac{dxyz^{v\mu}}{d\tau} A_{v\mu}(xyz(\tau))) = Pexp(i \int_{xyzf}^{xyzi} A)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle U[xyz_i, xyz_f; C] = Pexp(j \int_{\tau i}^{\tau f} d\tau \frac{dxyz^{v\mu}}{d\tau} A_{v\mu}(xyz(\tau))) = Pexp(j \int_{xyzi}^{xyzf} A)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle U[xyz_f, xyz_i; C] = Pexp(j \int_{\tau f}^{\tau i} d\tau \frac{dxyz^{v\mu}}{d\tau} A_{v\mu}(xyz(\tau))) = Pexp(j \int_{xyzf}^{xyzi} A)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle U[xyz_i, xyz_f; C] = Pexp(i \int_{\tau i}^{\tau f} d\tau \frac{dxyz^{\mu}}{d\tau} A_{\mu}(xyz(\tau))) = Pexp(j \int_{xyzi}^{xyzf} A)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle U[xyz_f, xyz_i; C] = Pexp(i \int_{\tau f}^{\tau i} d\tau \frac{dxyz^{\mu}}{d\tau} A_{\mu}(xyz(\tau))) = Pexp(j \int_{xyzf}^{xyzi} A)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle U[xyz_i, xyz_f; C] = Pexp(j \int_{\tau i}^{\tau f} d\tau \frac{dxyz^{\mu}}{d\tau} A_{\mu}(xyz(\tau))) = Pexp(i \int_{xyzi}^{xyzf} A)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle U[xyz_f, xyz_i; C] = Pexp(j \int_{\tau f}^{\tau i} d\tau \frac{dxyz^{\mu}}{d\tau} A_{\mu}(xyz(\tau))) = Pexp(i \int_{xyzf}^{xyzi} A)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle U[xyz_i, xyz_f; C] = Pexp(i\int_{\tau i}^{\tau f} d\tau \frac{dxyz^v}{d\tau} A_v(xyz(\tau))) = Pexp(j\int_{xyzi}^{xyzf} A)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle U[xyz_f, xyz_i; C] = Pexp(i\int_{\tau f}^{\tau i} d\tau \frac{dxyz^v}{d\tau} A_v(xyz(\tau))) = Pexp(j\int_{xyzf}^{xyzi} A)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle U[xyz_i, xyz_f; C] = Pexp(j\int_{\tau i}^{\tau f} d\tau \frac{dxyz^v}{d\tau} A_v(xyz(\tau))) = Pexp(i\int_{xyzi}^{xyzf} A)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle U[xyz_f, xyz_i; C] = Pexp(j\int_{\tau f}^{\tau i} d\tau \frac{dxyz^v}{d\tau} A_v(xyz(\tau))) = Pexp(i\int_{xyzf}^{xyzi} A)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle U[xyz_i, xyz_f; C] = Pexp(i\int_{\tau i}^{\tau f} d\tau \frac{dxyz^{\mu v}}{d\tau} A_{\mu v}(xyz(\tau))) = Pexp(j\int_{xyzi}^{xyzf} A)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle U[xyz_f, xyz_i; C] = Pexp(i\int_{\tau f}^{\tau i} d\tau \frac{dxyz^{\mu v}}{d\tau} A_{\mu v}(xyz(\tau))) = Pexp(j\int_{xyzf}^{xyzi} A)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle U[xyz_i, xyz_f; C] = Pexp(j\int_{\tau i}^{\tau f} d\tau \frac{dxyz^{\mu v}}{d\tau} A_{\mu v}(xyz(\tau))) = Pexp(i\int_{xyzi}^{xyzf} A)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle U[xyz_f, xyz_i; C] = Pexp(j\int_{\tau f}^{\tau i} d\tau \frac{dxyz^{\mu v}}{d\tau} A_{\mu v}(xyz(\tau))) = Pexp(i\int_{xyzf}^{xyzi} A)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle U[xyz_i, xyz_f; C] = Pexp(i\int_{\tau i}^{\tau f} d\tau \frac{dxyz^{v\mu}}{d\tau} A_{v\mu}(xyz(\tau))) = Pexp(j\int_{xyzi}^{xyzf} A)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle U[xyz_f, xyz_i; C] = Pexp(i\int_{\tau f}^{\tau i} d\tau \frac{dxyz^{v\mu}}{d\tau} A_{v\mu}(xyz(\tau))) = Pexp(j\int_{xyzf}^{xyzi} A)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle U[xyz_i, xyz_f; C] = Pexp(j\int_{\tau i}^{\tau f} d\tau \frac{dxyz^{v\mu}}{d\tau} A_{v\mu}(xyz(\tau))) = Pexp(i\int_{xyzi}^{xyzf} A)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle U[xyz_f, xyz_i; C] = Pexp(j\int_{\tau f}^{\tau i} d\tau \frac{dxyz^{v\mu}}{d\tau} A_{v\mu}(xyz(\tau))) = Pexp(i\int_{xyzf}^{xyzi} A)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle U[xyz_i, xyz_f; C] \rightarrow \Omega(xyz_i) U[xyz_i, xyz_f; C] \Omega \dagger (x_f)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle U[xyz_f, xyz_i; C] \rightarrow \Omega(xyz_j) U[xyz_f, xyz_i; C] \Omega \dagger (x_f)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[C] = trPexp(i \oint A) + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[C] = trPexp(f \oint A)$$

i. Cuantificación del grado de libertad.

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle S_{w} = \int d\tau\, i w^{\dagger} \frac{dw}{dt} + \lambda(w^{\dagger}w - k) + w^{\dagger}A(xyz(\tau))w + [w_i, w_j^{\dagger} = \delta_{ij} + \mid i_1 \dots i_n\rangle$$
$$= w_{i_1}^{\dagger} \dots w_{i_n}^{\dagger} \mid \xi_{\lambda\Omega\psi}^{\sigma\varsigma\zeta} \text{∑∬∬ħȹѬѮӁӜӃփӜӁ} \varsigma\pi mc^{\mathbb{R}4}\rangle$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle S_{w} = \int d\tau\, j w^{\dagger} \frac{dw}{dt} + \lambda(w^{\dagger}w - k) + w^{\dagger}A(xyz(\tau))w + [w_j, w_i^{\dagger} = \delta_{ji} + \mid j_1 \dots j_n\rangle$$
$$= w_{j_1}^{\dagger} \dots w_{j_n}^{\dagger} \mid \xi_{\lambda\Omega\psi}^{\sigma\varsigma\zeta} \text{∑∬∬ħȹѬѮӁӜӃփӜӁ} \varsigma\pi mc^{\mathbb{R}4}\rangle$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle Z_w[A] = trPexp(i \int d\tau\;\; A(\tau) + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle Z_w[A] = trPexp(j \int d\tau\;\; A(\tau))$$

j. Término Theta.

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle S_{\theta} = \frac{\theta}{16\pi^2} \int d^4\, x\, tr *\; F^{\mu v} F_{\mu v} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle S_{\theta}$$
$$= \frac{\theta}{16\pi^2} \int d^4\, xyz \dots . n\, tr *\; F^{v\mu} F_{\mu v} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle S_{\theta}$$
$$= \frac{\theta}{16\pi^2} \int d^4\, xyz \dots . n\, tr *\; F^{v\mu} F_{v\mu} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle S_{\theta}$$
$$= \frac{\theta}{16\pi^2} \int d^4\, xyz \dots . n\, tr *\; F^{\mu v} F_{v\mu}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle S_{\theta} = \frac{\theta}{8\pi^2} \int d^4\, x\, \partial_{\mu} K^{\mu} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle S_{\theta} = \frac{\theta}{8\pi^2} \int d^4\, xyz \dots n\, \partial_{v} K^{v} + \hat{H} \mid \psi\rangle$$
$$= E_{\psi} \mid \psi\rangle S_{\theta} = \frac{\theta}{8\pi^2} \int d^4\, xyz \dots n\, \partial_{\mu v} K^{\mu v} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle S_{\theta}$$
$$= \frac{\theta}{8\pi^2} \int d^4\, xyz \dots n\, \partial_{v\mu} K^{v\mu}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle K^{\mu} = \epsilon^{\mu v p \sigma} tr(A_v \partial_p A_{\sigma} - \frac{2i}{3} A_v A_p A_{\sigma}) + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle K^{v}$$
$$= \epsilon^{v\mu\sigma p} tr(A_{\mu} \partial_{\sigma} A_p A_v - \frac{2j}{3} A_{\mu} A_{\sigma} A_p A_v)$$

k. Cuantificación Canonical de Yang – Mills.

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle L = \frac{1}{2g^2}\ tr\ F^{\mu\nu}F_{\mu\nu} + \frac{\theta}{16\pi^2}\ tr *\ F^{\mu\nu}F_{\mu\nu} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle L$$

$$= \frac{1}{2g^2}\ tr\ F^{\nu\mu}F_{\nu\mu} + \frac{\theta}{16\pi^2}\ tr *\ F^{\nu\mu}F_{\nu\mu} + L$$

$$= \frac{1}{2g^2}\ tr\ (\lim_{n\to\infty}\left(1+\frac{1}{n}\right)^n \oiiint_{\nu}^{\mu} \mu\nu\nu\mu(\sqrt[n]{A^2 - B^2/B^2 - A^2} + \frac{\theta}{16\pi^2} tr \sqrt[n]{A^2.\frac{B^2}{B^2}.A^2}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle H = g^{\mu\nu p\sigma}\ tr\ (\pi - \frac{\theta}{16\pi^{\mu\nu p\sigma}}B)e^{-\frac{i\omega t}{\mu\nu p\sigma}} + \frac{1}{g^{\mu\nu p\sigma}} trB^{\mu\nu p\sigma} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle H$$

$$= g^{\nu\mu\sigma p}\ tr\ (\pi - \frac{\theta}{16\pi^{\nu\mu\sigma p}}B)e^{-i\omega t/\nu\mu\sigma p} + \frac{1}{g^{\nu\mu\sigma p}} trB^{\nu\mu\sigma p}$$

l. Construcción de un Espacio de Hilbert.

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle Q(w) = \oint d^n\ x\ tr(\pi\ .\ \ \delta\ A) = \frac{1}{g^n}\oint d^n\ x\ tr\ (E_i + \frac{\theta g^{\mu\nu p\sigma}}{16\pi^{\mu\nu p\sigma}}B_i)D_{iw}$$

$$= -\frac{1}{g^{\mu\nu p\sigma}}\oint d^n\ x\ tr\ (D_i E_i w_{\mu\nu p\sigma})$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle Q(w) = \oint d^n\ xyz \ldots n\ tr(\pi\ .\ \ \delta\ A.B) = \frac{1}{g^n}\oint d^n\ xyz \ldots n\ tr\ (E_i + \frac{\theta g^{\mu\nu p\sigma}}{16\pi^{\mu\nu p\sigma}}B_i)D_{iw}$$

$$= -\frac{1}{g^{\mu\nu p\sigma}}\oint d^n\ x\ tr\ (D_i E_i w_{\mu\nu p\sigma})$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle Q(w) = \oint d^n\ xyz \ldots n\ tr(\pi\ .\ \ \delta\ A.B) = \frac{1}{g^n}\oint d^n\ xyz \ldots n\ tr\ (E_j + \frac{\theta g^{\mu\nu p\sigma}}{16\pi^{\mu\nu p\sigma}}B_j)D_{jw}$$

$$= -\frac{1}{g^{\mu\nu p\sigma}}\oint d^n\ x\ tr\ (D_j E_j w_{\mu\nu p\sigma})$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle Q(w) = \oint d^n\ xyz \ldots n\ tr(\pi\ .\ \ \delta\ A.B) = \frac{1}{g^n}\oint d^n\ xyz \ldots n\ tr\ (E_{i,j} + \frac{\theta g^{\mu\nu p\sigma}}{16\pi^{\mu\nu p\sigma}}B_{i,j})D_{i,jw}$$

$$= -\frac{1}{g^{\mu\nu p\sigma}}\oint d^n\ x\ tr\ (D_{i,j} E_{i,j} w_{\mu\nu p\sigma})$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle Q(w) = \oint d^n\ xyz \ldots n\ tr(\pi\ .\ \ \delta\ A.B) = \frac{1}{g^n}\oint d^n\ xyz \ldots n\ tr\ (E_{j,i} + \frac{\theta g^{\mu\nu p\sigma}}{16\pi^{\mu\nu p\sigma}}B_{j,i})D_{j,iw}$$

$$= -\frac{1}{g^{\mu\nu p\sigma}}\oint d^n\ x\ tr\ (D_{j,i} E_{j,i} w_{\mu\nu p\sigma})$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle Q(w) = \oint d^{n}\, xyz \ldots n\, tr(\pi\, .\ \ \delta\, \mathrm{A.B}) = \frac{1}{g^{n}} \oint d^{n}\, xyz \ldots n\, tr\, (E_{i} + \frac{\theta g^{\nu\mu\sigma p}}{16\pi^{\nu\mu\sigma p}} B_{i}) D_{iw}$$

$$= -\frac{1}{g^{\nu\mu\sigma p}} \oint d^{n}\, x\, tr\, (D_{i} E_{i} w_{\nu\mu\sigma p}\,)$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle Q(w) = \oint d^{n}\, xyz \ldots n\, tr(\pi\, .\ \ \delta\, \mathrm{A.B}) = \frac{1}{g^{n}} \oint d^{n}\, xyz \ldots n\, tr\, (E_{j} + \frac{\theta g^{\nu\mu\sigma p}}{16\pi^{\nu\mu\sigma p}} B_{j}) D_{jw}$$

$$= -\frac{1}{g^{\nu\mu\sigma p}} \oint d^{n}\, x\, tr\, (D_{j} E_{j} w_{\nu\mu\sigma p}\ \ )$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle Q(w) = \oint d^{n}\, xyz \ldots n\, tr(\pi\, .\ \ \delta\, \mathrm{A.B}) = \frac{1}{g^{n}} \oint d^{n}\, xyz \ldots n\, tr\, (E_{i,j} + \frac{\theta g^{\nu\mu\sigma p}}{16\pi^{\nu\mu\sigma p}} B_{i,j}) D_{i,jw}$$

$$= -\frac{1}{g^{\nu\mu\sigma p}} \oint d^{n}\, x\, tr\, (D_{i,j} E_{i,j} w_{\nu\mu\sigma p}\ \ )$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle Q(w) = \oint d^{n}\, xyz \ldots n\, tr(\pi\, .\ \ \delta\, \mathrm{A.B}) = \frac{1}{g^{n}} \oint d^{n}\, xyz \ldots n\, tr\, (E_{j,i} + \frac{\theta g^{\nu\mu\sigma p}}{16\pi^{\nu\mu\sigma p}} B_{j,i}) D_{j,iw}$$

$$= -\frac{1}{g^{\nu\mu\sigma p}} \oint d^{n}\, x\, tr\, (D_{j,i} E_{j,i} w_{\nu\mu\sigma p}\ \ )$$

m. Función Chern – Simons.

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle D_{i}(-i\ \delta\psi/\delta A_{i}) = \xi_{\lambda\Omega\psi}^{\sigma\varsigma\zeta} \Sigma \iiiint \text{ħɸѬǮҖДҞփӜѪ}\varsigma\pi mc^{\mathbb{R}4}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle D_{j}(-j\ \delta\psi/\delta A_{j}) = \xi_{\lambda\Omega\psi}^{\sigma\varsigma\zeta} \Sigma \iiiint \text{ħɸѬǮҖДҞփӜѪ}\varsigma\pi mc^{\mathbb{R}4}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle D_{i,j}(-i\ \delta\psi/\delta A_{i,j}) = \xi_{\lambda\Omega\psi}^{\sigma\varsigma\zeta} \Sigma \iiiint \text{ħɸѬǮҖДҞփӜѪ}\varsigma\pi mc^{\mathbb{R}4}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle D_{j,i}(-i\ \delta\psi/\delta A_{j,i}) = \xi_{\lambda\Omega\psi}^{\sigma\varsigma\zeta} \Sigma \iiiint \text{ħɸѬǮҖДҞփӜѪ}\varsigma\pi mc^{\mathbb{R}4}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle H\psi = g^{\mu\nu\rho\sigma} tr\, (-i\ \delta/\delta\mathrm{A} - \frac{\theta g^{\mu\nu\rho\sigma}}{16\pi^{\mu\nu\rho\sigma}} B) exp^{\mu\nu\rho\sigma}\, \psi + 1/g^{\mu\nu\rho\sigma}\, tr\, B^{\mu\nu\rho\sigma}\psi$$

$$= \xi_{\lambda\Omega\psi}^{\sigma\varsigma\zeta} \Sigma \iiiint \text{ħɸѬǮҖДҞփӜѪ}\varsigma\pi mc^{\mathbb{R}4}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle H\psi = g^{\mu\nu\rho\sigma} tr\, (-j\ \delta/\delta\mathrm{A} - \frac{\theta g^{\mu\nu\rho\sigma}}{16\pi^{\mu\nu\rho\sigma}} B) exp^{\mu\nu\rho\sigma}\, \psi + 1/g^{\mu\nu\rho\sigma}\, tr\, B^{\mu\nu\rho\sigma}\psi$$

$$= \xi_{\lambda\Omega\psi}^{\sigma\varsigma\zeta} \Sigma \iiiint \text{ħɸѬǮҖДҞփӜѪ}\varsigma\pi mc^{\mathbb{R}4}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle H\psi = g^{\mu\nu\rho\sigma} tr\, (-i,j\ \delta/\delta\mathrm{A} - \frac{\theta g^{\mu\nu\rho\sigma}}{16\pi^{\mu\nu\rho\sigma}} B) exp^{\mu\nu\rho\sigma}\, \psi + 1/g^{\mu\nu\rho\sigma}\, tr\, B^{\mu\nu\rho\sigma}\psi$$

$$= \xi_{\lambda\Omega\psi}^{\sigma\varsigma\zeta} \Sigma \iiiint \text{ħɸѬǮҖДҞփӜѪ}\varsigma\pi mc^{\mathbb{R}4}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle H\psi = g^{\mu\nu p\sigma} tr\ (-j, i\ \delta/\delta A - \frac{\theta\, g^{\mu\nu p\sigma}}{16\pi^{\mu\nu p\sigma}} B) exp^{\mu\nu p\sigma}\ \psi + 1/g^{\mu\nu p\sigma}\ tr\ B^{\mu\nu p\sigma}\psi$$

$= \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\Sigma\iiiint$ħɸѬǮҖДКфӜѪ$\zeta\pi mc^{\mathbb{R}4}$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle H\psi = g^{\nu\mu\sigma p} tr\ (-i\ \delta/\delta A - \frac{\theta\, g^{\nu\mu\sigma p}}{16\pi^{\nu\mu\sigma p}} B) exp^{\nu\mu\sigma p}\ \psi + 1/g^{\nu\mu\sigma p}\ tr\ B^{\nu\mu\sigma p}\psi$$

$= \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\Sigma\iiiint$ħɸѬǮҖДКфӜѪ$\zeta\pi mc^{\mathbb{R}4}$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle H\psi = g^{\nu\mu\sigma p} tr\ (-j\ \delta/\delta A - \frac{\theta\, g^{\nu\mu\sigma p}}{16\pi^{\nu\mu\sigma p}} B) exp^{\nu\mu\sigma p}\ \psi + 1/g^{\nu\mu\sigma p}\ tr\ B^{\nu\mu\sigma p}\psi$$

$= \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\Sigma\iiiint$ħɸѬǮҖДКфӜѪ$\zeta\pi mc^{\mathbb{R}4}$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle H\psi = g^{\nu\mu\sigma p} tr\ (-i, j\ \delta/\delta A - \frac{\theta\, g^{\nu\mu\sigma p}}{16\pi^{\nu\mu\sigma p}} B) exp^{\nu\mu\sigma p}\ \psi + 1/g^{\nu\mu\sigma p}\ tr\ B^{\nu\mu\sigma p}\psi$$

$= \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\Sigma\iiiint$ħɸѬǮҖДКфӜѪ$\zeta\pi mc^{\mathbb{R}4}$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle H\psi = g^{\nu\mu p\sigma} tr\ (-j, i\ \delta/\delta A - \frac{\theta\, g^{\nu\mu p\sigma}}{16\pi^{\nu\mu p\sigma}} B) exp^{\nu\mu\sigma p}\ \psi + 1/g^{\nu\mu\sigma p}\ tr\ B^{\nu\mu\sigma p}\psi$$

$= \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\Sigma\iiiint$ħɸѬǮҖДКфӜѪ$\zeta\pi mc^{\mathbb{R}4}$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle - g^{\mu\nu p\sigma} tr \delta^{\mu\nu p\sigma}\psi_{\mu\nu p\sigma}/\delta A + 1/g^{\mu\nu p\sigma}\ tr\ B^{\mu\nu p\sigma}\psi_{\mu\nu p\sigma}$$

$= \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\Sigma\iiiint$ħɸѬǮҖДКфӜѪ$\zeta\pi mc^{\mathbb{R}4}$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle - g^{\nu\mu\sigma p} tr \delta^{\nu\mu\sigma p}\psi_{\nu\mu\sigma p}/\delta A + 1/g^{\nu\mu\sigma p}\ tr\ B^{\nu\mu\sigma p}\psi_{\nu\mu\sigma p}$$

$= \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\Sigma\iiiint$ħɸѬǮҖДКфӜѪ$\zeta\pi mc^{\mathbb{R}4}$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W(A) = 1/16\pi^{\mu\nu p\sigma} \int d^{\mu\nu p\sigma}\epsilon^{ijk}\ tr\ (F_{ij}\ A_k + 2i/3\ A_i A_j A_k)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W(A) = 1/16\pi^{\mu\nu p\sigma} \int d^{\mu\nu p\sigma}\epsilon^{jik}\ tr\ (F_{ji}\ A_k + 2i/3\ A_j A_i A_k)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W(A) = 1/16\pi^{\mu\nu p\sigma} \int d^{\mu\nu p\sigma}\epsilon^{kij}\ tr\ (F_{k}\ A_{ij} + 2i/3\ A_k A_i A_j)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W(A) = 1/16\pi^{\mu\nu p\sigma} \int d^{\mu\nu p\sigma}\epsilon^{kji}\ tr\ (F_{k}\ A_{ji} + 2i/3\ A_k A_j A_i)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W(A) = 1/16\pi^{\mu\nu p\sigma} \int d^{\mu\nu p\sigma}\epsilon^{ikj}\ tr\ (F_{ik}\ A_j + 2i/3\ A_i A_k A_j)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W(A) = 1/16\pi^{\mu\nu p\sigma} \int d^{\mu\nu p\sigma}\epsilon^{jki}\ tr\ (F_{jk}\ A_i + 2i/3\ A_j A_k A_i)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W(A) = 1/16\pi^{\nu\mu\sigma p} \int d^{\nu\mu\sigma p}\epsilon^{ijk}\ tr\ (F_{ij}\ A_k + 2i/3\ A_i A_j A_k)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W(A) = 1/16\pi^{\nu\mu\sigma p} \int d^{\nu\mu\sigma p} \epsilon^{jik}\, tr\,(F_{ji}\, A_k + 2i/3\, A_j A_i A_k)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W(A) = 1/16\pi^{\nu\mu\sigma p} \int d^{\nu\mu\sigma p} \epsilon^{kij}\, tr\,(F_k\, A_{ij} + 2i/3\, A_k A_i A_j)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W(A) = 1/16\pi^{\nu\mu\sigma p} \int d^{\nu\mu\sigma p} \epsilon^{kji}\, tr\,(F_k\, A_{ji} + 2i/3\, A_k A_j A_i)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W(A) = 1/16\pi^{\nu\mu\sigma p} \int d^{\nu\mu\sigma p} \epsilon^{ikj}\, tr\,(F_{ik}\, A_j + 2i/3\, A_i A_k A_j)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W(A) = 1/16\pi^{\nu\mu\sigma p} \int d^{\nu\mu\sigma p} \epsilon^{jki}\, tr\,(F_{jk}\, A_i + 2i/3\, A_j A_k A_i)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle SW(A)/\, \delta A_i = 1/16\pi^{\mu\nu p\sigma} \epsilon^{ijk} F_{jk} = 1/16\pi^{\mu\nu p\sigma} B_i$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle SW(A)/\, \delta A_j = 1/16\pi^{\mu\nu\sigma p} \epsilon^{ijk} F_{jk} = 1/16\pi^{\mu\nu p\sigma} B_j$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle SW(A)/\, \delta A_{i,j} = 1/16\pi^{\mu\nu\sigma p} \epsilon^{ijk} F_{jk} = 1/16\pi^{\mu\nu p\sigma} B_{i,j}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle SW(A)/\, \delta A_{j,i} = 1/16\pi^{\mu\nu\sigma p} \epsilon^{ijk} F_{jk} = 1/16\pi^{\mu\nu p\sigma} B_{j,i}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle SW(A)/\, \delta A_i = 1/16\pi^{\mu\nu p\sigma} \epsilon^{ikj} F_{kj} = 1/16\pi^{\mu\nu p\sigma} B_i$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle SW(A)/\, \delta A_j = 1/16\pi^{\mu\nu\sigma p} \epsilon^{jki} F_{ki} = 1/16\pi^{\mu\nu p\sigma} B_j$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle SW(A)/\, \delta A_{i,j} = 1/16\pi^{\mu\nu\sigma p} \epsilon^{kij} F_{kj} = 1/16\pi^{\mu\nu p\sigma} B_{i,j}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle SW(A)/\, \delta A_{j,i} = 1/16\pi^{\mu\nu\sigma p} \epsilon^{kji} F_{ki} = 1/16\pi^{\mu\nu p\sigma} B_{j,i}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle SW(A)/\, \delta A_i = 1/16\pi^{\nu\mu\sigma p} \epsilon^{ijk} F_{jk} = 1/16\pi^{\nu\mu\sigma p} B_i$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle SW(A)/\, \delta A_j = 1/16\pi^{\nu\mu\sigma p} \epsilon^{ijk} F_{jk} = 1/16\pi^{\nu\mu\sigma p} B_j$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle SW(A)/\, \delta A_{i,j} = 1/16\pi^{\nu\mu\sigma p} \epsilon^{ijk} F_{jk} = 1/16\pi^{\nu\mu\sigma p} B_{i,j}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle SW(A)/\, \delta A_{j,i} = 1/16\pi^{\nu\mu\sigma p} \epsilon^{ijk} F_{jk} = 1/16\pi^{\nu\mu\sigma p} B_{j,i}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle SW(A)/\, \delta A_i = 1/16\pi^{\nu\mu\sigma p} \epsilon^{ikj} F_{kj} = 1/16\pi^{\nu\mu\sigma p} B_i$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle SW(A)/\, \delta A_j = 1/16\pi^{\nu\mu\sigma p} \epsilon^{jki} F_{ki} = 1/16\pi^{\nu\mu\sigma p} B_j$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle SW(A)/\, \delta A_{i,j} = 1/16\pi^{\nu\mu\sigma p} \epsilon^{kij} F_{kj} = 1/16\pi^{\nu\mu\sigma p} B_{i,j}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle SW(A)/\, \delta A_{j,i} = 1/16\pi^{\nu\mu\sigma p} \epsilon^{kji} F_{ki} = 1/16\pi^{\nu\mu\sigma p} B_{j,i}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle - i\ \delta\ \psi(A)/\delta A_i = -ie^{i\theta W[A]} \frac{\delta\psi_{\mu\nu\sigma p}(A)}{\delta A_i} + \frac{\theta}{16\pi^{\mu\nu\sigma p}} B_i\ \psi\ (A)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle - j\ \delta\ \psi(A)/\delta A_j = -je^{j\theta W[A]} \frac{\delta\psi_{\mu\nu\sigma p}(A)}{\delta A_j} + \frac{\theta}{16\pi^{\mu\nu\sigma p}} B_j\ \psi\ (A)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle - i,j\ \delta\ \psi(A)/\delta A_{i,j} = -i,je^{i,j\theta W[A]} \frac{\delta\psi_{\mu\nu\sigma p}(A)}{\delta A_{i,j}} + \frac{\theta}{16\pi^{\mu\nu\sigma p}} B_{i,j}\ \psi\ (A)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle - j,i\ \delta\ \psi(A)/\delta A_{j,i} = -j,ie^{j,i\theta W[A]} \frac{\delta\psi_{\mu\nu\sigma p}(A)}{\delta A_{j,i}} + \frac{\theta}{16\pi^{\mu\nu\sigma p}} B_{j,i}\ \psi\ (A)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle - i\ \delta\ \psi(A)/\delta A_i = -ie^{i\theta W[A]} \frac{\delta\psi_{\nu\mu\sigma p}(A)}{\delta A_i} + \frac{\theta}{16\pi^{\nu\mu\sigma p}} B_i\ \psi\ (A)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle - j\ \delta\ \psi(A)/\delta A_j = -je^{j\theta W[A]} \frac{\delta\psi_{\nu\mu\sigma p}(A)}{\delta A_j} + \frac{\theta}{16\pi^{\nu\mu\sigma p}} B_j\ \psi\ (A)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle - i,j\ \delta\ \psi(A)/\delta A_{i,j} = -i,je^{i,j\theta W[A]} \frac{\delta\psi_{\nu\mu\sigma p}(A)}{\delta A_{i,j}} + \frac{\theta}{16\pi^{\nu\mu\sigma p}} B_{i,j}\ \psi\ (A)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle - j,i\ \delta\ \psi(A)/\delta A_{j,i} = -j,ie^{j,i\theta W[A]} \frac{\delta\psi_{\nu\mu\sigma p}(A)}{\delta A_{j,i}} + \frac{\theta}{16\pi^{\nu\mu\sigma p}} B_{j,i}\ \psi\ (A)$$

$$\begin{aligned} \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A] \\ \rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x[i\epsilon^{ijk}\partial_i\ tr\ (\partial_j \Omega\Omega\Delta\nabla\lambda_{k,i})n^{-\Omega^{-\mu\nu\sigma p}} \\ - 1/3\epsilon^{ijk}\ tr\ (\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}] \end{aligned}$$

$$\begin{aligned} \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A] \\ \rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x[j\epsilon^{ijk}\partial_j\ tr\ (\partial_i \Omega\Omega\Delta\nabla\lambda_{k,j})n^{-\Omega^{-\mu\nu\sigma p}} \\ - 1/3\epsilon^{ijk}\ tr\ (\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}] \end{aligned}$$

$$\begin{aligned} \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A] \\ \rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x[i\epsilon^{ijk}\partial_i\ tr\ (\partial_j \Omega\Omega\Delta\nabla\lambda_{i,k})n^{-\Omega^{-\mu\nu\sigma p}} \\ - 1/3\epsilon^{ijk}\ tr\ (\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}] \end{aligned}$$

$$\begin{aligned} \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A] \\ \rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x[j\epsilon^{ijk}\partial_j\ tr\ (\partial_i \Omega\Omega\Delta\nabla\lambda_{j,k})n^{-\Omega^{-\mu\nu\sigma p}} \\ - 1/3\epsilon^{ijk}\ tr\ (\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}] \end{aligned}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle W[A]$$

$$\rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\big[k\epsilon^{ijk}\partial_k\, tr\, (\partial_k \Omega\Omega\Delta\nabla\lambda_{i,j})n^{-\Omega^{-\mu\nu\sigma p}}$$

$$- 1/3\epsilon^{ijk}\, tr\, (\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle W[A]$$

$$\rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\big[k\epsilon^{ijk}\partial_k\, tr\, (\partial_k \Omega\Omega\Delta\nabla\lambda_{j,i})n^{-\Omega^{-\mu\nu\sigma p}}$$

$$- 1/3\epsilon^{ijk}\, tr\, (\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle W[A]$$

$$\rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\big[j\epsilon^{jik}\partial_j\, tr\, (\partial_i \Omega\Omega\Delta\nabla\lambda_{k,j})n^{-\Omega^{-\mu\nu\sigma p}}$$

$$- 1/3\epsilon^{jik}\, tr\, (\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle W[A]$$

$$\rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\big[i\epsilon^{jik}\partial_i\, tr\, (\partial_j \Omega\Omega\Delta\nabla\lambda_{k,i})n^{-\Omega^{-\mu\nu\sigma p}}$$

$$- 1/3\epsilon^{jik}\, tr\, (\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle W[A]$$

$$\rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\big[j\epsilon^{jik}\partial_j\, tr\, (\partial_i \Omega\Omega\Delta\nabla\lambda_{i,k})n^{-\Omega^{-\mu\nu\sigma p}}$$

$$- 1/3\epsilon^{jik}\, tr\, (\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle W[A]$$

$$\rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\big[i\epsilon^{jik}\partial_i\, tr\, (\partial_j \Omega\Omega\Delta\nabla\lambda_{j,k})n^{-\Omega^{-\mu\nu\sigma p}}$$

$$- 1/3\epsilon^{jik}\, tr\, (\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle W[A]$$

$$\rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\big[k\epsilon^{jik}\partial_k\, tr\, (\partial_k \Omega\Omega\Delta\nabla\lambda_{j,i})n^{-\Omega^{-\mu\nu\sigma p}}$$

$$- 1/3\epsilon^{jik}\, tr\, (\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle W[A]$$

$$\rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\big[k\epsilon^{jik}\partial_k\, tr\, (\partial_k \Omega\Omega\Delta\nabla\lambda_{i,j})n^{-\Omega^{-\mu\nu\sigma p}}$$

$$- 1/3\epsilon^{jik}\, tr\, (\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\big]$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\big[i\epsilon^{ikj}\partial_i\, tr\,(\partial_j \Omega\Omega\Delta\nabla\lambda_{k,i})n^{-\Omega^{-\mu\nu\sigma p}}$$
$$- 1/3\epsilon^{ikj}\, tr\,(\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\big]$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\big[j\epsilon^{ikj}\partial_j\, tr\,(\partial_i \Omega\Omega\Delta\nabla\lambda_{k,j})n^{-\Omega^{-\mu\nu\sigma p}}$$
$$- 1/3\epsilon^{ikj}\, tr\,(\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\big]$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\big[i\epsilon^{ikj}\partial_i\, tr\,(\partial_j \Omega\Omega\Delta\nabla\lambda_{i,k})n^{-\Omega^{-\mu\nu\sigma p}}$$
$$- 1/3\epsilon^{ikj}\, tr\,(\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\big]$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\big[j\epsilon^{ikj}\partial_j\, tr\,(\partial_i \Omega\Omega\Delta\nabla\lambda_{j,k})n^{-\Omega^{-\mu\nu\sigma p}}$$
$$- 1/3\epsilon^{ikj}\, tr\,(\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\big]$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\big[k\epsilon^{ikj}\partial_k\, tr\,(\partial_k \Omega\Omega\Delta\nabla\lambda_{i,j})n^{-\Omega^{-\mu\nu\sigma p}}$$
$$- 1/3\epsilon^{ikj}\, tr\,(\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\big]$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\big[k\epsilon^{ikj}\partial_k\, tr\,(\partial_k \Omega\Omega\Delta\nabla\lambda_{j,i})n^{-\Omega^{-\mu\nu\sigma p}}$$
$$- 1/3\epsilon^{ikj}\, tr\,(\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\big]$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\big[j\epsilon^{jki}\partial_j\, tr\,(\partial_i \Omega\Omega\Delta\nabla\lambda_{k,j})n^{-\Omega^{-\mu\nu\sigma p}}$$
$$- 1/3\epsilon^{jki}\, tr\,(\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\big]$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\big[i\epsilon^{jki}\partial_i\, tr\,(\partial_j \Omega\Omega\Delta\nabla\lambda_{k,i})n^{-\Omega^{-\mu\nu\sigma p}}$$
$$- 1/3\epsilon^{jki}\, tr\,(\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightharpoonup W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\big[j\epsilon^{jki}\partial_j\, tr\, (\partial_i \Omega\Omega\Delta\nabla\lambda_{j,k}) n^{-\Omega^{-\mu\nu\sigma p}}$$
$$- 1/3\epsilon^{jki}\, tr\, (\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightharpoonup W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\big[i\epsilon^{jki}\partial_i\, tr\, (\partial_j \Omega\Omega\Delta\nabla\lambda_{i,k}) n^{-\Omega^{-\mu\nu\sigma p}}$$
$$- 1/3\epsilon^{jki}\, tr\, (\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightharpoonup W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\big[k\epsilon^{jki}\partial_k\, tr\, (\partial_k \Omega\Omega\Delta\nabla\lambda_{j,i}) n^{-\Omega^{-\mu\nu\sigma p}}$$
$$- 1/3\epsilon^{jki}\, tr\, (\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightharpoonup W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\big[k\epsilon^{jki}\partial_k\, tr\, (\partial_k \Omega\Omega\Delta\nabla\lambda_{i,j}) n^{-\Omega^{-\mu\nu\sigma p}}$$
$$- 1/3\epsilon^{jki}\, tr\, (\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightharpoonup W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\big[i\epsilon^{kij}\partial_i\, tr\, (\partial_j \Omega\Omega\Delta\nabla\lambda_{k,i}) n^{-\Omega^{-\mu\nu\sigma p}}$$
$$- 1/3\epsilon^{kij}\, tr\, (\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightharpoonup W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\big[j\epsilon^{kij}\partial_j\, tr\, (\partial_i \Omega\Omega\Delta\nabla\lambda_{k,j}) n^{-\Omega^{-\mu\nu\sigma p}}$$
$$- 1/3\epsilon^{kij}\, tr\, (\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightharpoonup W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\big[i\epsilon^{kij}\partial_i\, tr\, (\partial_j \Omega\Omega\Delta\nabla\lambda_{i,k}) n^{-\Omega^{-\mu\nu\sigma p}}$$
$$- 1/3\epsilon^{kij}\, tr\, (\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightharpoonup W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\big[j\epsilon^{kij}\partial_j\, tr\, (\partial_i \Omega\Omega\Delta\nabla\lambda_{j,k}) n^{-\Omega^{-\mu\nu\sigma p}}$$
$$- 1/3\epsilon^{kij}\, tr\, (\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\big]$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\left[k\epsilon^{kij}\partial_k\, tr\, (\partial_k \Omega\Omega\Delta\nabla\lambda_{i,j})n^{-\Omega^{-\mu\nu\sigma p}}\right.$$
$$\left. - 1/3\epsilon^{kij}\, tr\, (\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\right]$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\left[k\epsilon^{kij}\partial_k\, tr\, (\partial_k \Omega\Omega\Delta\nabla\lambda_{j,i})n^{-\Omega^{-\mu\nu\sigma p}}\right.$$
$$\left. - 1/3\epsilon^{kij}\, tr\, (\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\right]$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\left[j\epsilon^{kji}\partial_j\, tr\, (\partial_i \Omega\Omega\Delta\nabla\lambda_{k,j})n^{-\Omega^{-\mu\nu\sigma p}}\right.$$
$$\left. - 1/3\epsilon^{kji}\, tr\, (\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\right]$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\left[i\epsilon^{kji}\partial_i\, tr\, (\partial_j \Omega\Omega\Delta\nabla\lambda_{k,i})n^{-\Omega^{-\mu\nu\sigma p}}\right.$$
$$\left. - 1/3\epsilon^{kji}\, tr\, (\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\right]$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\left[j\epsilon^{kji}\partial_j\, tr\, (\partial_i \Omega\Omega\Delta\nabla\lambda_{j,k})n^{-\Omega^{-\mu\nu\sigma p}}\right.$$
$$\left. - 1/3\epsilon^{kji}\, tr\, (\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\right]$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\left[i\epsilon^{kji}\partial_i\, tr\, (\partial_j \Omega\Omega\Delta\nabla\lambda_{i,k})n^{-\Omega^{-\mu\nu\sigma p}}\right.$$
$$\left. - 1/3\epsilon^{kji}\, tr\, (\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\right]$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\left[k\epsilon^{kji}\partial_k\, tr\, (\partial_k \Omega\Omega\Delta\nabla\lambda_{j,i})n^{-\Omega^{-\mu\nu\sigma p}}\right.$$
$$\left. - 1/3\epsilon^{kji}\, tr\, (\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\right]$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightarrow W[B] + 1/16\pi^{\mu\nu\sigma p} \int d^{\mu\nu\sigma p}\, x\left[k\epsilon^{kji}\partial_k\, tr\, (\partial_k \Omega\Omega\Delta\nabla\lambda_{i,j})n^{-\Omega^{-\mu\nu\sigma p}}\right.$$
$$\left. - 1/3\epsilon^{kji}\, tr\, (\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\right]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\big[i\epsilon^{ijk}\partial_i\, tr\,(\partial_j \Omega\Omega\Delta\nabla\lambda_{k,i})n^{-\Omega^{-\nu\mu\rho\sigma}}$$
$$- 1/3\epsilon^{ijk}\, tr\,(\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\big[j\epsilon^{ijk}\partial_j\, tr\,(\partial_i \Omega\Omega\Delta\nabla\lambda_{k,j})n^{-\Omega^{-\nu\mu\rho\sigma}}$$
$$- 1/3\epsilon^{ijk}\, tr\,(\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\big[i\epsilon^{ijk}\partial_i\, tr\,(\partial_j \Omega\Omega\Delta\nabla\lambda_{i,k})n^{-\Omega^{-\nu\mu\rho\sigma}}$$
$$- 1/3\epsilon^{ijk}\, tr\,(\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\big[j\epsilon^{ijk}\partial_j\, tr\,(\partial_i \Omega\Omega\Delta\nabla\lambda_{j,k})n^{-\Omega^{-\nu\mu\rho\sigma}}$$
$$- 1/3\epsilon^{ijk}\, tr\,(\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\big[k\epsilon^{ijk}\partial_k\, tr\,(\partial_k \Omega\Omega\Delta\nabla\lambda_{i,j})n^{-\Omega^{-\nu\mu\rho\sigma}}$$
$$- 1/3\epsilon^{ijk}\, tr\,(\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\big[k\epsilon^{ijk}\partial_k\, tr\,(\partial_k \Omega\Omega\Delta\nabla\lambda_{j,i})n^{-\Omega^{-\nu\mu\rho\sigma}}$$
$$- 1/3\epsilon^{ijk}\, tr\,(\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\big[j\epsilon^{jik}\partial_j\, tr\,(\partial_i \Omega\Omega\Delta\nabla\lambda_{k,j})n^{-\Omega^{-\nu\mu\rho\sigma}}$$
$$- 1/3\epsilon^{jik}\, tr\,(\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$
$$\rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\big[i\epsilon^{jik}\partial_i\, tr\,(\partial_j \Omega\Omega\Delta\nabla\lambda_{k,i})n^{-\Omega^{-\nu\mu\rho\sigma}}$$
$$- 1/3\epsilon^{jik}\, tr\,(\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$

$$\rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\big[j\epsilon^{jik}\partial_j\, tr\, (\partial_i \Omega\Omega\Delta\nabla\lambda_{i,k})n^{-\Omega^{-\nu\mu\rho\sigma}}$$

$$- 1/3\epsilon^{jik}\, tr\, (\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$

$$\rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\big[i\epsilon^{jik}\partial_i\, tr\, (\partial_j \Omega\Omega\Delta\nabla\lambda_{j,k})n^{-\Omega^{-\nu\mu\rho\sigma}}$$

$$- 1/3\epsilon^{jik}\, tr\, (\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$

$$\rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\big[k\epsilon^{jik}\partial_k\, tr\, (\partial_k \Omega\Omega\Delta\nabla\lambda_{j,i})n^{-\Omega^{-\nu\mu\rho\sigma}}$$

$$- 1/3\epsilon^{jik}\, tr\, (\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$

$$\rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\big[k\epsilon^{jik}\partial_k\, tr\, (\partial_k \Omega\Omega\Delta\nabla\lambda_{i,j})n^{-\Omega^{-\nu\mu\rho\sigma}}$$

$$- 1/3\epsilon^{jik}\, tr\, (\Omega^{-\nu\mu\rho\sigma\nu}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$

$$\rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\big[i\epsilon^{ikj}\partial_i\, tr\, (\partial_j \Omega\Omega\Delta\nabla\lambda_{k,i})n^{-\Omega^{-\nu\mu\rho\sigma}}$$

$$- 1/3\epsilon^{ikj}\, tr\, (\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$

$$\rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma\nu} \int d^{\nu\mu\rho\sigma}\, x\big[j\epsilon^{ikj}\partial_j\, tr\, (\partial_i \Omega\Omega\Delta\nabla\lambda_{k,j})n^{-\Omega^{-\nu\mu\rho\sigma}}$$

$$- 1/3\epsilon^{ikj}\, tr\, (\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$

$$\rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\big[i\epsilon^{ikj}\partial_i\, tr\, (\partial_j \Omega\Omega\Delta\nabla\lambda_{i,k})n^{-\Omega^{-\nu\mu\rho\sigma}}$$

$$- 1/3\epsilon^{ikj}\, tr\, (\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$

$$\rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\big[j\epsilon^{ikj}\partial_j\, tr\, (\partial_i \Omega\Omega\Delta\nabla\lambda_{j,k})n^{-\Omega^{-\nu\mu\rho\sigma}}$$

$$- 1/3\epsilon^{ikj}\, tr\, (\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\big]$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A] \rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\big[k\epsilon^{ikj}\partial_k\, tr\,(\partial_k \Omega\Omega\Delta\nabla\lambda_{i,j})n^{-\Omega^{-\mu\nu\rho\sigma}} - 1/3\epsilon^{ikj}\, tr\,(\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\big]$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A] \rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\big[k\epsilon^{ikj}\partial_k\, tr\,(\partial_k \Omega\Omega\Delta\nabla\lambda_{j,i})n^{-\Omega^{-\nu\mu\rho\sigma}} - 1/3\epsilon^{ikj}\, tr\,(\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\big]$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A] \rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\big[j\epsilon^{jki}\partial_j\, tr\,(\partial_i \Omega\Omega\Delta\nabla\lambda_{k,j})n^{-\Omega^{-\nu\mu\rho\sigma}} - 1/3\epsilon^{jki}\, tr\,(\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\big]$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A] \rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\big[i\epsilon^{jki}\partial_i\, tr\,(\partial_j \Omega\Omega\Delta\nabla\lambda_{k,i})n^{-\Omega^{-\nu\mu\rho\sigma}} - 1/3\epsilon^{jki}\, tr\,(\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\big]$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A] \rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\big[j\epsilon^{jki}\partial_j\, tr\,(\partial_i \Omega\Omega\Delta\nabla\lambda_{j,k})n^{-\Omega^{-\nu\mu\rho\sigma}} - 1/3\epsilon^{jki}\, tr\,(\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\big]$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A] \rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\big[i\epsilon^{jki}\partial_i\, tr\,(\partial_j \Omega\Omega\Delta\nabla\lambda_{i,k})n^{-\Omega^{-\nu\mu\rho\sigma}} - 1/3\epsilon^{jki}\, tr\,(\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\big]$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A] \rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\big[k\epsilon^{jki}\partial_k\, tr\,(\partial_k \Omega\Omega\Delta\nabla\lambda_{j,i})n^{-\Omega^{-\nu\mu\rho\sigma}} - 1/3\epsilon^{jki}\, tr\,(\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\big]$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A] \rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\big[k\epsilon^{jki}\partial_k\, tr\,(\partial_k \Omega\Omega\Delta\nabla\lambda_{i,j})n^{-\Omega^{-\nu\mu\rho\sigma}} - 1/3\epsilon^{jki}\, tr\,(\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\big]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$

$$\rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\left[i\epsilon^{kij} \partial_i \, tr \, (\partial_j \Omega \Omega \Delta \nabla \lambda_{k,i}) n^{-\Omega^{-\nu\mu\rho\sigma}} \right.$$

$$\left. - 1/3\epsilon^{kij} \, tr \, (\Omega^{-\nu\mu\rho\sigma} \partial_i \Omega \Omega^{-\nu\mu\rho\sigma} \partial_j \Omega \Omega^{-\nu\mu\rho\sigma} \partial_k \Omega \Omega^{-\nu\mu\rho\sigma} \right]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$

$$\rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\left[j\epsilon^{kij} \partial_j \, tr \, (\partial_i \Omega \Omega \Delta \nabla \lambda_{k,j}) n^{-\Omega^{-\nu\mu\rho\sigma}} \right.$$

$$\left. - 1/3\epsilon^{kij} \, tr \, (\Omega^{-\nu\mu\rho\sigma} \partial_j \Omega \Omega^{-\nu\mu\rho\sigma} \partial_i \Omega \Omega^{-\nu\mu\rho\sigma} \partial_k \Omega \Omega^{-\nu\mu\rho\sigma} \right]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$

$$\rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\left[i\epsilon^{kij} \partial_i \, tr \, (\partial_j \Omega \Omega \Delta \nabla \lambda_{i,k}) n^{-\Omega^{-\nu\mu\rho\sigma}} \right.$$

$$\left. - 1/3\epsilon^{kij} \, tr \, (\Omega^{-\nu\mu\rho\sigma} \partial_i \Omega \Omega^{-\nu\mu\rho\sigma} \partial_j \Omega \Omega^{-\nu\mu\rho\sigma} \partial_k \Omega \Omega^{-\nu\mu\rho\sigma} \right]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$

$$\rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\left[j\epsilon^{kij} \partial_j \, tr \, (\partial_i \Omega \Omega \Delta \nabla \lambda_{j,k}) n^{-\Omega^{-\mu\nu\rho\sigma}} \right.$$

$$\left. - 1/3\epsilon^{kij} \, tr \, (\Omega^{-\nu\mu\rho\sigma} \partial_j \Omega \Omega^{-\nu\mu\rho\sigma} \partial_i \Omega \Omega^{-\nu\mu\rho\sigma} \partial_k \Omega \Omega^{-\nu\mu\rho\sigma} \right]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$

$$\rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\left[k\epsilon^{kij} \partial_k \, tr \, (\partial_k \Omega \Omega \Delta \nabla \lambda_{i,j}) n^{-\Omega^{-\nu\mu\rho\sigma}} \right.$$

$$\left. - 1/3\epsilon^{kij} \, tr \, (\Omega^{-\nu\mu\rho\sigma} \partial_k \Omega \Omega^{-\nu\mu\rho\sigma} \partial_i \Omega \Omega^{-\nu\mu\rho\sigma} \partial_j \Omega \Omega^{-\nu\mu\rho\sigma} \right]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$

$$\rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\left[k\epsilon^{kij} \partial_k \, tr \, (\partial_k \Omega \Omega \Delta \nabla \lambda_{j,i}) n^{-\Omega^{-\nu\mu\rho\sigma}} \right.$$

$$\left. - 1/3\epsilon^{kij} \, tr \, (\Omega^{-\nu\mu\rho\sigma} \partial_k \Omega \Omega^{-\nu\mu\rho\sigma} \partial_j \Omega \Omega^{-\nu\mu\rho\sigma} \partial_i \Omega \Omega^{-\nu\mu\rho\sigma} \right]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$

$$\rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\left[j\epsilon^{kji} \partial_j \, tr \, (\partial_i \Omega \Omega \Delta \nabla \lambda_{k,j}) n^{-\Omega^{-\nu\mu\rho\sigma}} \right.$$

$$\left. - 1/3\epsilon^{kji} \, tr \, (\Omega^{-\nu\mu\rho\sigma} \partial_j \Omega \Omega^{-\nu\mu\rho\sigma} \partial_i \Omega \Omega^{-\nu\mu\rho\sigma} \partial_k \Omega \Omega^{-\nu\mu\rho\sigma} \right]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$

$$\rightarrow W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x\left[i\epsilon^{kji} \partial_i \, tr \, (\partial_j \Omega \Omega \Delta \nabla \lambda_{k,i}) n^{-\Omega^{-\nu\mu\rho\sigma}} \right.$$

$$\left. - 1/3\epsilon^{kji} \, tr \, (\Omega^{-\nu\mu\rho\sigma} \partial_i \Omega \Omega^{-\nu\mu\rho\sigma} \partial_j \Omega \Omega^{-\nu\mu\rho\sigma} \partial_k \Omega \Omega^{-\nu\mu\rho\sigma} \right]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$

$$\rightharpoonup W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x[j\epsilon^{kji}\partial_j\, tr\, (\partial_i \Omega\Omega\Delta\nabla\lambda_{j,k}) n^{-\Omega^{-\nu\mu\rho\sigma}}$$

$$- 1/3\epsilon^{kji}\, tr\, (\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$

$$\rightharpoonup W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x[i\epsilon^{kji}\partial_i\, tr\, (\partial_j \Omega\Omega\Delta\nabla\lambda_{i,k}) n^{-\Omega^{-\nu\mu\rho\sigma}}$$

$$- 1/3\epsilon^{kji}\, tr\, (\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$

$$\rightharpoonup W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x[k\epsilon^{kji}\partial_k\, tr\, (\partial_k \Omega\Omega\Delta\nabla\lambda_{j,i}) n^{-\Omega^{-\nu\mu\rho\sigma}}$$

$$- 1/3\epsilon^{kji}\, tr\, (\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle W[A]$$

$$\rightharpoonup W[B] + 1/16\pi^{\nu\mu\rho\sigma} \int d^{\nu\mu\rho\sigma}\, x[k\epsilon^{kji}\partial_k\, tr\, (\partial_k \Omega\Omega\Delta\nabla\lambda_{i,j}) n^{-\Omega^{-\nu\mu\rho\sigma}}$$

$$- 1/3\epsilon^{kji}\, tr\, (\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle n(\Omega) = 1/32\pi^{\mu\nu\sigma p}\int_{S^3} d^{\mu\nu\sigma p} S\epsilon^{ikj}\, tr(\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p})$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle n(\Omega) = 1/32\pi^{\mu\nu\sigma p}\int_{S^3} d^{\mu\nu\sigma p} S\epsilon^{ijk}\, tr(\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p})$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle n(\Omega) = 1/32\pi^{\mu\nu\sigma p}\int_{S^3} d^{\mu\nu\sigma p} S\epsilon^{jki}\, tr(\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p})$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle n(\Omega) = 1/32\pi^{\mu\nu\sigma p}\int_{S^3} d^{\mu\nu\sigma p} S\epsilon^{jik}\, tr(\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p})$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle n(\Omega) = 1/32\pi^{\mu\nu\sigma p}\int_{S^3} d^{\mu\nu\sigma p} S\epsilon^{kij}\, tr(\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p})$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle n(\Omega) = 1/32\pi^{\mu\nu\sigma p}\int_{S^3} d^{\mu\nu\sigma p} S\epsilon^{kji}\, tr(\Omega^{-\mu\nu\sigma p}\partial_k\Omega\Omega^{-\mu\nu\sigma p}\partial_j\Omega\Omega^{-\mu\nu\sigma p}\partial_i\Omega\Omega^{-\mu\nu\sigma p})$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle n(\Omega) = 1/32\pi^{\nu\mu\rho\sigma}\int_{S^3} d^{\nu\mu\rho\sigma} S\epsilon^{ikj}\, tr(\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma})$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle n(\Omega) = 1/32\pi^{\nu\mu\rho\sigma}\int_{S^3} d^{\nu\mu\rho\sigma} S\epsilon^{ijk}\, tr(\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma})$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle n(\Omega) = 1/32\pi^{\nu\mu\rho\sigma}\int_{S^3} d^{\nu\mu\rho\sigma} S\epsilon^{jki}\, tr(\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma})$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle n(\Omega) = 1/32\pi^{\nu\mu\rho\sigma}\int_{S^3} d^{\nu\mu\rho\sigma} S\epsilon^{jik}\, tr(\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma})$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle n(\Omega) = 1/32\pi^{\nu\mu\rho\sigma}\int_{S^3} d^{\nu\mu\rho\sigma} S\epsilon^{kij}\, tr(\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma})$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle n(\Omega) = 1/32\pi^{\nu\mu\rho\sigma}\int_{S^3} d^{\nu\mu\rho\sigma} S\epsilon^{kji}\, tr(\Omega^{-\nu\mu\rho\sigma}\partial_k\Omega\Omega^{-\nu\mu\rho\sigma}\partial_j\Omega\Omega^{-\nu\mu\rho\sigma}\partial_i\Omega\Omega^{-\nu\mu\rho\sigma})$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\psi\,(A) = e^{i\Theta W[A]}\psi_0(A)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\psi\,(B) = e^{i\Theta W[B]}\psi_0(B)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\psi\,(\partial\Delta\nabla\omega) = e^{i\Theta W[\partial\Delta\nabla\omega]}\psi_{\phi}\psi\partial\Delta\nabla\vartheta\varphi\tau(A)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\psi\,(\partial\Delta\nabla\omega) = e^{i\Theta W[\partial\Delta\nabla\omega]}\psi_{\phi}\psi\partial\Delta\nabla\vartheta\varphi\tau(B)$$

n. Dinámica hamiltoniana de partículas según la teoría de Yang-Mills.

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle = 1/\pi\epsilon^{ijke_{i\Theta W[\partial\Delta\nabla\omega]}}(-i\partial/\partial x + \Phi/\partial\pi R)exp^{\mu\nu\sigma p} + \psi_{\phi}\psi\partial\Delta\nabla\vartheta\varphi\tau(A) \quad + \quad \psi = \frac{1}{{}^{\mu\nu\sigma p}\sqrt{\frac{1}{\pi\epsilon^{ijk}}e^{\frac{i\Theta W[\partial\Delta\nabla\omega]}{R}}}} = E = \frac{1}{\pi e R^2}\left(n + \frac{\phi}{2\pi_{\varphi}}\right) = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\sum\iiiint \text{ħȸꞨѪǯЖДКџӜѪ}\varsigma\pi mc^{\mathbb{R}4}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle = 1/\pi\epsilon^{ijke_{i\Theta W[\partial\Delta\nabla\omega]}}(-i\partial/\partial x + \Phi/\partial\pi R)exp^{\nu\mu\rho\sigma} + \psi_{\phi}\psi\partial\Delta\nabla\vartheta\varphi\tau(A) \quad + \quad \psi = \frac{1}{{}^{\nu\mu\rho\sigma}\sqrt{\frac{1}{\pi\epsilon^{ijk}}e^{\frac{i\Theta W[\partial\Delta\nabla\omega]}{R}}}} = E = \frac{1}{\pi e R^2}\left(n + \frac{\phi}{2\pi_{\varphi}}\right) = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\sum\iiiint \text{ħȸꞨѪǯЖДКџӜѪ}\varsigma\pi mc^{\mathbb{R}4}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle = 1/\pi\epsilon^{ijke_{i\Theta W[\partial\Delta\nabla\omega]}}(-i\partial/\partial x + \Phi/\partial\pi R)exp^{\mu\nu\sigma p} + \psi_{\phi}\psi\partial\Delta\nabla\vartheta\varphi\tau(B) \quad + \quad \psi = \frac{1}{{}^{\mu\nu\sigma p}\sqrt{\frac{1}{\pi\epsilon^{ijk}}e^{\frac{i\Theta W[\partial\Delta\nabla\omega]}{R}}}} = E = \frac{1}{\pi e R^2}\left(n + \frac{\phi}{2\pi_{\varphi}}\right) = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\sum\iiiint \text{ħȸꞨѪǯЖДКџӜѪ}\varsigma\pi mc^{\mathbb{R}4}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle = 1/\pi\epsilon^{ijke_{i\Theta W[\partial\Delta\nabla\omega]}}(-i\partial/\partial x + \Phi/\partial\pi R)exp^{\nu\mu\rho\sigma} + \psi_{\phi}\psi\partial\Delta\nabla\vartheta\varphi\tau(B) \quad + \quad \psi = \frac{1}{{}^{\nu\mu\rho\sigma}\sqrt{\frac{1}{\pi\epsilon^{ijk}}e^{\frac{i\Theta W[\partial\Delta\nabla\omega]}{R}}}} = E = \frac{1}{\pi e R^2}\left(n + \frac{\phi}{2\pi_{\varphi}}\right) = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\sum\iiiint \text{ħȸꞨѪǯЖДКџӜѪ}\varsigma\pi mc^{\mathbb{R}4}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle = 1/\pi\epsilon^{ikje_{i\Theta W[\partial\Delta\nabla\omega]}}(-i\partial/\partial x + \Phi/\partial\pi R)exp^{\mu\nu\sigma p} + \psi_{\phi}\psi\partial\Delta\nabla\vartheta\varphi\tau(A) \quad + \quad \psi = \frac{1}{{}^{\mu\nu\sigma p}\sqrt{\frac{1}{\pi\epsilon^{ikj}}e^{\frac{i\Theta W[\partial\Delta\nabla\omega]}{R}}}} = E = \frac{1}{\pi e R^2}\left(n + \frac{\phi}{2\pi_{\varphi}}\right) = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\sum\iiiint \text{ħȸꞨѪǯЖДКџӜѪ}\varsigma\pi mc^{\mathbb{R}4}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle = 1/\pi\epsilon^{ikje_{i\Theta W[\partial\Delta\nabla\omega]}}(-i\partial/\partial x + \Phi/\partial\pi R)exp^{\nu\mu\rho\sigma} + \psi_{\phi}\psi\partial\Delta\nabla\vartheta\varphi\tau(A) \quad + \quad \psi = \frac{1}{{}^{\nu\mu\rho\sigma}\sqrt{\frac{1}{\pi\epsilon^{ikj}}e^{\frac{i\Theta W[\partial\Delta\nabla\omega]}{R}}}} = E = \frac{1}{\pi e R^2}\left(n + \frac{\phi}{2\pi_{\varphi}}\right) = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\sum\iiiint \text{ħȸꞨѪǯЖДКџӜѪ}\varsigma\pi mc^{\mathbb{R}4}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle = 1/\pi\epsilon^{ikje_{i\Theta W[\partial\Delta\nabla\omega]}}(-i\partial/\partial x + \Phi/\partial\pi R)exp^{\mu\nu\sigma p} + \psi_{\phi}\psi\partial\Delta\nabla\vartheta\varphi\tau(B) \quad + \quad \psi = \frac{1}{{}^{\mu\nu\sigma p}\sqrt{\frac{1}{\pi\epsilon^{ikj}}e^{\frac{i\Theta W[\partial\Delta\nabla\omega]}{R}}}} = E = \frac{1}{\pi e R^2}\left(n + \frac{\phi}{2\pi_{\varphi}}\right) = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\sum\iiiint \text{ħȸꞨѪǯЖДКџӜѪ}\varsigma\pi mc^{\mathbb{R}4}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle = 1/\pi\epsilon^{ikje_{i\theta W[\partial\Delta\nabla\omega]}}(-i\partial/\partial x + \Phi/\partial\pi R)exp^{\nu\mu p\sigma} + \psi_{\phi}\psi\partial\Delta\nabla\vartheta\varphi\tau(B) \quad + \quad \psi = \frac{1}{\nu\mu p\sigma\sqrt{\frac{1}{\pi\epsilon^{ikj}}e^{\frac{i\theta W[\partial\Delta\nabla\omega]}{R}}}} = E = \frac{1}{\pi e R^2}(n + \frac{\phi}{2\pi_{\varphi}}) = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\Sigma\iiiint \text{ħȸѬǯҖДКɥӜѪ}\zeta\pi mc^{\mathbb{R}4}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle = 1/\pi\epsilon^{jkie_{j\theta W[\partial\Delta\nabla\omega]}}(-j\partial/\partial x + \Phi/\partial\pi R)exp^{\mu\nu\sigma p} + \psi_{\phi}\psi\partial\Delta\nabla\vartheta\varphi\tau(A) \quad + \quad \psi = \frac{1}{\mu\nu\sigma p\sqrt{\frac{1}{\pi\epsilon^{jki}}e^{\frac{j\theta W[\partial\Delta\nabla\omega]}{R}}}} = E = \frac{1}{\pi e R^2}(n + \frac{\phi}{2\pi_{\varphi}}) = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\Sigma\iiiint \text{ħȸѬǯҖДКɥӜѪ}\zeta\pi mc^{\mathbb{R}4}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle = 1/\pi\epsilon^{jkie_{j\theta W[\partial\Delta\nabla\omega]}}(-j\partial/\partial x + \Phi/\partial\pi R)exp^{\nu\mu p\sigma} + \psi_{\phi}\psi\partial\Delta\nabla\vartheta\varphi\tau(A) \quad + \quad \psi = \frac{1}{\nu\mu p\sigma\sqrt{\frac{1}{\pi\epsilon^{jki}}e^{\frac{j\theta W[\partial\Delta\nabla\omega]}{R}}}} = E = \frac{1}{\pi e R^2}(n + \frac{\phi}{2\pi_{\varphi}}) = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\Sigma\iiiint \text{ħȸѬǯҖДКɥӜѪ}\zeta\pi mc^{\mathbb{R}4}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle = 1/\pi\epsilon^{jkie_{j\theta W[\partial\Delta\nabla\omega]}}(-j\partial/\partial x + \Phi/\partial\pi R)exp^{\mu\nu\sigma p} + \psi_{\phi}\psi\partial\Delta\nabla\vartheta\varphi\tau(B) \quad + \quad \psi = \frac{1}{\mu\nu\sigma p\sqrt{\frac{1}{\pi\epsilon^{jki}}e^{\frac{j\theta W[\partial\Delta\nabla\omega]}{R}}}} = E = \frac{1}{\pi e R^2}(n + \frac{\phi}{2\pi_{\varphi}}) = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\Sigma\iiiint \text{ħȸѬǯҖДКɥӜѪ}\zeta\pi mc^{\mathbb{R}4}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle = 1/\pi\epsilon^{jkie_{j\theta W[\partial\Delta\nabla\omega]}}(-j\partial/\partial x + \Phi/\partial\pi R)exp^{\nu\mu p\sigma} + \psi_{\phi}\psi\partial\Delta\nabla\vartheta\varphi\tau(B) \quad + \quad \psi = \frac{1}{\nu\mu p\sigma\sqrt{\frac{1}{\pi\epsilon^{jki}}e^{\frac{j\theta W[\partial\Delta\nabla\omega]}{R}}}} = E = \frac{1}{\pi e R^2}(n + \frac{\phi}{2\pi_{\varphi}}) = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\Sigma\iiiint \text{ħȸѬǯҖДКɥӜѪ}\zeta\pi mc^{\mathbb{R}4}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle = 1/\pi\epsilon^{jike_{j\theta W[\partial\Delta\nabla\omega]}}(-j\partial/\partial x + \Phi/\partial\pi R)exp^{\mu\nu\sigma p} + \psi_{\phi}\psi\partial\Delta\nabla\vartheta\varphi\tau(A) \quad + \quad \psi = \frac{1}{\mu\nu\sigma p\sqrt{\frac{1}{\pi\epsilon^{jik}}e^{\frac{j\theta W[\partial\Delta\nabla\omega]}{R}}}} = E = \frac{1}{\pi e R^2}(n + \frac{\phi}{2\pi_{\varphi}}) = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\Sigma\iiiint \text{ħȸѬǯҖДКɥӜѪ}\zeta\pi mc^{\mathbb{R}4}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle = 1/\pi\epsilon^{jike_{j\theta W[\partial\Delta\nabla\omega]}}(-j\partial/\partial x + \Phi/\partial\pi R)exp^{\nu\mu p\sigma} + \psi_{\phi}\psi\partial\Delta\nabla\vartheta\varphi\tau(A) \quad + \quad \psi = \frac{1}{\nu\mu p\sigma\sqrt{\frac{1}{\pi\epsilon^{jik}}e^{\frac{j\theta W[\partial\Delta\nabla\omega]}{R}}}} = E = \frac{1}{\pi e R^2}(n + \frac{\phi}{2\pi_{\varphi}}) = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\Sigma\iiiint \text{ħȸѬǯҖДКɥӜѪ}\zeta\pi mc^{\mathbb{R}4}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle = 1/\pi\epsilon^{jike_{j\theta W[\partial\Delta\nabla\omega]}}(-j\partial/\partial x + \Phi/\partial\pi R)exp^{\mu\nu\sigma p} + \psi_{\phi}\psi\partial\Delta\nabla\vartheta\varphi\tau(B) \quad + \quad \psi = \frac{1}{\mu\nu\sigma p\sqrt{\frac{1}{\pi\epsilon^{jik}}e^{\frac{j\theta W[\partial\Delta\nabla\omega]}{R}}}} = E = \frac{1}{\pi e R^2}(n + \frac{\phi}{2\pi_{\varphi}}) = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\Sigma\iiiint \text{ħȸѬǯҖДКɥӜѪ}\zeta\pi mc^{\mathbb{R}4}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle = 1/\pi\epsilon^{jike_{j\theta W[\partial\Delta\nabla\omega]}}(-j\partial/\partial x + \Phi/\partial\pi R)exp^{\nu\mu p\sigma} + \psi_{\phi}\psi\partial\Delta\nabla\vartheta\varphi\tau(B) \quad + \quad \psi = \frac{1}{\nu\mu p\sigma\sqrt{\frac{1}{\pi\epsilon^{jik}}e^{\frac{j\theta W[\partial\Delta\nabla\omega]}{R}}}} = E = \frac{1}{\pi e R^2}(n + \frac{\phi}{2\pi_{\varphi}}) = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\Sigma\iiiint \text{ħȸѬǯҖДКɥӜѪ}\zeta\pi mc^{\mathbb{R}4}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle = 1/\pi\epsilon^{kije_{k\theta W[\partial\Delta\nabla\omega]}}(-k\partial/\partial x + \Phi/\partial\pi R)exp^{\mu\nu\sigma p} + \psi_{\phi}\psi\partial\Delta\nabla\vartheta\varphi\tau(A) \quad + \quad \psi = \frac{1}{\sqrt[\mu\nu\sigma p]{\frac{1}{\pi\epsilon^{kij}}e^{\frac{k\Theta W[\partial\Delta\nabla\omega]}{R}}}} = E = \frac{1}{\pi e R^2}\left(n + \frac{\phi}{2\pi_{\varphi}}\right) = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\sum \iint\iint \text{ħфѬѮҖДКфӜѪ}\zeta\pi mc^{\mathbb{R}4}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle = 1/\pi\epsilon^{kije_{k\theta W[\partial\Delta\nabla\omega]}}(-k\partial/\partial x + \Phi/\partial\pi R)exp^{\nu\mu\rho\sigma} + \psi_{\phi}\psi\partial\Delta\nabla\vartheta\varphi\tau(A) \quad + \quad \psi = \frac{1}{\sqrt[\nu\mu\rho\sigma]{\frac{1}{\pi\epsilon^{kij}}e^{\frac{k\Theta W[\partial\Delta\nabla\omega]}{R}}}} = E = \frac{1}{\pi e R^2}\left(n + \frac{\phi}{2\pi_{\varphi}}\right) = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\sum \iint\iint \text{ħфѬѮҖДКфӜѪ}\zeta\pi mc^{\mathbb{R}4}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle = 1/\pi\epsilon^{kije_{k\theta W[\partial\Delta\nabla\omega]}}(-k\partial/\partial x + \Phi/\partial\pi R)exp^{\mu\nu\sigma p} + \psi_{\phi}\psi\partial\Delta\nabla\vartheta\varphi\tau(B) \quad + \quad \psi = \frac{1}{\sqrt[\mu\nu\sigma p]{\frac{1}{\pi\epsilon^{kij}}e^{\frac{k\Theta W[\partial\Delta\nabla\omega]}{R}}}} = E = \frac{1}{\pi e R^2}\left(n + \frac{\phi}{2\pi_{\varphi}}\right) = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\sum \iint\iint \text{ħфѬѮҖДКфӜѪ}\zeta\pi mc^{\mathbb{R}4}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle = 1/\pi\epsilon^{kije_{k\theta W[\partial\Delta\nabla\omega]}}(-k\partial/\partial x + \Phi/\partial\pi R)exp^{\nu\mu\rho\sigma} + \psi_{\phi}\psi\partial\Delta\nabla\vartheta\varphi\tau(B) \quad + \quad \psi = \frac{1}{\sqrt[\nu\mu\rho\sigma]{\frac{1}{\pi\epsilon^{kij}}e^{\frac{k\Theta W[\partial\Delta\nabla\omega]}{R}}}} = E = \frac{1}{\pi e R^2}\left(n + \frac{\phi}{2\pi_{\varphi}}\right) = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\sum \iint\iint \text{ħфѬѮҖДКфӜѪ}\zeta\pi mc^{\mathbb{R}4}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle = 1/\pi\epsilon^{kjie_{k\theta W[\partial\Delta\nabla\omega]}}(-k\partial/\partial x + \Phi/\partial\pi R)exp^{\mu\nu\sigma p} + \psi_{\phi}\psi\partial\Delta\nabla\vartheta\varphi\tau(A) \quad + \quad \psi = \frac{1}{\sqrt[\mu\nu\sigma p]{\frac{1}{\pi\epsilon^{kji}}e^{\frac{k\Theta W[\partial\Delta\nabla\omega]}{R}}}} = E = \frac{1}{\pi e R^2}\left(n + \frac{\phi}{2\pi_{\varphi}}\right) = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\sum \iint\iint \text{ħфѬѮҖДКфӜѪ}\zeta\pi mc^{\mathbb{R}4}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle = 1/\pi\epsilon^{kjie_{k\theta W[\partial\Delta\nabla\omega]}}(-k\partial/\partial x + \Phi/\partial\pi R)exp^{\nu\mu\rho\sigma} + \psi_{\phi}\psi\partial\Delta\nabla\vartheta\varphi\tau(A) \quad + \quad \psi = \frac{1}{\sqrt[\nu\mu\rho\sigma]{\frac{1}{\pi\epsilon^{kji}}e^{\frac{k\Theta W[\partial\Delta\nabla\omega]}{R}}}} = E = \frac{1}{\pi e R^2}\left(n + \frac{\phi}{2\pi_{\varphi}}\right) = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\sum \iint\iint \text{ħфѬѮҖДКфӜѪ}\zeta\pi mc^{\mathbb{R}4}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle = 1/\pi\epsilon^{kjie_{k\theta W[\partial\Delta\nabla\omega]}}(-k\partial/\partial x + \Phi/\partial\pi R)exp^{\mu\nu\sigma p} + \psi_{\phi}\psi\partial\Delta\nabla\vartheta\varphi\tau(B) \quad + \quad \psi = \frac{1}{\sqrt[\mu\nu\sigma p]{\frac{1}{\pi\epsilon^{kji}}e^{\frac{k\Theta W[\partial\Delta\nabla\omega]}{R}}}} = E = \frac{1}{\pi e R^2}\left(n + \frac{\phi}{2\pi_{\varphi}}\right) = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\sum \iint\iint \text{ħфѬѮҖДКфӜѪ}\zeta\pi mc^{\mathbb{R}4}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle = 1/\pi\epsilon^{kjie_{k\theta W[\partial\Delta\nabla\omega]}}(-k\partial/\partial x + \Phi/\partial\pi R)exp^{\nu\mu\rho\sigma} + \psi_{\phi}\psi\partial\Delta\nabla\vartheta\varphi\tau(B) \quad + \quad \psi = \frac{1}{\sqrt[\nu\mu\rho\sigma]{\frac{1}{\pi\epsilon^{kji}}e^{\frac{k\Theta W[\partial\Delta\nabla\omega]}{R}}}} = E = \frac{1}{\pi e R^2}\left(n + \frac{\phi}{2\pi_{\varphi}}\right) = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\sum \iint\iint \text{ħфѬѮҖДКфӜѪ}\zeta\pi mc^{\mathbb{R}4}$$

o. Ángulo Theta.

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle H = 1/2m\partial^2/\partial x^2 + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle H = 1/2m\partial^2/\partial y^2 + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle H$$
$$= 1/2m\partial^2/\partial z^2 + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle H$$
$$= 1/2m\partial^{ijk}/\partial n^{\mu\nu\sigma p}/\partial\psi^{\frac{i\Theta W[\partial\Delta\nabla\omega]}{R}} - \partial i\varphi\Phi\omega\Omega\Delta\nabla\phi\sigma\lambda\xi\Psi\mathbb{R}^{\alpha\beta\psi_{ЖЖфп}\infty^{\mathbb{R}4}} + \hat{H} \mid \psi\rangle$$
$$= E_{\psi} \mid \psi\rangle H$$
$$= 1/2m\partial^{ikj}/\partial n^{\mu\nu\sigma p}/\partial\psi^{\frac{i\Theta W[\partial\Delta\nabla\omega]}{R}} - \partial i\varphi\Phi\omega\Omega\Delta\nabla\phi\sigma\lambda\xi\Psi\mathbb{R}^{\alpha\beta\psi_{ЖЖфп}\infty^{\mathbb{R}4}} + \hat{H} \mid \psi\rangle$$
$$= E_{\psi} \mid \psi\rangle H$$
$$= 1/2m\partial^{jik}/\partial n^{\mu\nu\sigma p}/\partial\psi^{\frac{j\Theta W[\partial\Delta\nabla\omega]}{R}} - \partial j\varphi\Phi\omega\Omega\Delta\nabla\phi\sigma\lambda\xi\Psi\mathbb{R}^{\alpha\beta\psi_{ЖЖфп}\infty^{\mathbb{R}4}} + \hat{H} \mid \psi\rangle$$
$$= E_{\psi} \mid \psi\rangle H$$
$$= 1/2m\partial^{jki}/\partial n^{\mu\nu\sigma p}/\partial\psi^{\frac{j\Theta W[\partial\Delta\nabla\omega]}{R}} - \partial j\varphi\Phi\omega\Omega\Delta\nabla\phi\sigma\lambda\xi\Psi\mathbb{R}^{\alpha\beta\psi_{ЖЖфп}\infty^{\mathbb{R}4}} + \hat{H} \mid \psi\rangle$$
$$= E_{\psi} \mid \psi\rangle H$$
$$= 1/2m\partial^{kij}/\partial n^{\mu\nu\sigma p}/\partial\psi^{\frac{k\Theta W[\partial\Delta\nabla\omega]}{R}} - \partial k\varphi\Phi\omega\Omega\Delta\nabla\phi\sigma\lambda\xi\Psi\mathbb{R}^{\alpha\beta\psi_{ЖЖфп}\infty^{\mathbb{R}4}} + \hat{H} \mid \psi\rangle$$
$$= E_{\psi} \mid \psi\rangle H = 1/2m\partial^{kji}/\partial n^{\mu\nu\sigma p}/\partial\psi^{\frac{k\Theta W[\partial\Delta\nabla\omega]}{R}} - \partial k\varphi\Phi\omega\Omega\Delta\nabla\phi\sigma\lambda\xi\Psi\mathbb{R}^{\alpha\beta\psi_{ЖЖфп}\infty^{\mathbb{R}4}}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle H = 1/2m\partial^2/\partial x^2 + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle H = 1/2m\partial^2/\partial y^2 + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle H$$
$$= 1/2m\partial^2/\partial z^2 + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle H$$
$$= 1/2m\partial^{ijk}/\partial n^{\nu\mu p\sigma}/\partial\psi^{\frac{i\Theta W[\partial\Delta\nabla\omega]}{R}} - \partial i\varphi\Phi\omega\Omega\Delta\nabla\phi\sigma\lambda\xi\Psi\mathbb{R}^{\alpha\beta\psi_{ЖЖфп}\infty^{\mathbb{R}4}} + \hat{H} \mid \psi\rangle$$
$$= E_{\psi} \mid \psi\rangle H$$
$$= 1/2m\partial^{ikj}/\partial n^{\nu\mu p\sigma}/\partial\psi^{\frac{i\Theta W[\partial\Delta\nabla\omega]}{R}} - \partial i\varphi\Phi\omega\Omega\Delta\nabla\phi\sigma\lambda\xi\Psi\mathbb{R}^{\alpha\beta\psi_{ЖЖфп}\infty^{\mathbb{R}4}} + \hat{H} \mid \psi\rangle$$
$$= E_{\psi} \mid \psi\rangle H$$
$$= 1/2m\partial^{jik}/\partial n^{\nu\mu p\sigma}/\partial\psi^{\frac{j\Theta W[\partial\Delta\nabla\omega]}{R}} - \partial j\varphi\Phi\omega\Omega\Delta\nabla\phi\sigma\lambda\xi\Psi\mathbb{R}^{\alpha\beta\psi_{ЖЖфп}\infty^{\mathbb{R}4}} + \hat{H} \mid \psi\rangle$$
$$= E_{\psi} \mid \psi\rangle H$$
$$= 1/2m\partial^{jki}/\partial n^{\nu\mu p\sigma}/\partial\psi^{\frac{j\Theta W[\partial\Delta\nabla\omega]}{R}} - \partial j\varphi\Phi\omega\Omega\Delta\nabla\phi\sigma\lambda\xi\Psi\mathbb{R}^{\alpha\beta\psi_{ЖЖфп}\infty^{\mathbb{R}4}} + \hat{H} \mid \psi\rangle$$
$$= E_{\psi} \mid \psi\rangle H$$
$$= 1/2m\partial^{kij}/\partial n^{\nu\mu p\sigma}/\partial\psi^{\frac{k\Theta W[\partial\Delta\nabla\omega]}{R}} - \partial k\varphi\Phi\omega\Omega\Delta\nabla\phi\sigma\lambda\xi\Psi\mathbb{R}^{\alpha\beta\psi_{ЖЖфп}\infty^{\mathbb{R}4}} + \hat{H} \mid \psi\rangle$$
$$= E_{\psi} \mid \psi\rangle H = 1/2m\partial^{kji}/\partial n^{\nu\mu p\sigma}/\partial\psi^{\frac{k\Theta W[\partial\Delta\nabla\omega]}{R}} - \partial k\varphi\Phi\omega\Omega\Delta\nabla\phi\sigma\lambda\xi\Psi\mathbb{R}^{\alpha\beta\psi_{ЖЖфп}\infty^{\mathbb{R}4}}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(A') = e^{i\theta n}\varphi_{\mu\nu\sigma p}(Ai)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle \varphi_{\mu\nu\sigma p}(A') = e^{i\theta n}\varphi_{\mu\nu\sigma p}(Bi)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle \varphi_{\mu\nu\sigma p}(B') = e^{i\theta n}\varphi_{\mu\nu\sigma p}(Ai)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle \varphi_{\mu\nu\sigma p}(B') = e^{i\theta n}\varphi_{\mu\nu\sigma p}(Bi)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle \varphi_{\mu\nu\sigma p}(A') = e^{j\theta n}\varphi_{\mu\nu\sigma p}(Aj)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle \varphi_{\mu\nu\sigma p}(A') = e^{j\theta n}\varphi_{\mu\nu\sigma p}(Bj)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle \varphi_{\mu\nu\sigma p}(B') = e^{j\theta n}\varphi_{\mu\nu\sigma p}(Aj)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle \varphi_{\mu\nu\sigma p}(B') = e^{j\theta n}\varphi_{\mu\nu\sigma p}(Bj)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle \varphi_{\mu\nu\sigma p}(A') = e^{k\theta n}\varphi_{\mu\nu\sigma p}(Ak)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle \varphi_{\mu\nu\sigma p}(A') = e^{k\theta n}\varphi_{\mu\nu\sigma p}(Bk)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle \varphi_{\mu\nu\sigma p}(B') = e^{k\theta n}\varphi_{\mu\nu\sigma p}(Ak)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle \varphi_{\mu\nu\sigma p}(B') = e^{k\theta n}\varphi_{\mu\nu\sigma p}(Bk)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle \varphi_{\mu\nu\sigma p}(A') = e^{ijk\theta n}\varphi_{\mu\nu\sigma p}(Ai, Aj, Ak)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle \varphi_{\mu\nu\sigma p}(A') = e^{ijk\theta n}\varphi_{\mu\nu\sigma p}(Bi, Bj, Bk)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle \varphi_{\mu\nu\sigma p}(B') = e^{ijk\theta n}\varphi_{\mu\nu\sigma p}(Ai, Aj, Ak)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle \varphi_{\mu\nu\sigma p}(B') = e^{ijk\theta n}\varphi_{\mu\nu\sigma p}(Bi, Bj, Bk)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle \varphi_{\mu\nu\sigma p}(A') = e^{ikj\theta n}\varphi_{\mu\nu\sigma p}(Ai, Ak, Aj)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle \varphi_{\mu\nu\sigma p}(A') = e^{ikj\theta n}\varphi_{\mu\nu\sigma p}(Bi, Bk, Bj)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle \varphi_{\mu\nu\sigma p}(B') = e^{ikj\theta n}\varphi_{\mu\nu\sigma p}(Ai, Ak, Aj)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle \varphi_{\mu\nu\sigma p}(B') = e^{ikj\theta n}\varphi_{\mu\nu\sigma p}(Bi, Bk, Bj)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle \varphi_{\mu\nu\sigma p}(A') = e^{jik\theta n}\varphi_{\mu\nu\sigma p}(Aj, Ai, Ak)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle \varphi_{\mu\nu\sigma p}(A') = e^{jik\theta n}\varphi_{\mu\nu\sigma p}(Bj, Bi, Bk)$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle \varphi_{\mu\nu\sigma p}(B') = e^{jik\theta n}\varphi_{\mu\nu\sigma p}(Aj, Ai, Ak)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(B') = e^{jik\theta n} \varphi_{\mu\nu\sigma p}(Bj, Bi, Bk)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(A') = e^{jki\theta n} \varphi_{\mu\nu\sigma p}(Aj, Ak, Ai)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(A') = e^{jki\theta n} \varphi_{\mu\nu\sigma p}(Bj, Bk, Bi)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(B') = e^{jki\theta n} \varphi_{\mu\nu\sigma p}(Aj, Ak, Ai)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(B') = e^{jki\theta n} \varphi_{\mu\nu\sigma p}(Bj, Bk, Bi)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(A') = e^{kij\theta n} \varphi_{\mu\nu\sigma p}(Ak, Ai, Aj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(A') = e^{kij\theta n} \varphi_{\mu\nu\sigma p}(Bk, Bi, Bj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(B') = e^{kij\theta n} \varphi_{\mu\nu\sigma p}(Ak, Ai, Aj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(B') = e^{kij\theta n} \varphi_{\mu\nu\sigma p}(Bk, Bi, Bj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(A') = e^{kji\theta n} \varphi_{\mu\nu\sigma p}(Ak, Aj, Ai)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(A') = e^{kji\theta n} \varphi_{\mu\nu\sigma p}(Bk, Bj, Bi)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(B') = e^{kji\theta n} \varphi_{\mu\nu\sigma p}(Ak, Aj, Ai)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(B') = e^{kji\theta n} \varphi_{\mu\nu\sigma p}(Bk, Bj, Bi)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu p\sigma}(A') = e^{i\theta n} \varphi_{\nu\mu p\sigma}(Ai)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu p\sigma}(A') = e^{i\theta n} \varphi_{\nu\mu p\sigma}(Bi)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu p\sigma}(B') = e^{i\theta n} \varphi_{\nu\mu p\sigma}(Ai)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu p\sigma}(B') = e^{i\theta n} \varphi_{\nu\mu p\sigma}(Bi)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu p\sigma}(A') = e^{j\theta n} \varphi_{\nu\mu p\sigma}(Aj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu p\sigma}(A') = e^{j\theta n} \varphi_{\nu\mu p\sigma}(Bj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu p\sigma}(B') = e^{j\theta n} \varphi_{\nu\mu p\sigma}(Aj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu p\sigma}(B') = e^{j\theta n} \varphi_{\nu\mu p\sigma}(Bj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu p\sigma}(A') = e^{k\theta n} \varphi_{\nu\mu p\sigma}(Ak)$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu\rho\sigma}(A') = e^{k\theta n}\varphi_{\nu\mu\rho\sigma}(Bk)$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu\rho\sigma}(B') = e^{k\theta n}\varphi_{\nu\mu\rho\sigma}(Ak)$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu\rho\sigma}(B') = e^{k\theta n}\varphi_{\nu\mu\rho\sigma}(Bk)$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu\rho\sigma}(A') = e^{ijk\theta n}\varphi_{\nu\mu\rho\sigma}(Ai, Aj, Ak)$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu\rho\sigma}(A') = e^{ijk\theta n}\varphi_{\nu\mu\rho\sigma}(Bi, Bj, Bk)$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu\rho\sigma}(B') = e^{ijk\theta n}\varphi_{\nu\mu\rho\sigma}(Ai, Aj, Ak)$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu\rho\sigma}(B') = e^{ijk\theta n}\varphi_{\nu\mu\rho\sigma}(Bi, Bj, Bk)$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu\rho\sigma}(A') = e^{ikj\theta n}\varphi_{\nu\mu\rho\sigma}(Ai, Ak, Aj)$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu\rho\sigma}(A') = e^{ikj\theta n}\varphi_{\nu\mu\rho\sigma}(Bi, Bk, Bj)$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu\rho\sigma}(B') = e^{ikj\theta n}\varphi_{\nu\mu\rho\sigma}(Ai, Ak, Aj)$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu\rho\sigma}(B') = e^{ikj\theta n}\varphi_{\nu\mu\rho\sigma}(Bi, Bk, Bj)$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu\rho\sigma}(A') = e^{jik\theta n}\varphi_{\nu\mu\rho\sigma}(Aj, Ai, Ak)$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu\rho\sigma}(A') = e^{jik\theta n}\varphi_{\nu\mu\rho\sigma}(Bj, Bi, Bk)$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu\rho\sigma}(B') = e^{jik\theta n}\varphi_{\nu\mu\rho\sigma}(Aj, Ai, Ak)$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu\rho\sigma}(B') = e^{jik\theta n}\varphi_{\nu\mu\rho\sigma}(Bj, Bi, Bk)$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu\rho\sigma}(A') = e^{jki\theta n}\varphi_{\nu\mu\rho\sigma}(Aj, Ak, Ai)$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu\rho\sigma}(A') = e^{jki\theta n}\varphi_{\nu\mu\rho\sigma}(Bj, Bk, Bi)$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu\rho\sigma}(B') = e^{jki\theta n}\varphi_{\nu\mu\rho\sigma}(Aj, Ak, Ai)$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu\rho\sigma}(B') = e^{jki\theta n}\varphi_{\nu\mu\rho\sigma}(Bj, Bk, Bi)$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu\rho\sigma}(A') = e^{kij\theta n}\varphi_{\nu\mu\rho\sigma}(Ak, Ai, Aj)$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu\rho\sigma}(A') = e^{kij\theta n}\varphi_{\nu\mu\rho\sigma}(Bk, Bi, Bj)$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu\rho\sigma}(B') = e^{kij\theta n}\varphi_{\nu\mu\rho\sigma}(Ak, Ai, Aj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu\rho\sigma}(B') = e^{kij\theta n} \varphi_{\nu\mu\rho\sigma}(Bk, Bi, Bj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu\rho\sigma}(A') = e^{kji\theta n} \varphi_{\nu\mu\rho\sigma}(Ak, Aj, Ai)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu\rho\sigma}(A') = e^{kji\theta n} \varphi_{\nu\mu\rho\sigma}(Bk, Bj, Bi)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu\rho\sigma}(B') = e^{kji\theta n} \varphi_{\nu\mu\rho\sigma}(Ak, Aj, Ai)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\nu\mu\rho\sigma}(B') = e^{kji\theta n} \varphi_{\nu\mu\rho\sigma}(Bk, Bj, Bi)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(A') = e^{i\theta n} \varphi_{\nu\mu\rho\sigma}(Ai)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(A') = e^{i\theta n} \varphi_{\nu\mu\rho\sigma}(Bi)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(B') = e^{i\theta n} \varphi_{\nu\mu\rho\sigma}(Ai)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(B') = e^{i\theta n} \varphi_{\nu\mu\rho\sigma}(Bi)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(A') = e^{j\theta n} \varphi_{\nu\mu\rho\sigma}(Aj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(A') = e^{j\theta n} \varphi_{\nu\mu\rho\sigma}(Bj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(B') = e^{j\theta n} \varphi_{\nu\mu\rho\sigma}(Aj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(B') = e^{j\theta n} \varphi_{\nu\mu\rho\sigma}(Bj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(A') = e^{k\theta n} \varphi_{\nu\mu\rho\sigma}(Ak)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(A') = e^{k\theta n} \varphi_{\nu\mu\rho\sigma}(Bk)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(B') = e^{k\theta n} \varphi_{\nu\mu\rho\sigma}(Ak)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(B') = e^{k\theta n} \varphi_{\nu\mu\rho\sigma}(Bk)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(A') = e^{ijk\theta n} \varphi_{\nu\mu\rho\sigma}(Ai, Aj, Ak)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(A') = e^{ijk\theta n} \varphi_{\nu\mu\rho\sigma}(Bi, Bj, Bk)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(B') = e^{ijk\theta n} \varphi_{\nu\mu\rho\sigma}(Ai, Aj, Ak)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(B') = e^{ijk\theta n} \varphi_{\nu\mu\rho\sigma}(Bi, Bj, Bk)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \varphi_{\mu\nu\sigma p}(A') = e^{ikj\theta n} \varphi_{\nu\mu\rho\sigma}(Ai, Ak, Aj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{\mu\nu\sigma p}(A') = e^{ikj\theta n}\varphi_{\nu\mu p\sigma}(Bi, Bk, Bj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{\mu\nu\sigma p}(B') = e^{ikj\theta n}\varphi_{\nu\mu p\sigma}(Ai, Ak, Aj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{\mu\nu\sigma p}(B') = e^{ikj\theta n}\varphi_{\nu\mu p\sigma}(Bi, Bk, Bj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{\mu\nu\sigma p}(A') = e^{jik\theta n}\varphi_{\nu\mu p\sigma}(Aj, Ai, Ak)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{\mu\nu\sigma p}(A') = e^{jik\theta n}\varphi_{\nu\mu p\sigma}(Bj, Bi, Bk)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{\mu\nu\sigma p}(B') = e^{jik\theta n}\varphi_{\nu\mu p\sigma}(Aj, Ai, Ak)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{\mu\nu\sigma p}(B') = e^{jik\theta n}\varphi_{\nu\mu p\sigma}(Bj, Bi, Bk)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{\mu\nu\sigma p}(A') = e^{jki\theta n}\varphi_{\nu\mu p\sigma}(Aj, Ak, Ai)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{\mu\nu\sigma p}(A') = e^{jki\theta n}\varphi_{\nu\mu p\sigma}(Bj, Bk, Bi)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{\mu\nu\sigma p}(B') = e^{jki\theta n}\varphi_{\nu\mu p\sigma}(Aj, Ak, Ai)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{\mu\nu\sigma p}(B') = e^{jki\theta n}\varphi_{\nu\mu p\sigma}(Bj, Bk, Bi)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{\mu\nu\sigma p}(A') = e^{kij\theta n}\varphi_{\nu\mu p\sigma}(Ak, Ai, Aj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{\mu\nu\sigma p}(A') = e^{kij\theta n}\varphi_{\nu\mu p\sigma}(Bk, Bi, Bj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{\mu\nu\sigma p}(B') = e^{kij\theta n}\varphi_{\nu\mu p\sigma}(Ak, Ai, Aj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{\mu\nu\sigma p}(B') = e^{kij\theta n}\varphi_{\nu\mu p\sigma}(Bk, Bi, Bj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{\mu\nu\sigma p}(A') = e^{kji\theta n}\varphi_{\nu\mu p\sigma}(Ak, Aj, Ai)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{\mu\nu\sigma p}(A') = e^{kji\theta n}\varphi_{\nu\mu p\sigma}(Bk, Bj, Bi)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{\mu\nu\sigma p}(B') = e^{kji\theta n}\varphi_{\nu\mu p\sigma}(Ak, Aj, Ai)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{\mu\nu\sigma p}(B') = e^{kji\theta n}\varphi_{\nu\mu p\sigma}(Bk, Bj, Bi)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{\nu\mu p\sigma}(A') = e^{i\theta n}\varphi_{\mu\nu\sigma p}(Ai)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{\nu\mu p\sigma}(A') = e^{i\theta n}\varphi_{\mu\nu\sigma p}(Bi)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{\nu\mu p\sigma}(B') = e^{i\theta n}\varphi_{\mu\nu\sigma p}(Ai)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu\rho\sigma}(B') = e^{i\theta n}\varphi_{\mu v\sigma p}(Bi)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu\rho\sigma}(A') = e^{j\theta n}\varphi_{\mu v\sigma p}(Aj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu\rho\sigma}(A') = e^{j\theta n}\varphi_{\mu v\sigma p}(Bj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu\rho\sigma}(B') = e^{j\theta n}\varphi_{\mu v\sigma p}(Aj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu\rho\sigma}(B') = e^{j\theta n}\varphi_{\mu v\sigma p}(Bj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu\rho\sigma}(A') = e^{k\theta n}\varphi_{\mu v\sigma p}(Ak)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu\rho\sigma}(A') = e^{k\theta n}\varphi_{\mu v\sigma p}(Bk)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu\rho\sigma}(B') = e^{k\theta n}\varphi_{\mu v\sigma p}(Ak)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu\rho\sigma}(B') = e^{k\theta n}\varphi_{\mu v\sigma p}(Bk)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu\rho\sigma}(A') = e^{ijk\theta n}\varphi_{\mu v\sigma p}(Ai, Aj, Ak)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu\rho\sigma}(A') = e^{ijk\theta n}\varphi_{\mu v\sigma p}(Bi, Bj, Bk)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu\rho\sigma}(B') = e^{ijk\theta n}\varphi_{\mu v\sigma p}(Ai, Aj, Ak)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu\rho\sigma}(B') = e^{ijk\theta n}\varphi_{\mu v\sigma p}(Bi, Bj, Bk)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu\rho\sigma}(A') = e^{ikj\theta n}\varphi_{\mu v\sigma p}(Ai, Ak, Aj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu\rho\sigma}(A') = e^{ikj\theta n}\varphi_{\mu v\sigma p}(Bi, Bk, Bj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu\rho\sigma}(B') = e^{ikj\theta n}\varphi_{\mu v\sigma p}(Ai, Ak, Aj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu\rho\sigma}(B') = e^{ikj\theta n}\varphi_{\mu v\sigma p}(Bi, Bk, Bj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu\rho\sigma}(A') = e^{jik\theta n}\varphi_{\mu v\sigma p}(Aj, Ai, Ak)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu\rho\sigma}(A') = e^{jik\theta n}\varphi_{\mu v\sigma p}(Bj, Bi, Bk)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu\rho\sigma}(B') = e^{jik\theta n}\varphi_{\mu v\sigma p}(Aj, Ai, Ak)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu\rho\sigma}(B') = e^{jik\theta n}\varphi_{\mu v\sigma p}(Bj, Bi, Bk)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu\rho\sigma}(A') = e^{jki\theta n}\varphi_{\mu v\sigma p}(Aj, Ak, Ai)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu p\sigma}(A') = e^{jki\theta n}\varphi_{\mu v\sigma p}(Bj, Bk, Bi)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu p\sigma}(B') = e^{jki\theta n}\varphi_{\mu v\sigma p}(Aj, Ak, Ai)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu p\sigma}(B') = e^{jki\theta n}\varphi_{\mu v\sigma p}(Bj, Bk, Bi)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu p\sigma}(A') = e^{kij\theta n}\varphi_{\mu v\sigma p}(Ak, Ai, Aj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu p\sigma}(A') = e^{kij\theta n}\varphi_{\mu v\sigma p}(Bk, Bi, Bj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu p\sigma}(B') = e^{kij\theta n}\varphi_{\mu v\sigma p}(Ak, Ai, Aj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu p\sigma}(B') = e^{kij\theta n}\varphi_{\mu v\sigma p}(Bk, Bi, Bj)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu p\sigma}(A') = e^{kji\theta n}\varphi_{\mu v\sigma p}(Ak, Aj, Ai)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu p\sigma}(A') = e^{kji\theta n}\varphi_{\mu v\sigma p}(Bk, Bj, Bi)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu p\sigma}(B') = e^{kji\theta n}\varphi_{\mu v\sigma p}(Ak, Aj, Ai)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\varphi_{v\mu p\sigma}(B') = e^{kji\theta n}\varphi_{\mu v\sigma p}(Bk, Bj, Bi)$$

p. Ondas de Bloch.

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle iV\nabla V^{\mu v\sigma p} + iV\nabla V^{ijk} + iV\nabla V^{\mu v} + iV\nabla V_{vu} = \lambda\nabla\Delta_j^i k$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle iV\nabla V^{v\mu p\sigma} + iV\nabla V^{ijk} + iV\nabla V^{\mu v} + iV\nabla V_{vu} = \lambda\nabla\Delta_j^i k$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle iV\nabla V^{\mu v\sigma p} + iV\nabla V^{ikj} + iV\nabla V^{\mu v} + iV\nabla V_{vu} = \lambda\nabla\Delta_k^i j$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle iV\nabla V^{v\mu p\sigma} + iV\nabla V^{ikj} + iV\nabla V^{\mu v} + iV\nabla V_{vu} = \lambda\nabla\Delta_k^i j$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle jV\nabla V^{\mu v\sigma p} + jV\nabla V^{jik} + jV\nabla V^{\mu v} + jV\nabla V_{vu} = \lambda\nabla\Delta_i^j k$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle iV\nabla V^{v\mu p\sigma} + iV\nabla V^{jik} + iV\nabla V^{\mu v} + iV\nabla V_{vu} = \lambda\nabla\Delta_i^j k$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle iV\nabla V^{\mu v\sigma p} + iV\nabla V^{jki} + iV\nabla V^{\mu v} + iV\nabla V_{vu} = \lambda\nabla\Delta_k^j i$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle iV\nabla V^{v\mu p\sigma} + iV\nabla V^{jki} + iV\nabla V^{\mu v} + iV\nabla V_{vu} = \lambda\nabla\Delta_k^j i$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle kV\nabla V^{\mu v\sigma p} + kV\nabla V^{kij} + kV\nabla V^{\mu v} + kV\nabla V_{vu} = \lambda\nabla\Delta_i^k j$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle iV\nabla V^{v\mu p\sigma} + iV\nabla V^{kij} + iV\nabla V^{\mu v} + iV\nabla V_{vu} = \lambda\nabla\Delta_i^k j$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle iV\nabla V^{\mu\nu\sigma p} + iV\nabla V^{kji} + iV\nabla V^{\mu\nu} + iV\nabla V_{\nu u} = \lambda\nabla\Delta_j^k i$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle iV\nabla V^{\nu\mu p\sigma} + iV\nabla V^{kji} + iV\nabla V^{\mu\nu} + iV\nabla V_{\nu u} = \lambda\nabla\Delta_j^k i$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle = e^{i\theta n'} \mid \psi\rangle + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle = e^{i\theta m'} \mid \psi\rangle + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle = e^{i\theta m',n'} \mid \psi\rangle$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle = e^{j\theta n'} \mid \psi\rangle + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle = e^{j\theta m'} \mid \psi\rangle + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle = e^{j\theta m',n'} \mid \psi\rangle$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle = e^{k\theta n'} \mid \psi\rangle + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle = e^{k\theta m'} \mid \psi\rangle + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle = e^{k\theta m',n'} \mid \psi\rangle$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle = e^{ijk\theta n'} \mid \psi\rangle + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle = e^{ijk\theta m'} \mid \psi\rangle + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle = e^{ijk\theta m',n'} \mid \psi\rangle$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle = e^{ikj\theta n'} \mid \psi\rangle + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle = e^{ikj\theta m'} \mid \psi\rangle + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle = e^{ikj\theta m',n'} \mid \psi\rangle$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle = e^{jik\theta n'} \mid \psi\rangle + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle = e^{jik\theta m'} \mid \psi\rangle + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle = e^{jik\theta m',n'} \mid \psi\rangle$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle = e^{jki\theta n'} \mid \psi\rangle + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle = e^{jki\theta m'} \mid \psi\rangle + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle = e^{jki\theta m',n'} \mid \psi\rangle$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle = e^{kij\theta n'} \mid \psi\rangle + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle = e^{kij\theta m'} \mid \psi\rangle + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle = e^{kij\theta m',n'} \mid \psi\rangle$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle = e^{kji\theta n'} \mid \psi\rangle + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle = e^{kji\theta m'} \mid \psi\rangle + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle = e^{kji\theta m',n'} \mid \psi\rangle$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega \mid \psi\rangle \mid \theta\rangle = \sum_{\nabla\nu\mu}^{\Delta\mu\nu} \lambda ijk \iiint \mid d_{\nu\mu}^{\mu\nu} tr\rangle^{ijk}\sqrt{\partial e^{i\theta n'}\partial e^{i\theta m'}\partial e^{j\theta n'}\partial e^{j\theta m'}\partial e^{k\theta n'}\partial e^{k\theta m'}\partial e^{ijk\theta}}^{\infty} \mid \psi\rangle \mid n\rangle \mid m\rangle \mid \xi\sigma\mathbb{R}^4\rangle$$

q. Instantones.

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle S_{\theta} = \theta/16\pi^2 \bar{\int}\underline{\int} d^{ijk}x\ tr * F^{\mu\nu}F_{\nu\mu} = \theta/8\pi^2 \bar{\int}\underline{\int} d^{ijk}x\ \partial_{\mu\nu}K^{\nu\mu}$$
$$= e^{\mu\nu p\sigma} tr\ (A_{\mu\nu}\partial_p A_{\sigma} - 2ijk/3\ A_{\mu\nu}\partial_p A_{\sigma})\ e^{\nu\mu\sigma p} tr\ (A_{\nu\mu}\partial_{\sigma}A_p - 2ijk/3\ A_{\nu\mu}\partial_{\sigma}A_p)$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle A_{\mu\nu} \mapsto i\Omega\partial_{\mu\nu}\Omega^{-ijk} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle A_{\mu\nu} \mapsto j\Omega\partial_{\mu\nu}\Omega^{-ijk} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle A_{\mu\nu} \mapsto k\Omega\partial_{\mu\nu}\Omega^{-ijk}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle A_{\nu\mu} \mapsto i\Omega\partial_{\nu\mu}\Omega^{-ijk} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle A_{\nu\mu} \mapsto j\Omega\partial_{\nu\mu}\Omega^{-ijk} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle A_{\nu\mu} \mapsto k\Omega\partial_{\nu\mu}\Omega^{-ijk}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle v(\Omega) = 1/24\pi^2 \oint_{\nu\mu}^{\mu\nu} S_{\infty}^{\mu\nu\nu\mu}\, d^{ijk^{\mu\nu\nu\mu}} S\varepsilon^{ijk}\, tr\ (\Omega\partial_i\Omega^{-i})\ (\Omega\partial_j\Omega^{-j})\ (\Omega\partial_k\Omega^{-k})$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle S_{YM} = 1/8g^2 \int d^{ijk}\, x\ tr\ (F_{\mu\nu}\ \tilde{\mp} * F_{\nu\mu}) exp^2 \mp 1/4g^2 \int d^{ijk}\, x\ tr\ F_{\mu\nu} * F^{\nu\mu}$$
$$\gtreqless 16\pi^2/g^{ijk} \mid \mu\nu \mid \pm \mid \nu\mu \mid$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle S_{YM} = 1/8g^2 \int d^{ijk}\, x\ tr\ (F_{\nu\mu} \pm * F_{\mu\nu}) exp^2 \pm 1/4g^2 \int d^{ijk}\, x\ tr\ F_{\nu\mu} * F^{\mu\nu}$$
$$\gtreqless 16\pi^2/g^{ijk} \mid \nu\mu \mid \pm \mid \mu\nu \mid$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle e^{-S_{instanton}} = e^{\partial^{\pi^2} |\mu\nu| \pm |\nu\mu| / g^{ijk}} e^{ijk\theta |\nu\mu| \pm |\mu\nu|}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \Omega(x) = x_{\mu}\sigma^{\mu}/\sqrt{x_{\mu}^{i}} + A_{\mu} \mapsto i\Omega\partial_{\mu}\Omega^{ijk} = 1/x_{ijk}^{\mu}\eta_{\mu\nu}^{i}\sigma^{i} + A_{\mu}$$
$$= 1/x^{ijk} + \rho^{ijk}\eta_{\mu\nu}^{i}x^{\nu}\sigma^{i} + F_{\mu\nu} = 2\rho^{ijk}/(x^{ijk} + \rho^{ijk}) exp^{ijk}\eta_{\mu\nu}^{i}\sigma^{i}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \Omega(y) = y_{\mu}\sigma^{\mu}/\sqrt{y_{\mu}^{i}} + A_{\mu} \mapsto i\Omega\partial_{\mu}\Omega^{ijk} = 1/y_{ijk}^{\mu}\eta_{\mu\nu}^{i}\sigma^{i} + A_{\mu}$$
$$= 1/y^{ijk} + \rho^{ijk}\eta_{\mu\nu}^{i}y^{\nu}\sigma^{i} + F_{\mu\nu} = 2\rho^{ijk}/(y^{ijk} + \rho^{ijk}) exp^{ijk}\eta_{\mu\nu}^{i}\sigma^{i}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \Omega(z) = z_{\mu}\sigma^{\mu}/\sqrt{z_{\mu}^{i}} + A_{\mu} \mapsto i\Omega\partial_{\mu}\Omega^{ijk} = 1/z_{ijk}^{\mu}\eta_{\mu\nu}^{i}\sigma^{i} + A_{\mu}$$
$$= 1/z^{ijk} + \rho^{ijk}\eta_{\mu\nu}^{i}z^{\nu}\sigma^{i} + F_{\mu\nu} = 2\rho^{ijk}/(z^{ijk} + \rho^{ijk}) exp^{ijk}\eta_{\mu\nu}^{i}\sigma^{i}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \Omega(n) = n_{\mu}\sigma^{\mu}/\sqrt{n_{\mu}^{i}} + A_{\mu} \mapsto i\Omega\partial_{\mu}\Omega^{ijk} = 1/n_{ijk}^{\mu}\eta_{\mu\nu}^{i}\sigma^{i} + A_{\mu}$$
$$= 1/n^{ijk} + \rho^{ijk}\eta_{\mu\nu}^{i}n^{\nu}\sigma^{i} + F_{\mu\nu} = 2\rho^{ijk}/(n^{ijk} + \rho^{ijk}) exp^{ijk}\eta_{\mu\nu}^{i}\sigma^{i}$$

$$\eta^1_{\mu i} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{matrix} \quad \eta^2_{\mu i} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ -1 & 0 & 0 \end{matrix} \quad \eta^3_{\mu i} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{matrix} \quad \eta^\infty_{\mu i} = \begin{matrix} 0 & -1 & 0 \\ 0 & 1 & 1 \\ -1 & 0 & 0 \end{matrix}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega(x) = x_v\sigma^v/\sqrt{x^i_v} + A_v \mapsto i\Omega\partial_v\Omega^{ijk} = 1/x^v_{ijk}\eta^i_{v\mu}\sigma^i + A_v$$
$$= 1/x^{ijk} + \rho^{ijk}\eta^i_{v\mu}x^\mu\sigma^i + F_{v\mu} = 2\rho^{ijk}/(x^{ijk} + \rho^{ijk})exp^{ijk}\eta^i_{v\mu}\sigma^i$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega(y) = y_v\sigma^v/\sqrt{y^i_v} + A_v \mapsto i\Omega\partial_v\Omega^{ijk} = 1/y^v_{ijk}\eta^i_{v\mu}\sigma^i + A_v$$
$$= 1/y^{ijk} + \rho^{ijk}\eta^i_{v\mu}y^\mu\sigma^i + F_{v\mu} = 2\rho^{ijk}/(y^{ijk} + \rho^{ijk})exp^{ijk}\eta^i_{v\mu}\sigma^i$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega(z) = z_v\sigma^v/\sqrt{z^i_v} + A_v \mapsto i\Omega\partial_v\Omega^{ijk} = 1/z^v_{ijk}\eta^i_{v\mu}\sigma^i + A_v$$
$$= 1/z^{ijk} + \rho^{ijk}\eta^i_{v\mu}z^\mu\sigma^i + F_{v\mu} = 2\rho^{ijk}/(z^{ijk} + \rho^{ijk})exp^{ijk}\eta^i_{v\mu}\sigma^i$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega(n) = n_v\sigma^v/\sqrt{n^i_v} + A_v \mapsto i\Omega\partial_v\Omega^{ijk} = 1/n^v_{ijk}\eta^i_{v\mu}\sigma^i + A_v$$
$$= 1/n^{ijk} + \rho^{ijk}\eta^i_{v\mu}n^\mu\sigma^i + F_{v\mu} = 2\rho^{ijk}/(n^{ijk} + \rho^{ijk})exp^{ijk}\eta^i_{v\mu}\sigma^i$$

$$\eta^1_{vi} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{matrix} \quad \eta^2_{vi} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ -1 & 0 & 0 \end{matrix} \quad \eta^3_{vi} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{matrix} \quad \eta^\infty_{vi} = \begin{matrix} 0 & 1 & 0 \\ 0 & 1 & 1 \\ -1 & 0 & 0 \end{matrix}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega(x) = x_{\mu v}\sigma^{\mu v}/\sqrt{x^{ijk}_{\mu v}} + A_{\mu v} \mapsto ijk\Omega\partial_{\mu v}\Omega^{ijk} = 1/x^{\mu v}_{ijk}\eta^{ijk}_{\mu v}\sigma^{ijk} + A_{\mu v}$$
$$= 1/x^{ijk} + \rho^{ijk}\eta^{ijk}_{\mu v}x^{\mu v}\sigma^{ijk} + F_{\mu v} = 2\rho^{ijk}/(x^{ijk} + \rho^{ijk})exp^{ijk}\eta^{ijk}_{\mu v}\sigma^{ijk}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega(y) = y_{\mu v}\sigma^{\mu v}/\sqrt{y^{ijk}_{\mu v}} + A_{\mu v} \mapsto ijk\Omega\partial_{\mu v}\Omega^{ijk} = 1/y^{\mu v}_{ijk}\eta^{ijk}_{\mu v}\sigma^{ijk} + A_{\mu v}$$
$$= 1/y^{ijk} + \rho^{ijk}\eta^{ijk}_{\mu v}y^{\mu v}\sigma^{ijk} + F_{\mu v} = 2\rho^{ijk}/(y^{ijk} + \rho^{ijk})exp^{ijk}\eta^{ijk}_{\mu v}\sigma^{ijk}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega(z) = z_{\mu v}\sigma^{\mu v}/\sqrt{z^{ijk}_{\mu v}} + A_{\mu v} \mapsto ijk\Omega\partial_{\mu v}\Omega^{ijk} = 1/z^{\mu v}_{ijk}\eta^{ijk}_{\mu v}\sigma^{ijk} + A_{\mu v}$$
$$= 1/z^{ijk} + \rho^{ijk}\eta^{ijk}_{\mu v}z^{\mu v}\sigma^{ijk} + F_{\mu v} = 2\rho^{ijk}/(z^{ijk} + \rho^{ijk})exp^{ijk}\eta^{ijk}_{\mu v}\sigma^{ijk}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega(n) = n_{\mu v}\sigma^{\mu v}/\sqrt{n^{ijk}_{\mu v}} + A_{\mu v} \mapsto ijk\Omega\partial_{\mu v}\Omega^{ijk} = 1/n^{\mu v}_{ijk}\eta^{ijk}_{\mu v}\sigma^{ijk} + A_{\mu v}$$
$$= 1/n^{ijk} + \rho^{ijk}\eta^{ijk}_{\mu v}n^{\mu v}\sigma^{ijk} + F_{\mu v} = 2\rho^{ijk}/(n^{ijk} + \rho^{ijk})exp^{ijk}\eta^{ijk}_{\mu v}\sigma^{ijk}$$

$$\eta^1_{\mu vi} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{matrix} \quad \eta^2_{\mu vi} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ -1 & 0 & 0 \end{matrix} \quad \eta^3_{\mu vi} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{matrix} \quad \eta^\infty_{\mu vi} = \begin{matrix} 0 & -1 & 0 \\ 0 & 1 & 1 \\ -1 & 0 & 0 \end{matrix}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(x) = x_{v\mu}\sigma^{v\mu}/\sqrt{x_{v\mu}^{ijk}} + A_{v\mu} \mapsto ijk\Omega\partial_{v\mu}\Omega^{ijk} = 1/x_{ijk}^{v\mu}\eta_{v\mu}^{ijk}\sigma^{ijk} + A_{v\mu}$$

$$= 1/x^{ijk} + \rho^{ijk}\eta_{v\mu}^{ijk}x^{v\mu}\sigma^{ijk} + F_{v\mu} = 2\rho^{ijk}/(x^{ijk} + \rho^{ijk})exp^{ijk}\eta_{v\mu}^{ijk}\sigma^{ijk}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(y) = y_{v\mu}\sigma^{v\mu}/\sqrt{y_{v\mu}^{ijk}} + A_{v\mu} \mapsto ijk\Omega\partial_{v\mu}\Omega^{ijk} = 1/y_{ijk}^{v\mu}\eta_{v\mu}^{ijk}\sigma^{ijk} + A_{v\mu}$$

$$= 1/y^{ijk} + \rho^{ijk}\eta_{v\mu}^{ijk}y^{v\mu}\sigma^{ijk} + F_{v\mu} = 2\rho^{ijk}/(y^{ijk} + \rho^{ijk})exp^{ijk}\eta_{v\mu}^{ijk}\sigma^{ijk}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(z) = z_{v\mu}\sigma^{v\mu}/\sqrt{z_{v\mu}^{ijk}} + A_{v\mu} \mapsto ijk\Omega\partial_{v\mu}\Omega^{ijk} = 1/z_{ijk}^{v\mu}\eta_{v\mu}^{ijk}\sigma^{ijk} + A_{v\mu}$$

$$= 1/z^{ijk} + \rho^{ijk}\eta_{v\mu}^{ijk}z^{v\mu}\sigma^{ijk} + F_{v\mu} = 2\rho^{ijk}/(z^{ijk} + \rho^{ijk})exp^{ijk}\eta_{v\mu}^{ijk}\sigma^{ijk}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(n) = n_{v\mu}\sigma^{v\mu}/\sqrt{n_{v\mu}^{ijk}} + A_{v\mu} \mapsto ijk\Omega\partial_{v\mu}\Omega^{ijk} = 1/n_{ijk}^{v\mu}\eta_{v\mu}^{ijk}\sigma^{ijk} + A_{v\mu}$$

$$= 1/n^{ijk} + \rho^{ijk}\eta_{v\mu}^{ijk}n^{v\mu}\sigma^{ijk} + F_{v\mu} = 2\rho^{ijk}/(n^{ijk} + \rho^{ijk})exp^{ijk}\eta_{v\mu}^{ijk}\sigma^{ijk}$$

$$\eta_{v\mu i}^{1} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{v\mu i}^{2} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ -1 & 0 & 0 \end{matrix} \quad \eta_{v\mu i}^{3} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{v\mu i}^{\infty} = \begin{matrix} 0 & 1 & 0 \\ 0 & 1 & 1 \\ -1 & 0 & 0 \end{matrix}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(x) = x_{\mu}\sigma^{\mu}/\sqrt{x_{\mu}^{i}} + A_{\mu} \mapsto i\Omega\partial_{\mu}\Omega^{ikj} = 1/x_{ikj}^{\mu}\eta_{\mu v}^{i}\sigma^{i} + A_{\mu}$$

$$= 1/x^{ikj} + \rho^{ikj}\eta_{\mu v}^{i}x^{v}\sigma^{i} + F_{\mu v} = 2\rho^{ikj}/(x^{ikj} + \rho^{ikj})exp^{ikj}\eta_{\mu v}^{i}\sigma^{i}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(y) = y_{\mu}\sigma^{\mu}/\sqrt{y_{\mu}^{i}} + A_{\mu} \mapsto i\Omega\partial_{\mu}\Omega^{ikj} = 1/y_{ikj}^{\mu}\eta_{\mu v}^{i}\sigma^{i} + A_{\mu}$$

$$= 1/y^{ikj} + \rho^{ikj}\eta_{\mu v}^{i}y^{v}\sigma^{i} + F_{\mu v} = 2\rho^{ikj}/(y^{ikj} + \rho^{ikj})exp^{ikj}\eta_{\mu v}^{i}\sigma^{i}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(z) = z_{\mu}\sigma^{\mu}/\sqrt{z_{\mu}^{i}} + A_{\mu} \mapsto i\Omega\partial_{\mu}\Omega^{ikj} = 1/z_{ikj}^{\mu}\eta_{\mu v}^{i}\sigma^{i} + A_{\mu}$$

$$= 1/z^{ikj} + \rho^{ikj}\eta_{\mu v}^{i}z^{v}\sigma^{i} + F_{\mu v} = 2\rho^{ikj}/(z^{ikj} + \rho^{ikj})exp^{ikj}\eta_{\mu v}^{i}\sigma^{i}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(n) = n_{\mu}\sigma^{\mu}/\sqrt{n_{\mu}^{i}} + A_{\mu} \mapsto i\Omega\partial_{\mu}\Omega^{ikj} = 1/n_{ikj}^{\mu}\eta_{\mu v}^{i}\sigma^{i} + A_{\mu}$$

$$= 1/n^{ikj} + \rho^{ikj}\eta_{\mu v}^{i}n^{v}\sigma^{i} + F_{\mu v} = 2\rho^{ikj}/(n^{ikj} + \rho^{ikj})exp^{ikj}\eta_{\mu v}^{i}\sigma^{i}$$

$$\eta_{\mu i}^{1} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{\mu i}^{2} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ -1 & 0 & 0 \end{matrix} \quad \eta_{\mu i}^{3} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{\mu i}^{\infty} = \begin{matrix} 0 & -1 & 0 \\ 0 & 1 & 1 \\ -1 & 0 & 0 \end{matrix}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(x) = x_{v}\sigma^{v}/\sqrt{x_{v}^{i}} + A_{v} \mapsto i\Omega\partial_{v}\Omega^{ikj} = 1/x_{ikj}^{v}\eta_{v\mu}^{i}\sigma^{i} + A_{v}$$

$$= 1/x^{ikj} + \rho^{ikj}\eta_{v\mu}^{i}x^{\mu}\sigma^{i} + F_{v\mu} = 2\rho^{ikj}/(x^{ikj} + \rho^{ikj})exp^{ikj}\eta_{v\mu}^{i}\sigma^{i}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(y) = y_{v}\sigma^{v}/\sqrt{y_{v}^{i}} + A_{v} \mapsto i\Omega\partial_{v}\Omega^{ikj} = 1/y_{ikj}^{v}\eta_{v\mu}^{i}\sigma^{i} + A_{v}$$

$$= 1/y^{ikj} + \rho^{ikj}\eta_{v\mu}^{i}y^{\mu}\sigma^{i} + F_{v\mu} = 2\rho^{ikj}/(y^{ikj} + \rho^{ikj})exp^{ikj}\eta_{v\mu}^{i}\sigma^{i}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(z) = z_{v}\sigma^{v}/\sqrt{z_{v}^{i}} + A_{v} \mapsto i\Omega\partial_{v}\Omega^{ikj} = 1/z_{ikj}^{v}\eta_{v\mu}^{i}\sigma^{i} + A_{v}$$

$$= 1/z^{ikj} + \rho^{ikj}\eta_{v\mu}^{i}z^{\mu}\sigma^{i} + F_{v\mu} = 2\rho^{ikj}/(z^{ikj} + \rho^{ikj})exp^{ikj}\eta_{v\mu}^{i}\sigma^{i}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(n) = n_{v}\sigma^{v}/\sqrt{n_{v}^{i}} + A_{v} \mapsto i\Omega\partial_{v}\Omega^{ikj} = 1/n_{ikj}^{v}\eta_{v\mu}^{i}\sigma^{i} + A_{v}$$

$$= 1/n^{ikj} + \rho^{ikj}\eta_{v\mu}^{i}n^{\mu}\sigma^{i} + F_{v\mu} = 2\rho^{ikj}/(n^{ikj} + \rho^{ikj})exp^{ikj}\eta_{v\mu}^{i}\sigma^{i}$$

$$\eta_{vi}^{1} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{vi}^{2} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ -1 & 0 & 0 \end{matrix} \quad \eta_{vi}^{3} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{vi}^{\infty} = \begin{matrix} 0 & 1 & 0 \\ 0 & 1 & 1 \\ -1 & 0 & 0 \end{matrix}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(x) = x_{\mu v}\sigma^{\mu v}/\sqrt{x_{\mu v}^{ikj}} + A_{\mu v} \mapsto ikj\Omega\partial_{\mu v}\Omega^{ikj} = 1/x_{ikj}^{\mu v}\eta_{\mu v}^{ikj}\sigma^{ikj} + A_{\mu v}$$

$$= 1/x^{ikj} + \rho^{ikj}\eta_{\mu v}^{ikj}x^{\mu v}\sigma^{ikj} + F_{\mu v} = 2\rho^{ikj}/(x^{ikj} + \rho^{ikj})exp^{ikj}\eta_{\mu v}^{ikj}\sigma^{ikj}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(y) = y_{\mu v}\sigma^{\mu v}/\sqrt{y_{\mu v}^{ikj}} + A_{\mu v} \mapsto ikj\Omega\partial_{\mu v}\Omega^{ikj} = 1/y_{ikj}^{\mu v}\eta_{\mu v}^{ikj}\sigma^{ikj} + A_{\mu v}$$

$$= 1/y^{ikj} + \rho^{ikj}\eta_{\mu v}^{ikj}y^{\mu v}\sigma^{ikj} + F_{\mu v} = 2\rho^{ikj}/(y^{ikj} + \rho^{ikj})exp^{ikj}\eta_{\mu v}^{ikj}\sigma^{ikj}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(z) = z_{\mu v}\sigma^{\mu v}/\sqrt{z_{\mu v}^{ikj}} + A_{\mu v} \mapsto ikj\Omega\partial_{\mu v}\Omega^{ikj} = 1/z_{ikj}^{\mu v}\eta_{\mu v}^{ikj}\sigma^{ikj} + A_{\mu v}$$

$$= 1/z^{ikj} + \rho^{ikj}\eta_{\mu v}^{ikj}z^{\mu v}\sigma^{ikj} + F_{\mu v} = 2\rho^{ikj}/(z^{ikj} + \rho^{ikj})exp^{ikj}\eta_{\mu v}^{ikj}\sigma^{ikj}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(n) = n_{\mu v}\sigma^{\mu v}/\sqrt{n_{\mu v}^{ikj}} + A_{\mu v} \mapsto ikj\Omega\partial_{\mu v}\Omega^{ikj} = 1/n_{ikj}^{\mu v}\eta_{\mu v}^{ikj}\sigma^{ikj} + A_{\mu v}$$

$$= 1/n^{ikj} + \rho^{ikj}\eta_{\mu v}^{ikj}n^{\mu v}\sigma^{ikj} + F_{\mu v} = 2\rho^{ikj}/(n^{ikj} + \rho^{ikj})exp^{ikj}\eta_{\mu v}^{ikj}\sigma^{ikj}$$

$$\eta_{\mu vi}^{1} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{\mu vi}^{2} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ -1 & 0 & 0 \end{matrix} \quad \eta_{\mu vi}^{3} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{\mu vi}^{\infty} = \begin{matrix} 0 & -1 & 0 \\ 0 & 1 & 1 \\ -1 & 0 & 0 \end{matrix}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(x) = x_{v\mu}\sigma^{v\mu}/\sqrt{x_{v\mu}^{ikj}} + A_{v\mu} \mapsto ikj\Omega\partial_{v\mu}\Omega^{ikj} = 1/x_{ikj}^{v\mu}\eta_{v\mu}^{ikj}\sigma^{ikj} + A_{v\mu}$$

$$= 1/x^{ikj} + \rho^{ikj}\eta_{v\mu}^{ikj}x^{v\mu}\sigma^{ikj} + F_{v\mu} = 2\rho^{ikj}/(x^{ikj} + \rho^{ikj})exp^{ikj}\eta_{v\mu}^{ikj}\sigma^{ikj}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(y) = y_{v\mu}\sigma^{v\mu}/\sqrt{y_{v\mu}^{ikj}} + A_{v\mu} \mapsto ikj\Omega\partial_{v\mu}\Omega^{ikj} = 1/y_{ikj}^{v\mu}\eta_{v\mu}^{ikj}\sigma^{ikj} + A_{v\mu}$$

$$= 1/y^{ikj} + \rho^{ikj}\eta_{v\mu}^{ikj}y^{v\mu}\sigma^{ikj} + F_{v\mu} = 2\rho^{ikj}/(y^{ikj} + \rho^{ikj})exp^{ikj}\eta_{v\mu}^{ikj}\sigma^{ikj}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(z) = z_{v\mu}\sigma^{v\mu}/\sqrt{z_{v\mu}^{ikj}} + A_{v\mu} \mapsto ikj\Omega\partial_{v\mu}\Omega^{ikj} = 1/z_{ikj}^{v\mu}\eta_{v\mu}^{ikj}\sigma^{ikj} + A_{v\mu}$$

$$= 1/z^{ikj} + \rho^{ikj}\eta_{v\mu}^{ikj}z^{v\mu}\sigma^{ikj} + F_{v\mu} = 2\rho^{ikj}/(z^{ikj} + \rho^{ikj})exp^{ikj}\eta_{v\mu}^{ikj}\sigma^{ikj}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(n) = n_{v\mu}\sigma^{v\mu}/\sqrt{n_{v\mu}^{ikj}} + A_{v\mu} \mapsto ikj\Omega\partial_{v\mu}\Omega^{ikj} = 1/n_{ikj}^{v\mu}\eta_{v\mu}^{ikj}\sigma^{ikj} + A_{v\mu}$$

$$= 1/n^{ikj} + \rho^{ikj}\eta_{v\mu}^{ikj}n^{v\mu}\sigma^{ikj} + F_{v\mu} = 2\rho^{ikj}/(n^{ikj} + \rho^{ikj})exp^{ikj}\eta_{v\mu}^{ikj}\sigma^{ikj}$$

$$\eta_{v\mu i}^{1} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{v\mu i}^{2} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ -1 & 0 & 0 \end{matrix} \quad \eta_{v\mu i}^{3} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{v\mu i}^{\infty} = \begin{matrix} 0 & 1 & 0 \\ 0 & 1 & 1 \\ -1 & 0 & 0 \end{matrix}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(x) = x_{\mu}\sigma^{\mu}/\sqrt{x_{\mu}^{j}} + A_{\mu} \mapsto j\Omega\partial_{\mu}\Omega^{jik} = 1/x_{jik}^{\mu}\eta_{\mu v}^{j}\sigma^{j} + A_{\mu}$$

$$= 1/x^{jik} + \rho^{jik}\eta_{\mu v}^{j}x^{v}\sigma^{j} + F_{\mu v} = 2\rho^{jik}/(x^{jik} + \rho^{jik})exp^{jik}\eta_{\mu v}^{j}\sigma^{j}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(y) = y_{\mu}\sigma^{\mu}/\sqrt{y_{\mu}^{j}} + A_{\mu} \mapsto j\Omega\partial_{\mu}\Omega^{jik} = 1/y_{jik}^{\mu}\eta_{\mu v}^{j}\sigma^{j} + A_{\mu}$$

$$= 1/y^{jik} + \rho^{jik}\eta_{\mu v}^{j}y^{v}\sigma^{j} + F_{\mu v} = 2\rho^{jik}/(y^{jik} + \rho^{jik})exp^{jik}\eta_{\mu v}^{j}\sigma^{j}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(z) = z_{\mu}\sigma^{\mu}/\sqrt{z_{\mu}^{j}} + A_{\mu} \mapsto j\Omega\partial_{\mu}\Omega^{jik} = 1/z_{jik}^{\mu}\eta_{\mu v}^{j}\sigma^{j} + A_{\mu}$$

$$= 1/z^{jik} + \rho^{jik}\eta_{\mu v}^{j}z^{v}\sigma^{j} + F_{\mu v} = 2\rho^{jik}/(z^{jik} + \rho^{jik})exp^{jik}\eta_{\mu v}^{j}\sigma^{j}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(n) = n_{\mu}\sigma^{\mu}/\sqrt{n_{\mu}^{j}} + A_{\mu} \mapsto j\Omega\partial_{\mu}\Omega^{jik} = 1/n_{jik}^{\mu}\eta_{\mu v}^{j}\sigma^{j} + A_{\mu}$$

$$= 1/n^{jik} + \rho^{jik}\eta_{\mu v}^{j}n^{v}\sigma^{j} + F_{\mu v} = 2\rho^{jik}/(n^{jik} + \rho^{jik})exp^{jik}\eta_{\mu v}^{j}\sigma^{j}$$

$$\eta_{\mu j}^{1} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{\mu j}^{2} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ -1 & 0 & 0 \end{matrix} \quad \eta_{\mu j}^{3} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{\mu j}^{\infty} = \begin{matrix} 0 & -1 & 0 \\ 0 & 1 & 1 \\ -1 & 0 & 0 \end{matrix}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(x) = x_{v}\sigma^{v}/\sqrt{x_{v}^{j}} + A_{v} \mapsto j\Omega\partial_{v}\Omega^{jik} = 1/x_{jik}^{v}\eta_{v\mu}^{j}\sigma^{j} + A_{v}$$

$$= 1/x^{jik} + \rho^{jik}\eta_{v\mu}^{j}x^{\mu}\sigma^{j} + F_{v\mu} = 2\rho^{jik}/(x^{jik} + \rho^{jik})exp^{jik}\eta_{v\mu}^{j}\sigma^{j}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(y) = y_{v}\sigma^{v}/\sqrt{y_{v}^{j}} + A_{v} \mapsto j\Omega\partial_{v}\Omega^{jik} = 1/y_{jik}^{v}\eta_{v\mu}^{j}\sigma^{j} + A_{v}$$

$$= 1/y^{jik} + \rho^{jik}\eta_{v\mu}^{j}y^{\mu}\sigma^{j} + F_{v\mu} = 2\rho^{jik}/(y^{jik} + \rho^{jik})exp^{jik}\eta_{v\mu}^{j}\sigma^{j}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(z) = z_{v}\sigma^{v}/\sqrt{z_{v}^{j}} + A_{v} \mapsto j\Omega\partial_{v}\Omega^{jik} = 1/z_{jik}^{v}\eta_{v\mu}^{j}\sigma^{j} + A_{v}$$

$$= 1/z^{jik} + \rho^{jik}\eta_{v\mu}^{j}z^{\mu}\sigma^{j} + F_{v\mu} = 2\rho^{jik}/(z^{jik} + \rho^{jik})exp^{jik}\eta_{v\mu}^{j}\sigma^{j}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(n) = n_{v}\sigma^{v}/\sqrt{n_{v}^{j}} + A_{v} \mapsto j\Omega\partial_{v}\Omega^{jik} = 1/n_{jik}^{v}\eta_{v\mu}^{j}\sigma^{j} + A_{v}$$

$$= 1/n^{jik} + \rho^{jik}\eta_{v\mu}^{j}n^{\mu}\sigma^{j} + F_{v\mu} = 2\rho^{jik}/(n^{jik} + \rho^{jik})exp^{jik}\eta_{v\mu}^{j}\sigma^{j}$$

$$\eta_{vj}^{1} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{vj}^{2} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ -1 & 0 & 0 \end{matrix} \quad \eta_{vj}^{3} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{vj}^{\infty} = \begin{matrix} 0 & 1 & 0 \\ 0 & 1 & 1 \\ -1 & 0 & 0 \end{matrix}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(x) = x_{\mu v}\sigma^{\mu v}/\sqrt{x_{\mu v}^{jik}} + A_{\mu v} \mapsto jik\Omega\partial_{\mu v}\Omega^{jik} = 1/x_{jik}^{\mu v}\eta_{\mu v}^{jik}\sigma^{jik} + A_{\mu v}$$

$$= 1/x^{jik} + \rho^{jik}\eta_{\mu v}^{jik}x^{\mu v}\sigma^{jik} + F_{\mu v} = 2\rho^{jik}/(x^{jik} + \rho^{jik})exp^{jik}\eta_{\mu v}^{jik}\sigma^{jik}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(y) = y_{\mu v}\sigma^{\mu v}/\sqrt{y_{\mu v}^{jik}} + A_{\mu v} \mapsto jik\Omega\partial_{\mu v}\Omega^{jik} = 1/y_{jik}^{\mu v}\eta_{\mu v}^{jik}\sigma^{jik} + A_{\mu v}$$

$$= 1/y^{jik} + \rho^{jik}\eta_{\mu v}^{jik}y^{\mu v}\sigma^{jik} + F_{\mu v} = 2\rho^{jik}/(y^{jik} + \rho^{jik})exp^{jik}\eta_{\mu v}^{jik}\sigma^{jik}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(z) = z_{\mu v}\sigma^{\mu v}/\sqrt{z_{\mu v}^{jik}} + A_{\mu v} \mapsto jik\Omega\partial_{\mu v}\Omega^{jik} = 1/z_{jik}^{\mu v}\eta_{\mu v}^{jik}\sigma^{jik} + A_{\mu v}$$

$$= 1/z^{jik} + \rho^{jik}\eta_{\mu v}^{jik}z^{\mu v}\sigma^{jik} + F_{\mu v} = 2\rho^{jik}/(z^{jik} + \rho^{jik})exp^{jik}\eta_{\mu v}^{jik}\sigma^{jik}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(n) = n_{\mu v}\sigma^{\mu v}/\sqrt{n_{\mu v}^{jik}} + A_{\mu v} \mapsto jik\Omega\partial_{\mu v}\Omega^{jik} = 1/n_{jik}^{\mu v}\eta_{\mu v}^{jik}\sigma^{jik} + A_{\mu v}$$

$$= 1/n^{jik} + \rho^{jik}\eta_{\mu v}^{jik}n^{\mu v}\sigma^{jik} + F_{\mu v} = 2\rho^{jik}/(n^{jik} + \rho^{jik})exp^{jik}\eta_{\mu v}^{jik}\sigma^{jik}$$

$$\eta_{\mu vj}^{1} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{\mu vj}^{2} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ -1 & 0 & 0 \end{matrix} \quad \eta_{\mu vj}^{3} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{\mu vj}^{\infty} = \begin{matrix} 0 & -1 & 0 \\ 0 & 1 & 1 \\ -1 & 0 & 0 \end{matrix}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(x) = x_{v\mu}\sigma^{v\mu}/\sqrt{x_{v\mu}^{jik}} + A_{v\mu} \mapsto jik\Omega\partial_{v\mu}\Omega^{jik} = 1/x_{jik}^{v\mu}\eta_{v\mu}^{jik}\sigma^{jik} + A_{v\mu}$$

$$= 1/x^{jik} + \rho^{jik}\eta_{v\mu}^{jik}x^{v\mu}\sigma^{jik} + F_{v\mu} = 2\rho^{jik}/(x^{jik} + \rho^{jik})exp^{jik}\eta_{v\mu}^{jik}\sigma^{jik}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(y) = y_{v\mu}\sigma^{v\mu}/\sqrt{y_{v\mu}^{jik}} + A_{v\mu} \mapsto jik\Omega\partial_{v\mu}\Omega^{jik} = 1/y_{jik}^{v\mu}\eta_{v\mu}^{jik}\sigma^{jik} + A_{v\mu}$$

$$= 1/y^{jik} + \rho^{jik}\eta_{v\mu}^{jik}y^{v\mu}\sigma^{jik} + F_{v\mu} = 2\rho^{jik}/(y^{jik} + \rho^{jik})exp^{jik}\eta_{v\mu}^{jik}\sigma^{jik}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(z) = z_{v\mu}\sigma^{v\mu}/\sqrt{z_{v\mu}^{jik}} + A_{v\mu} \mapsto jik\Omega\partial_{v\mu}\Omega^{jik} = 1/z_{jik}^{v\mu}\eta_{v\mu}^{jik}\sigma^{jik} + A_{v\mu}$$

$$= 1/z^{jik} + \rho^{jik}\eta_{v\mu}^{jik}z^{v\mu}\sigma^{jik} + F_{v\mu} = 2\rho^{jik}/(z^{jik} + \rho^{jik})exp^{jik}\eta_{v\mu}^{jik}\sigma^{jik}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(n) = n_{v\mu}\sigma^{v\mu}/\sqrt{n_{v\mu}^{jik}} + A_{v\mu} \mapsto jik\Omega\partial_{v\mu}\Omega^{jik} = 1/n_{jik}^{v\mu}\eta_{v\mu}^{jik}\sigma^{jik} + A_{v\mu}$$

$$= 1/n^{jik} + \rho^{jik}\eta_{v\mu}^{jik}n^{v\mu}\sigma^{jik} + F_{v\mu} = 2\rho^{jik}/(n^{jik} + \rho^{jik})exp^{jik}\eta_{v\mu}^{jik}\sigma^{jik}$$

$$\eta_{v\mu j}^{1} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{v\mu j}^{2} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ -1 & 0 & 0 \end{matrix} \quad \eta_{v\mu j}^{3} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{v\mu j}^{\infty} = \begin{matrix} 0 & 1 & 0 \\ 0 & 1 & 1 \\ -1 & 0 & 0 \end{matrix}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(x) = x_{\mu}\sigma^{\mu}/\sqrt{x_{\mu}^{j}} + A_{\mu} \mapsto j\Omega\partial_{\mu}\Omega^{jki} = 1/x_{jki}^{\mu}\eta_{\mu v}^{j}\sigma^{j} + A_{\mu}$$

$$= 1/x^{jki} + \rho^{jki}\eta_{\mu v}^{j}x^{v}\sigma^{j} + F_{\mu v} = 2\rho^{jki}/(x^{jki} + \rho^{jki})exp^{jki}\eta_{\mu v}^{j}\sigma^{j}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(y) = y_{\mu}\sigma^{\mu}/\sqrt{y_{\mu}^{j}} + A_{\mu} \mapsto j\Omega\partial_{\mu}\Omega^{jki} = 1/y_{jki}^{\mu}\eta_{\mu v}^{j}\sigma^{j} + A_{\mu}$$

$$= 1/y^{jki} + \rho^{jki}\eta_{\mu v}^{j}y^{v}\sigma^{j} + F_{\mu v} = 2\rho^{jki}/(y^{jki} + \rho^{jki})exp^{jki}\eta_{\mu v}^{j}\sigma^{j}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(z) = z_{\mu}\sigma^{\mu}/\sqrt{z_{\mu}^{j}} + A_{\mu} \mapsto j\Omega\partial_{\mu}\Omega^{jki} = 1/z_{jki}^{\mu}\eta_{\mu v}^{j}\sigma^{j} + A_{\mu}$$

$$= 1/z^{jki} + \rho^{jki}\eta_{\mu v}^{j}z^{v}\sigma^{j} + F_{\mu v} = 2\rho^{jki}/(z^{jki} + \rho^{jki})exp^{jki}\eta_{\mu v}^{j}\sigma^{j}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(n) = n_{\mu}\sigma^{\mu}/\sqrt{n_{\mu}^{j}} + A_{\mu} \mapsto j\Omega\partial_{\mu}\Omega^{jki} = 1/n_{jki}^{\mu}\eta_{\mu v}^{j}\sigma^{j} + A_{\mu}$$

$$= 1/n^{jki} + \rho^{jki}\eta_{\mu v}^{j}n^{v}\sigma^{j} + F_{\mu v} = 2\rho^{jki}/(n^{jki} + \rho^{jki})exp^{jki}\eta_{\mu v}^{j}\sigma^{j}$$

$$\eta_{\mu j}^{1} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{\mu j}^{2} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ -1 & 0 & 0 \end{matrix} \quad \eta_{\mu j}^{3} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{\mu j}^{\infty} = \begin{matrix} 0 & -1 & 0 \\ 0 & 1 & 1 \\ -1 & 0 & 0 \end{matrix}$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega(x) = x_v\sigma^v/\sqrt{x_v^j} + A_v \mapsto j\Omega\partial_v\Omega^{jki} = 1/x_{jki}^v\eta_{v\mu}^j\sigma^j + A_v$$

$$= 1/x^{jki} + \rho^{jki}\eta_{v\mu}^j x^\mu\sigma^j + F_{v\mu} = 2\rho^{jki}/(x^{jki} + \rho^{jki})exp^{jki}\eta_{v\mu}^j\sigma^j$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega(y) = y_v\sigma^v/\sqrt{y_v^j} + A_v \mapsto j\Omega\partial_v\Omega^{jki} = 1/y_{jki}^v\eta_{v\mu}^j\sigma^j + A_v$$

$$= 1/y^{jki} + \rho^{jki}\eta_{v\mu}^j y^\mu\sigma^j + F_{v\mu} = 2\rho^{jki}/(y^{jki} + \rho^{jki})exp^{jki}\eta_{v\mu}^j\sigma^j$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega(z) = z_v\sigma^v/\sqrt{z_v^j} + A_v \mapsto j\Omega\partial_v\Omega^{jki} = 1/z_{jki}^v\eta_{v\mu}^j\sigma^j + A_v$$

$$= 1/z^{jki} + \rho^{jki}\eta_{v\mu}^j z^\mu\sigma^j + F_{v\mu} = 2\rho^{jki}/(z^{jki} + \rho^{jki})exp^{jki}\eta_{v\mu}^j\sigma^j$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega(n) = n_v\sigma^v/\sqrt{n_v^j} + A_v \mapsto j\Omega\partial_v\Omega^{jki} = 1/n_{jki}^v\eta_{v\mu}^j\sigma^j + A_v$$

$$= 1/n^{jki} + \rho^{jki}\eta_{v\mu}^j n^\mu\sigma^j + F_{v\mu} = 2\rho^{jki}/(n^{jki} + \rho^{jki})exp^{jki}\eta_{v\mu}^j\sigma^j$$

$$\eta_{vj}^1 = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{vj}^2 = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ -1 & 0 & 0 \end{matrix} \quad \eta_{vj}^3 = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{vj}^\infty = \begin{matrix} 0 & 1 & 0 \\ 0 & 1 & 1 \\ -1 & 0 & 0 \end{matrix}$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega(x) = x_{\mu v}\sigma^{\mu v}/\sqrt{x_{\mu v}^{jki}} + A_{\mu v} \mapsto jki\Omega\partial_{\mu v}\Omega^{jki} = 1/x_{jki}^{\mu v}\eta_{\mu v}^{jki}\sigma^{jki} + A_{\mu v}$$

$$= 1/x^{jki} + \rho^{jki}\eta_{\mu v}^{jki} x^{\mu v}\sigma^{jki} + F_{\mu v} = 2\rho^{jki}/(x^{jki} + \rho^{jki})exp^{jki}\eta_{\mu v}^{jki}\sigma^{jki}$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega(y) = y_{\mu v}\sigma^{\mu v}/\sqrt{y_{\mu v}^{jki}} + A_{\mu v} \mapsto jki\Omega\partial_{\mu v}\Omega^{jki} = 1/y_{jki}^{\mu v}\eta_{\mu v}^{jki}\sigma^{jki} + A_{\mu v}$$

$$= 1/y^{jki} + \rho^{jki}\eta_{\mu v}^{jki} y^{\mu v}\sigma^{jki} + F_{\mu v} = 2\rho^{jki}/(y^{jki} + \rho^{jki})exp^{jki}\eta_{\mu v}^{jki}\sigma^{jki}$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega(z) = z_{\mu v}\sigma^{\mu v}/\sqrt{z_{\mu v}^{jki}} + A_{\mu v} \mapsto jki\Omega\partial_{\mu v}\Omega^{jki} = 1/z_{jki}^{\mu v}\eta_{\mu v}^{jki}\sigma^{jki} + A_{\mu v}$$

$$= 1/z^{jki} + \rho^{jki}\eta_{\mu v}^{jki} z^{\mu v}\sigma^{jki} + F_{\mu v} = 2\rho^{jki}/(z^{jki} + \rho^{jki})exp^{jki}\eta_{\mu v}^{jki}\sigma^{jki}$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\Omega(n) = n_{\mu v}\sigma^{\mu v}/\sqrt{n_{\mu v}^{jki}} + A_{\mu v} \mapsto jki\Omega\partial_{\mu v}\Omega^{jki} = 1/n_{jki}^{\mu v}\eta_{\mu v}^{jki}\sigma^{jki} + A_{\mu v}$$

$$= 1/n^{jki} + \rho^{jki}\eta_{\mu v}^{j} n^{\mu v}\sigma^{j} + F_{\mu v} = 2\rho^{jki}/(n^{jki} + \rho^{jki})exp^{jki}\eta_{\mu v}^{jki}\sigma^{jki}$$

$$\eta_{\mu vj}^1 = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{\mu vj}^2 = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ -1 & 0 & 0 \end{matrix} \quad \eta_{\mu vj}^3 = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{\mu vj}^\infty = \begin{matrix} 0 & -1 & 0 \\ 0 & 1 & 1 \\ -1 & 0 & 0 \end{matrix}$$

$$\hat{H}\mid\psi\rangle = E_\psi \mid\psi\rangle\Omega(x) = x_{v\mu}\sigma^{v\mu}/\sqrt{x_{v\mu}^{jki}} + A_{v\mu} \mapsto jki\Omega\partial_{v\mu}\Omega^{jki} = 1/x_{jki}^{v\mu}\eta_{v\mu}^{jki}\sigma^{jki} + A_{v\mu}$$

$$= 1/x^{jki} + \rho^{jki}\eta_{v\mu}^{jki}x^{v\mu}\sigma^{jki} + F_{v\mu} = 2\rho^{jki}/(x^{jki} + \rho^{jki})exp^{jki}\eta_{v\mu}^{jki}\sigma^{jki}$$

$$\hat{H}\mid\psi\rangle = E_\psi \mid\psi\rangle\Omega(y) = y_{v\mu}\sigma^{v\mu}/\sqrt{y_{v\mu}^{jki}} + A_{v\mu} \mapsto jki\Omega\partial_{v\mu}\Omega^{jki} = 1/y_{jki}^{v\mu}\eta_{v\mu}^{jki}\sigma^{jki} + A_{v\mu}$$

$$= 1/y^{jki} + \rho^{jki}\eta_{v\mu}^{jki}y^{v\mu}\sigma^{jki} + F_{v\mu} = 2\rho^{jki}/(y^{jki} + \rho^{jki})exp^{jki}\eta_{v\mu}^{jki}\sigma^{jki}$$

$$\hat{H}\mid\psi\rangle = E_\psi \mid\psi\rangle\Omega(z) = z_{v\mu}\sigma^{v\mu}/\sqrt{z_{v\mu}^{jki}} + A_{v\mu} \mapsto jki\Omega\partial_{v\mu}\Omega^{jki} = 1/z_{jki}^{v\mu}\eta_{v\mu}^{jki}\sigma^{jki} + A_{v\mu}$$

$$= 1/z^{jki} + \rho^{jki}\eta_{v\mu}^{jki}z^{v\mu}\sigma^{jki} + F_{v\mu} = 2\rho^{jki}/(z^{jki} + \rho^{jki})exp^{jki}\eta_{v\mu}^{jki}\sigma^{jki}$$

$$\hat{H}\mid\psi\rangle = E_\psi \mid\psi\rangle\Omega(n) = n_{v\mu}\sigma^{v\mu}/\sqrt{n_{v\mu}^{jki}} + A_{v\mu} \mapsto jki\Omega\partial_{v\mu}\Omega^{jki} = 1/n_{jki}^{v\mu}\eta_{v\mu}^{jki}\sigma^{jki} + A_{v\mu}$$

$$= 1/n^{jki} + \rho^{jki}\eta_{v\mu}^{jki}n^{v\mu}\sigma^{jki} + F_{v\mu} = 2\rho^{jki}/(n^{jki} + \rho^{jki})exp^{jki}\eta_{v\mu}^{jki}\sigma^{jki}$$

$$\eta_{v\mu j}^{1} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{v\mu j}^{2} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ -1 & 0 & 0 \end{matrix} \quad \eta_{v\mu j}^{3} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{v\mu j}^{\infty} = \begin{matrix} 0 & 1 & 0 \\ 0 & 1 & 1 \\ -1 & 0 & 0 \end{matrix}$$

$$\hat{H}\mid\psi\rangle = E_\psi \mid\psi\rangle\Omega(x) = x_{\mu}\sigma^{\mu}/\sqrt{x_{\mu}^{k}} + A_{\mu} \mapsto k\Omega\partial_{\mu}\Omega^{kij} = 1/x_{kij}^{\mu}\eta_{\mu v}^{k}\sigma^{k} + A_{\mu}$$

$$= 1/x^{kij} + \rho^{kij}\eta_{\mu v}^{k}x^{v}\sigma^{k} + F_{\mu v} = 2\rho^{kij}/(x^{kij} + \rho^{kij})exp^{kij}\eta_{\mu v}^{k}\sigma^{k}$$

$$\hat{H}\mid\psi\rangle = E_\psi \mid\psi\rangle\Omega(y) = y_{\mu}\sigma^{\mu}/\sqrt{y_{\mu}^{k}} + A_{\mu} \mapsto k\Omega\partial_{\mu}\Omega^{kij} = 1/y_{kij}^{\mu}\eta_{\mu v}^{k}\sigma^{k} + A_{\mu}$$

$$= 1/y^{kij} + \rho^{kij}\eta_{\mu v}^{k}y^{v}\sigma^{k} + F_{\mu v} = 2\rho^{kij}/(y^{kij} + \rho^{kij})exp^{kij}\eta_{\mu v}^{k}\sigma^{k}$$

$$\hat{H}\mid\psi\rangle = E_\psi \mid\psi\rangle\Omega(z) = z_{\mu}\sigma^{\mu}/\sqrt{z_{\mu}^{k}} + A_{\mu} \mapsto k\Omega\partial_{\mu}\Omega^{kij} = 1/z_{kij}^{\mu}\eta_{\mu v}^{k}\sigma^{k} + A_{\mu}$$

$$= 1/z^{kij} + \rho^{kij}\eta_{\mu v}^{k}z^{v}\sigma^{k} + F_{\mu v} = 2\rho^{kij}/(z^{kij} + \rho^{kij})exp^{kij}\eta_{\mu v}^{k}\sigma^{k}$$

$$\hat{H}\mid\psi\rangle = E_\psi \mid\psi\rangle\Omega(n) = n_{\mu}\sigma^{\mu}/\sqrt{n_{\mu}^{k}} + A_{\mu} \mapsto k\Omega\partial_{\mu}\Omega^{kij} = 1/n_{kij}^{\mu}\eta_{\mu v}^{k}\sigma^{k} + A_{\mu}$$

$$= 1/n^{kij} + \rho^{kij}\eta_{\mu v}^{k}n^{v}\sigma^{k} + F_{\mu v} = 2\rho^{kij}/(n^{kij} + \rho^{kij})exp^{kij}\eta_{\mu v}^{k}\sigma^{k}$$

$$\eta_{\mu k}^{1} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{\mu k}^{2} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ -1 & 0 & 0 \end{matrix} \quad \eta_{\mu k}^{3} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{\mu k}^{\infty} = \begin{matrix} 0 & -1 & 0 \\ 0 & 1 & 1 \\ -1 & 0 & 0 \end{matrix}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(x) = x_{v}\sigma^{v}/\sqrt{x_{v}^{k}} + A_{v} \mapsto k\Omega\partial_{v}\Omega^{kij} = 1/x_{kij}^{v}\eta_{v\mu}^{k}\sigma^{k} + A_{v}$$
$$= 1/x^{kij} + \rho^{kij}\eta_{v\mu}^{k}x^{\mu}\sigma^{k} + F_{v\mu} = 2\rho^{kij}/(x^{kij} + \rho^{kij})exp^{kij}\eta_{v\mu}^{k}\sigma^{k}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(y) = y_{v}\sigma^{v}/\sqrt{y_{v}^{k}} + A_{v} \mapsto k\Omega\partial_{v}\Omega^{kij} = 1/y_{kij}^{v}\eta_{v\mu}^{k}\sigma^{k} + A_{v}$$
$$= 1/y^{kij} + \rho^{kij}\eta_{v\mu}^{k}y^{\mu}\sigma^{k} + F_{v\mu} = 2\rho^{kij}/(y^{kij} + \rho^{kij})exp^{kij}\eta_{v\mu}^{k}\sigma^{k}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(z) = z_{v}\sigma^{v}/\sqrt{z_{v}^{k}} + A_{v} \mapsto k\Omega\partial_{v}\Omega^{kij} = 1/z_{kij}^{v}\eta_{v\mu}^{k}\sigma^{k} + A_{v}$$
$$= 1/z^{kij} + \rho^{kij}\eta_{v\mu}^{k}z^{\mu}\sigma^{k} + F_{v\mu} = 2\rho^{kij}/(z^{kij} + \rho^{kij})exp^{kij}\eta_{v\mu}^{k}\sigma^{k}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(n) = n_{v}\sigma^{v}/\sqrt{n_{v}^{k}} + A_{v} \mapsto k\Omega\partial_{v}\Omega^{kij} = 1/n_{kij}^{v}\eta_{v\mu}^{k}\sigma^{k} + A_{v}$$
$$= 1/n^{kij} + \rho^{kij}\eta_{v\mu}^{k}n^{\mu}\sigma^{k} + F_{v\mu} = 2\rho^{kij}/(n^{kij} + \rho^{kij})exp^{kij}\eta_{v\mu}^{k}\sigma^{k}$$

$$\eta_{vk}^{1} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{vk}^{2} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ -1 & 0 & 0 \end{matrix} \quad \eta_{vk}^{3} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{vk}^{\infty} = \begin{matrix} 0 & 1 & 0 \\ 0 & 1 & 1 \\ -1 & 0 & 0 \end{matrix}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(x) = x_{\mu v}\sigma^{\mu v}/\sqrt{x_{\mu v}^{kij}} + A_{\mu v} \mapsto kij\Omega\partial_{\mu v}\Omega^{kij} = 1/x_{kij}^{\mu v}\eta_{\mu v}^{kij}\sigma^{kij} + A_{\mu v}$$
$$= 1/x^{kij} + \rho^{kij}\eta_{\mu v}^{kij}x^{\mu v}\sigma^{kij} + F_{\mu v} = 2\rho^{kij}/(x^{kij} + \rho^{kij})exp^{kij}\eta_{\mu v}^{kij}\sigma^{kij}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(y) = y_{\mu v}\sigma^{\mu v}/\sqrt{y_{\mu v}^{kij}} + A_{\mu v} \mapsto kij\Omega\partial_{\mu v}\Omega^{kij} = 1/y_{kij}^{\mu v}\eta_{\mu v}^{kij}\sigma^{kij} + A_{\mu v}$$
$$= 1/y^{kij} + \rho^{kij}\eta_{\mu v}^{kij}y^{\mu v}\sigma^{kij} + F_{\mu v} = 2\rho^{kij}/(y^{kij} + \rho^{kij})exp^{kij}\eta_{\mu v}^{kij}\sigma^{kij}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(z) = z_{\mu v}\sigma^{\mu v}/\sqrt{z_{\mu v}^{kij}} + A_{\mu v} \mapsto kij\Omega\partial_{\mu v}\Omega^{kij} = 1/z_{kij}^{\mu v}\eta_{\mu v}^{kij}\sigma^{kij} + A_{\mu v}$$
$$= 1/z^{kij} + \rho^{kij}\eta_{\mu v}^{kij}z^{\mu v}\sigma^{kij} + F_{\mu v} = 2\rho^{kij}/(z^{kij} + \rho^{kij})exp^{kij}\eta_{\mu v}^{kij}\sigma^{kij}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(n) = n_{\mu v}\sigma^{\mu v}/\sqrt{n_{\mu v}^{kij}} + A_{\mu v} \mapsto kij\Omega\partial_{\mu v}\Omega^{kij} = 1/n_{kij}^{\mu v}\eta_{\mu v}^{kij}\sigma^{kij} + A_{\mu v}$$
$$= 1/n^{kij} + \rho^{kij}\eta_{\mu v}^{kij}n^{\mu v}\sigma^{kij} + F_{\mu v} = 2\rho^{kij}/(n^{kij} + \rho^{kij})exp^{kij}\eta_{\mu v}^{kij}\sigma^{kij}$$

$$\eta_{\mu vk}^{1} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{\mu vk}^{2} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ -1 & 0 & 0 \end{matrix} \quad \eta_{\mu vk}^{3} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{\mu vk}^{\infty} = \begin{matrix} 0 & -1 & 0 \\ 0 & 1 & 1 \\ -1 & 0 & 0 \end{matrix}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(x) = x_{v\mu}\sigma^{v\mu}/\sqrt{x_{v\mu}^{kij}} + A_{v\mu} \mapsto kij\Omega\partial_{v\mu}\Omega^{kij} = 1/x_{kij}^{v\mu}\eta_{v\mu}^{kij}\sigma^{kij} + A_{v\mu}$$

$$= 1/x^{kij} + \rho^{kij}\eta_{v\mu}^{kij}x^{v\mu}\sigma^{kij} + F_{v\mu} = 2\rho^{kij}/(x^{kij} + \rho^{kij})exp^{kij}\eta_{v\mu}^{kij}\sigma^{kij}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(y) = y_{v\mu}\sigma^{v\mu}/\sqrt{y_{v\mu}^{kij}} + A_{v\mu} \mapsto kij\Omega\partial_{v\mu}\Omega^{kij} = 1/y_{kij}^{v\mu}\eta_{v\mu}^{kij}\sigma^{kij} + A_{v\mu}$$

$$= 1/y^{kij} + \rho^{kij}\eta_{v\mu}^{kij}y^{v\mu}\sigma^{kij} + F_{v\mu} = 2\rho^{kij}/(y^{kij} + \rho^{kij})exp^{kij}\eta_{v\mu}^{kij}\sigma^{kij}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(z) = z_{v\mu}\sigma^{v\mu}/\sqrt{z_{v\mu}^{kij}} + A_{v\mu} \mapsto kij\Omega\partial_{v\mu}\Omega^{kij} = 1/z_{kij}^{v\mu}\eta_{v\mu}^{kij}\sigma^{kij} + A_{v\mu}$$

$$= 1/z^{kij} + \rho^{kij}\eta_{v\mu}^{kij}z^{v\mu}\sigma^{kij} + F_{v\mu} = 2\rho^{kij}/(z^{kij} + \rho^{kij})exp^{kij}\eta_{v\mu}^{kij}\sigma^{kij}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(n) = n_{v\mu}\sigma^{v\mu}/\sqrt{n_{v\mu}^{kij}} + A_{v\mu} \mapsto kij\Omega\partial_{v\mu}\Omega^{kij} = 1/n_{kij}^{v\mu}\eta_{v\mu}^{kij}\sigma^{kij} + A_{v\mu}$$

$$= 1/n^{kij} + \rho^{kij}\eta_{v\mu}^{kij}n^{v\mu}\sigma^{kij} + F_{v\mu} = 2\rho^{kij}/(n^{kij} + \rho^{kij})exp^{kij}\eta_{v\mu}^{kij}\sigma^{kij}$$

$$\eta_{v\mu k}^{1} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{v\mu k}^{2} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ -1 & 0 & 0 \end{matrix} \quad \eta_{v\mu k}^{3} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{v\mu k}^{\infty} = \begin{matrix} 0 & 1 & 0 \\ 0 & 1 & 1 \\ -1 & 0 & 0 \end{matrix}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(x) = x_{\mu}\sigma^{\mu}/\sqrt{x_{\mu}^{k}} + A_{\mu} \mapsto k\Omega\partial_{\mu}\Omega^{kji} = 1/x_{kji}^{\mu}\eta_{\mu v}^{k}\sigma^{k} + A_{\mu}$$

$$= 1/x^{kji} + \rho^{kji}\eta_{\mu v}^{k}x^{v}\sigma^{k} + F_{\mu v} = 2\rho^{kji}/(x^{kji} + \rho^{kji})exp^{kji}\eta_{\mu v}^{k}\sigma^{k}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(y) = y_{\mu}\sigma^{\mu}/\sqrt{y_{\mu}^{k}} + A_{\mu} \mapsto k\Omega\partial_{\mu}\Omega^{kji} = 1/y_{kji}^{\mu}\eta_{\mu v}^{k}\sigma^{k} + A_{\mu}$$

$$= 1/y^{kji} + \rho^{kji}\eta_{\mu v}^{k}y^{v}\sigma^{k} + F_{\mu v} = 2\rho^{kji}/(y^{kji} + \rho^{kji})exp^{kji}\eta_{\mu v}^{k}\sigma^{k}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(z) = z_{\mu}\sigma^{\mu}/\sqrt{z_{\mu}^{k}} + A_{\mu} \mapsto k\Omega\partial_{\mu}\Omega^{kji} = 1/z_{kji}^{\mu}\eta_{\mu v}^{k}\sigma^{k} + A_{\mu}$$

$$= 1/z^{kji} + \rho^{kji}\eta_{\mu v}^{k}z^{v}\sigma^{k} + F_{\mu v} = 2\rho^{kji}/(z^{kji} + \rho^{kji})exp^{kji}\eta_{\mu v}^{k}\sigma^{k}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\Omega(n) = n_{\mu}\sigma^{\mu}/\sqrt{n_{\mu}^{k}} + A_{\mu} \mapsto k\Omega\partial_{\mu}\Omega^{kji} = 1/n_{kji}^{\mu}\eta_{\mu v}^{k}\sigma^{k} + A_{\mu}$$

$$= 1/n^{kji} + \rho^{kji}\eta_{\mu v}^{k}n^{v}\sigma^{k} + F_{\mu v} = 2\rho^{kji}/(n^{kji} + \rho^{kji})exp^{kji}\eta_{\mu v}^{k}\sigma^{k}$$

$$\eta_{\mu k}^{1} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{\mu k}^{2} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ -1 & 0 & 0 \end{matrix} \quad \eta_{\mu k}^{3} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{\mu k}^{\infty} = \begin{matrix} 0 & -1 & 0 \\ 0 & 1 & 1 \\ -1 & 0 & 0 \end{matrix}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \Omega(x) = x_{v}\sigma^{v}/\sqrt{x_{v}^{k}} + A_{v} \mapsto k\Omega\partial_{v}\Omega^{kji} = 1/x_{kji}^{v}\eta_{v\mu}^{k}\sigma^{k} + A_{v}$$
$$= 1/x^{kji} + \rho^{kji}\eta_{v\mu}^{k}x^{\mu}\sigma^{k} + F_{v\mu} = 2\rho^{kji}/(x^{kji} + \rho^{kji})exp^{kji}\eta_{v\mu}^{k}\sigma^{k}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \Omega(y) = y_{v}\sigma^{v}/\sqrt{y_{v}^{k}} + A_{v} \mapsto k\Omega\partial_{v}\Omega^{kji} = 1/y_{kji}^{v}\eta_{v\mu}^{k}\sigma^{k} + A_{v}$$
$$= 1/y^{kji} + \rho^{kji}\eta_{v\mu}^{k}y^{\mu}\sigma^{k} + F_{v\mu} = 2\rho^{kji}/(y^{kji} + \rho^{kji})exp^{kji}\eta_{v\mu}^{k}\sigma^{k}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \Omega(z) = z_{v}\sigma^{v}/\sqrt{z_{v}^{k}} + A_{v} \mapsto k\Omega\partial_{v}\Omega^{kji} = 1/z_{kji}^{v}\eta_{v\mu}^{k}\sigma^{k} + A_{v}$$
$$= 1/z^{kji} + \rho^{kji}\eta_{v\mu}^{k}z^{\mu}\sigma^{k} + F_{v\mu} = 2\rho^{kji}/(z^{kji} + \rho^{kji})exp^{kji}\eta_{v\mu}^{k}\sigma^{k}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \Omega(n) = n_{v}\sigma^{v}/\sqrt{n_{v}^{k}} + A_{v} \mapsto k\Omega\partial_{v}\Omega^{kji} = 1/n_{kji}^{v}\eta_{v\mu}^{k}\sigma^{k} + A_{v}$$
$$= 1/n^{kji} + \rho^{kji}\eta_{v\mu}^{k}n^{\mu}\sigma^{k} + F_{v\mu} = 2\rho^{kji}/(n^{kji} + \rho^{kji})exp^{kji}\eta_{v\mu}^{k}\sigma^{k}$$

$$\eta_{vk}^{1} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{vk}^{2} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ -1 & 0 & 0 \end{matrix} \quad \eta_{vk}^{3} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{vk}^{\infty} = \begin{matrix} 0 & 1 & 0 \\ 0 & 1 & 1 \\ -1 & 0 & 0 \end{matrix}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \Omega(x) = x_{\mu v}\sigma^{\mu v}/\sqrt{x_{\mu v}^{kji}} + A_{\mu v} \mapsto kji\Omega\partial_{\mu v}\Omega^{kji} = 1/x_{kji}^{\mu v}\eta_{\mu v}^{kji}\sigma^{kji} + A_{\mu v}$$
$$= 1/x^{kji} + \rho^{kji}\eta_{\mu v}^{kji}x^{\mu v}\sigma^{kji} + F_{\mu v} = 2\rho^{kji}/(x^{kji} + \rho^{kji})exp^{kji}\eta_{\mu v}^{kji}\sigma^{kji}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \Omega(y) = y_{\mu v}\sigma^{\mu v}/\sqrt{y_{\mu v}^{kji}} + A_{\mu v} \mapsto kji\Omega\partial_{\mu v}\Omega^{kji} = 1/y_{kji}^{\mu v}\eta_{\mu v}^{kji}\sigma^{kji} + A_{\mu v}$$
$$= 1/y^{kji} + \rho^{kji}\eta_{\mu v}^{kji}y^{\mu v}\sigma^{kji} + F_{\mu v} = 2\rho^{kji}/(y^{kji} + \rho^{kji})exp^{kji}\eta_{\mu v}^{kji}\sigma^{kji}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \Omega(z) = z_{\mu v}\sigma^{\mu v}/\sqrt{z_{\mu v}^{kji}} + A_{\mu v} \mapsto kji\Omega\partial_{\mu v}\Omega^{kji} = 1/z_{kji}^{\mu v}\eta_{\mu v}^{kji}\sigma^{kji} + A_{\mu v}$$
$$= 1/z^{kji} + \rho^{kji}\eta_{\mu v}^{kji}z^{\mu v}\sigma^{kji} + F_{\mu v} = 2\rho^{kji}/(z^{kji} + \rho^{kji})exp^{kji}\eta_{\mu v}^{kji}\sigma^{kji}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \Omega(n) = n_{\mu v}\sigma^{\mu v}/\sqrt{n_{\mu v}^{kji}} + A_{\mu v} \mapsto kji\Omega\partial_{\mu v}\Omega^{kji} = 1/n_{kji}^{\mu v}\eta_{\mu v}^{kji}\sigma^{kji} + A_{\mu v}$$
$$= 1/n^{kji} + \rho^{kji}\eta_{\mu v}^{kji}n^{\mu v}\sigma^{kji} + F_{\mu v} = 2\rho^{kji}/(n^{kji} + \rho^{kji})exp^{kji}\eta_{\mu v}^{kji}\sigma^{kji}$$

$$\eta_{\mu vk}^{1} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{\mu vk}^{2} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ -1 & 0 & 0 \end{matrix} \quad \eta_{\mu vk}^{3} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{\mu vk}^{\infty} = \begin{matrix} 0 & -1 & 0 \\ 0 & 1 & 1 \\ -1 & 0 & 0 \end{matrix}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \Omega(x) = x_{v\mu}\sigma^{v\mu}/\sqrt{x_{v\mu}^{kji}} + A_{v\mu} \mapsto kji\Omega\partial_{v\mu}\Omega^{kji} = 1/x_{kji}^{v\mu}\eta_{v\mu}^{kji}\sigma^{kji} + A_{v\mu}$$

$$= 1/x^{kji} + \rho^{kji}\eta_{v\mu}^{kji}x^{v\mu}\sigma^{kji} + F_{v\mu} = 2\rho^{kji}/(x^{kji} + \rho^{kji})exp^{kji}\eta_{v\mu}^{kji}\sigma^{kji}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \Omega(y) = y_{v\mu}\sigma^{v\mu}/\sqrt{y_{v\mu}^{kji}} + A_{v\mu} \mapsto kji\Omega\partial_{v\mu}\Omega^{kji} = 1/y_{kji}^{v\mu}\eta_{v\mu}^{kji}\sigma^{kji} + A_{v\mu}$$

$$= 1/y^{kji} + \rho^{kji}\eta_{v\mu}^{kji}y^{v\mu}\sigma^{kji} + F_{v\mu} = 2\rho^{kji}/(y^{kji} + \rho^{kji})exp^{kji}\eta_{v\mu}^{kji}\sigma^{kji}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \Omega(z) = z_{v\mu}\sigma^{v\mu}/\sqrt{z_{v\mu}^{kji}} + A_{v\mu} \mapsto kji\Omega\partial_{v\mu}\Omega^{kji} = 1/z_{kji}^{v\mu}\eta_{v\mu}^{kji}\sigma^{kji} + A_{v\mu}$$

$$= 1/z^{kji} + \rho^{kji}\eta_{v\mu}^{kji}z^{v\mu}\sigma^{kji} + F_{v\mu} = 2\rho^{kji}/(z^{kji} + \rho^{kji})exp^{kji}\eta_{v\mu}^{kji}\sigma^{kji}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \Omega(n) = n_{v\mu}\sigma^{v\mu}/\sqrt{n_{v\mu}^{kji}} + A_{v\mu} \mapsto kji\Omega\partial_{v\mu}\Omega^{kji} = 1/n_{kji}^{v\mu}\eta_{v\mu}^{kji}\sigma^{kji} + A_{v\mu}$$

$$= 1/n^{kji} + \rho^{kji}\eta_{v\mu}^{kji}n^{v\mu}\sigma^{kji} + F_{v\mu} = 2\rho^{kji}/(n^{kji} + \rho^{kji})exp^{kji}\eta_{v\mu}^{kji}\sigma^{kji}$$

$$\eta_{v\mu k}^{1} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{v\mu k}^{2} = \begin{matrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ -1 & 0 & 0 \end{matrix} \quad \eta_{v\mu k}^{3} = \begin{matrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{matrix} \quad \eta_{v\mu k}^{\infty} = \begin{matrix} 0 & 1 & 0 \\ 0 & 1 & 1 \\ -1 & 0 & 0 \end{matrix}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle V(x) = \lambda(x_{\mu\nu\rho\sigma}^{ijk} + a_{\mu\nu\rho\sigma}^{ijk})exp_{\mu\nu\rho\sigma}^{ijk} \prod_{\mu\nu\rho\sigma}^{ijk} \frac{\partial\theta}{\frac{\Delta\nabla\Omega}{\xi\mathbb{R}^4}} = \delta\varphi\phi\phi\Phi d\omega(\tau)$$

$$= a\ tanh/cosh + senh\ (w/\pi^2(\tau - \tau_{\mu\nu\rho\sigma}^{ijk}))$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle V(x) = \lambda(x_{ijk}^{\mu\nu\rho\sigma} + a_{ijk}^{\mu\nu\rho\sigma})exp_{ijk}^{\mu\nu\rho\sigma} \prod_{ijk}^{\mu\nu\rho\sigma} \frac{\partial\theta}{\frac{\Delta\nabla\Omega}{\xi\mathbb{R}^4}} = \delta\varphi\phi\phi\Phi d\omega(\tau)$$

$$= a\ tanh/cosh + senh\ (w/\pi^2(\tau - \tau_{ijk}^{\mu\nu\rho\sigma}))$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle V(x) = \lambda(x_{\mu\nu\rho\sigma}^{ijk} + a_{ijk}^{\mu\nu\rho\sigma})exp_{\mu\nu\rho\sigma}^{ijk} \prod_{ijk}^{\mu\nu\rho\sigma} \frac{\partial\theta}{\frac{\Delta\nabla\Omega}{\xi\mathbb{R}^4}} = \delta\varphi\phi\phi\Phi d\omega(\tau)$$

$$= a\ tanh/cosh + senh\ (w/\pi^2(\tau - \tau_{\mu\nu\rho\sigma}^{ijk}))$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle V(x) = \lambda(x_{ijk}^{\mu\nu\rho\sigma} + a_{\mu\nu\rho\sigma}^{ijk})exp_{ijk}^{\mu\nu\rho\sigma} \prod_{\mu\nu\rho\sigma}^{ijk} \frac{\partial\theta}{\frac{\Delta\nabla\Omega}{\xi\mathbb{R}^4}} = \delta\varphi\phi\phi\Phi d\omega(\tau)$$

$$= a\ tanh/cosh + senh\ (w/\pi^2(\tau - \tau_{ijk}^{\mu\nu\rho\sigma}))$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\langle a \mid e^{-HT} \mid -a\rangle = N \oint_{x(0)=-a}^{x(T)=+a} Dx(\tau)\, e^{S_{E[x(\tau)]}} + \hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\langle a \mid e^{+HT} \mid +a\rangle$$

$$= N \oint_{x(T)=+a}^{x(0)=-a} Dx(\tau)\, e^{S_{E[x(\tau)]}}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\langle b \mid e^{-HT} \mid -b\rangle = N \oint_{x(0)=-b}^{x(T)=+b} Dx(\tau)\, e^{S_{E[x(\tau)]}} + \hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\langle b \mid e^{+HT} \mid +b\rangle$$

$$= N \oint_{x(T)=+b}^{x(0)=-b} Dx(\tau)\, e^{S_{E[x(\tau)]}}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\langle c \mid e^{-HT} \mid -c\rangle = N \oint_{x(0)=-c}^{x(T)=+c} Dx(\tau)\, e^{S_{E[x(\tau)]}} + \hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\langle c \mid e^{+HT} \mid +c\rangle$$

$$= N \oint_{x(T)=+c}^{x(0)=-c} Dx(\tau)\, e^{S_{E[x(\tau)]}}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\langle a \mid e^{-HT} \mid -a\rangle = N \oint_{y(0)=-a}^{y(T)=+a} Dy(\tau)\, e^{S_{E[y(\tau)]}} + \hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\langle a \mid e^{+HT} \mid +a\rangle$$

$$= N \oint_{y(T)=+a}^{y(0)=-a} Dy(\tau)\, e^{S_{E[y(\tau)]}}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\langle b \mid e^{-HT} \mid -b\rangle = N \oint_{y(0)=-b}^{y(T)=+b} Dy(\tau)\, e^{S_{E[y(\tau)]}} + \hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\langle b \mid e^{+HT} \mid +b\rangle$$

$$= N \oint_{y(T)=+b}^{y(0)=-b} Dy(\tau)\, e^{S_{E[y(\tau)]}}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\langle c \mid e^{-HT} \mid -c\rangle = N \oint_{y(0)=-c}^{y(T)=+c} Dy(\tau)\, e^{S_{E[y(\tau)]}} + \hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\langle c \mid e^{+HT} \mid +c\rangle$$

$$= N \oint_{y(T)=+c}^{y(0)=-c} Dy(\tau)\, e^{S_{E[y(\tau)]}}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\langle a \mid e^{-HT} \mid -a\rangle = N \oint_{z(0)=-a}^{z(T)=+a} Dz(\tau)\, e^{S_{E[z(\tau)]}} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\langle a \mid e^{+HT} \mid +a\rangle$$

$$= N \oint_{z(T)=+a}^{z(0)=-a} Dz(\tau)\, e^{S_{E[z(\tau)]}}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\langle b \mid e^{-HT} \mid -b\rangle = N \oint_{z(0)=-b}^{z(T)=+b} Dz(\tau)\, e^{S_{E[z(\tau)]}} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\langle b \mid e^{+HT} \mid +b\rangle$$

$$= N \oint_{z(T)=+b}^{z(0)=-b} Dz(\tau)\, e^{S_{E[z(\tau)]}}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\langle c \mid e^{-HT} \mid -c\rangle = N \oint_{z(0)=-c}^{z(T)=+c} Dz(\tau)\, e^{S_{E[z(\tau)]}} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\langle c \mid e^{+HT} \mid +c\rangle$$

$$= N \oint_{z(T)=+c}^{z(0)=-c} Dz(\tau)\, e^{S_{E[z(\tau)]}}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\langle a \mid e^{-HT} \mid -a\rangle = N \oint_{x(0)=-a}^{x(T)=+a} Dx(\mu\nu\rho\sigma)\, e^{S_{E[x(\mu\nu\rho\sigma)]}} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\langle a \mid e^{+HT}$$

$$\mid +a\rangle = N \oint_{x(T)=+a}^{x(0)=-a} Dx(\mu\nu\rho\sigma)\, e^{S_{E[x(\mu\nu\rho\sigma)]}}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\langle b \mid e^{-HT} \mid -b\rangle = N \oint_{x(0)=-b}^{x(T)=+b} Dx(\mu\nu\rho\sigma)\, e^{S_{E[x(\mu\nu\rho\sigma)]}} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\langle b \mid e^{+HT}$$

$$\mid +b\rangle = N \oint_{x(T)=+b}^{x(0)=-b} Dx(\mu\nu\rho\sigma)\, e^{S_{E[x(\mu\nu\rho\sigma)]}}$$

$$\hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\langle c \mid e^{-HT} \mid -c\rangle = N \oint_{x(0)=-c}^{x(T)=+c} Dx(\mu\nu\rho\sigma)\, e^{S_{E[x(\mu\nu\rho\sigma)]}} + \hat{H} \mid \psi\rangle = E_{\psi} \mid \psi\rangle\langle c \mid e^{+HT} \mid +c\rangle$$

$$= N \oint_{x(T)=+c}^{x(0)=-c} Dx(\mu\nu\rho\sigma)\, e^{S_{E[x(\mu\nu\rho\sigma)]}}$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle a \mid e^{-HT} \mid -a\rangle = N \oint_{y(0)=-a}^{y(T)=+a} Dy(\mu\nu\rho\sigma)\, e^{S_{E[y(\mu\nu\rho\sigma)]}} + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle a \mid e^{+HT}$$

$$\mid +a\rangle = N \oint_{y(T)=+a}^{y(0)=-a} Dy(\mu\nu\rho\sigma)\, e^{S_{E[y(\mu\nu\rho\sigma)]}}$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle b \mid e^{-HT} \mid -b\rangle = N \oint_{y(0)=-b}^{y(T)=+b} Dy(\mu\nu\rho\sigma)\, e^{S_{E[y(\mu\nu\rho\sigma)]}} + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle b \mid e^{+HT}$$

$$\mid +b\rangle = N \oint_{y(T)=+b}^{y(0)=-b} Dy(\mu\nu\rho\sigma)\, e^{S_{E[y(\mu\nu\rho\sigma)]}}$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle c \mid e^{-HT} \mid -c\rangle = N \oint_{y(0)=-c}^{y(T)=+c} Dy(\mu\nu\rho\sigma)\, e^{S_{E[y(\mu\nu\rho\sigma)]}} + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle c \mid e^{+HT} \mid +c\rangle$$

$$= N \oint_{y(T)=+c}^{y(0)=-c} Dy(\mu\nu\rho\sigma)\, e^{S_{E[y(\mu\nu\rho\sigma)]}}$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle a \mid e^{-HT} \mid -a\rangle = N \oint_{z(0)=-a}^{z(T)=+a} Dz(\mu\nu\rho\sigma)\, e^{S_{E[z(\mu\nu\rho\sigma)]}} + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle a \mid e^{+HT}$$

$$\mid +a\rangle = N \oint_{z(T)=+a}^{z(0)=-a} Dz(\mu\nu\rho\sigma)\, e^{S_{E[z(\mu\nu\rho\sigma)]}}$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle b \mid e^{-HT} \mid -b\rangle = N \oint_{z(0)=-b}^{z(T)=+b} Dz(\mu\nu\rho\sigma)\, e^{S_{E[z(\mu\nu\rho\sigma)]}} + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle b \mid e^{+HT} \mid +b\rangle$$

$$= N \oint_{z(T)=+b}^{z(0)=-b} Dz(\mu\nu\rho\sigma)\, e^{S_{E[z(\mu\nu\rho\sigma)]}}$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle c \mid e^{-HT} \mid -c\rangle = N \oint_{z(0)=-c}^{z(T)=+c} Dz(\mu\nu\rho\sigma)\, e^{S_{E[z(\mu\nu\rho\sigma)]}} + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle c \mid e^{+HT} \mid +c\rangle$$

$$= N \oint_{z(T)=+c}^{z(0)=-c} Dz(\mu\nu\rho\sigma)\, e^{S_{E[z(\mu\nu\rho\sigma)]}}$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle a \mid e^{-HT} \mid -a\rangle = N \oint_{x(0)=-a}^{x(T)=+a} Dx(ijk)\, e^{S_{E[x(ijk)]}} + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle a \mid e^{+HT} \mid +a\rangle$$

$$= N \oint_{x(T)=+a}^{x(0)=-a} Dx(ijk)\, e^{S_{E[x(ijk)]}}$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle b \mid e^{-HT} \mid -b\rangle = N \oint_{x(0)=-b}^{x(T)=+b} Dx(ijk)\, e^{S_{E[x(ijk)]}} + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle b \mid e^{+HT} \mid +b\rangle$$

$$= N \oint_{x(T)=+b}^{x(0)=-b} Dx(ijk)\, e^{S_{E[x(ijk)]}}$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle c \mid e^{-HT} \mid -c\rangle = N \oint_{x(0)=-c}^{x(T)=+c} Dx(ijk)\, e^{S_{E[x(ijk)]}} + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle c \mid e^{+HT} \mid +c\rangle$$

$$= N \oint_{x(T)=+c}^{x(0)=-c} Dx(ijk)\, e^{S_{E[x(ijk)]}}$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle a \mid e^{-HT} \mid -a\rangle = N \oint_{y(0)=-a}^{y(T)=+a} Dy(ijk)\, e^{S_{E[y(ijk)]}} + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle a \mid e^{+HT} \mid +a\rangle$$

$$= N \oint_{y(T)=+a}^{y(0)=-a} Dy(ijk)\, e^{S_{E[y(ijk)]}}$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle b \mid e^{-HT} \mid -b\rangle = N \oint_{y(0)=-b}^{y(T)=+b} Dy(ijk)\, e^{S_{E[y(ijk)]}} + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle b \mid e^{+HT} \mid +b\rangle$$

$$= N \oint_{y(T)=+b}^{y(0)=-b} Dy(ijk)\, e^{S_{E[y(ijk)]}}$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle c \mid e^{-HT} \mid -c\rangle = N \oint_{y(0)=-c}^{y(T)=+c} Dy(ijk)\, e^{S_{E[y(ijk)]}} + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle c \mid e^{+HT} \mid +c\rangle$$

$$= N \oint_{y(T)=+c}^{y(0)=-c} Dy(ijk)\, e^{S_{E[y(ijk)]}}$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle a \mid e^{-HT} \mid -a\rangle = N \oint_{z(0)=-a}^{z(T)=+a} Dz(ijk)\, e^{S_{E[z(ijk)]}} + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle a \mid e^{+HT} \mid +a\rangle$$

$$= N \oint_{z(T)=+a}^{z(0)=-a} Dz(ijk)\, e^{S_{E[z(ijk)]}}$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle b \mid e^{-HT} \mid -b\rangle = N \oint_{z(0)=-b}^{z(T)=+b} Dz(ijk)\, e^{S_{E[z(ijk)]}} + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle b \mid e^{+HT} \mid +b\rangle$$

$$= N \oint_{z(T)=+b}^{z(0)=-b} Dz(ijk)\, e^{S_{E[z(ijk)]}}$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle c \mid e^{-HT} \mid -c\rangle = N \oint_{z(0)=-c}^{z(T)=+c} Dz(ijk)\, e^{S_{E[z(ijk)]}} + \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle\langle c \mid e^{+HT} \mid +c\rangle$$

$$= N \oint_{z(T)=+c}^{z(0)=-c} Dz(ijk)\, e^{S_{E[z(ijk)]}}$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle x(\tau) = \varkappa(\tau) + \delta x(\tau) = \hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle S_E[x(\tau)]$$

$$= S_{instanton}$$

$$+ \oint_{ijk}^{\mu\nu\rho\sigma} d(\tau)\delta(\tau)\, \partial(\tau)\, \Omega(\tau)\, \varphi(\tau)\, \phi(\tau)\, \xi(\tau)\, \lambda(\tau) \frac{\omega}{p}.\, \mathbb{R}^4/x^n \oint_{x(0)=-a}^{x(T)=+a} D\infty(\tau)\, e^{-S_{E[x(\tau)]}}$$

$$= e^{-Sinstanton} \oint_{\delta x(0)=0}^{\delta x(T)=0} D\delta(\tau)\, e^{d(\tau)\delta(\tau)\, \partial(\tau)\, \Omega(\tau)\, \varphi(\tau)\, \phi(\tau)\, \xi(\tau)\, \lambda(\tau) \frac{\omega}{p} \cdot \frac{\mathbb{R}^4}{x^n}}$$

$$\approx e^{-S_{instanton}}/d\omega_{\lambda\nu/\lambda\sigma}^{\lambda\mu/\lambda\rho} \Delta\nabla\Omega\eta\varphi\phi$$

r. Análisis de Campos Yang – Mills (Teorización Final).

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle S_{YM} + S_{gf\mu\nu} \oint_{ijk=m}^{ijk=n} \lambda\, 1/g^{\mu\nu\rho\sigma} \oint_{\nu}^{\mu} d_\varphi^\omega \theta\Omega\, tr\, [\frac{1}{2} \dot{F}_{\mu\nu} \dot{F}^{\mu\nu} + n\dot{F}^{\mu\nu} \dot{D}_\mu \lambda\partial/\Delta\nabla\, \delta\, A_\nu$$

$$+ \dot{D}^\mu \lambda\partial/\Delta\nabla\, \delta\, A^\nu \dot{D}_\mu \lambda\partial/\Delta\nabla\, \delta\, A_\nu - \dot{D}^\mu \lambda\partial/\Delta\nabla\, \delta\, A^\nu \dot{D}_\nu \lambda\partial/\Delta\nabla\, \delta\, A_\mu - i\dot{F}^{\mu\nu} \dot{F}_{\mu\nu} [\delta\, A_\mu , \delta\, A_\nu]$$

$$- 2ijk\dot{D}^\mu \lambda\partial/\Delta\nabla\, \delta\, A^\nu [\delta\, A_\mu , \delta\, A_\nu] - 1/2[\delta\, A^\mu , \delta\, A^\nu][\delta\, A_\mu , \delta\, A_\nu]]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle S_{YM} + S_{gf\nu\mu} \oint_{ijk=m}^{ijk=n} \lambda\, 1/g^{\mu\nu\rho\sigma} \oint_{\mu}^{\nu} d_{\varphi}^{\omega} \theta \Omega\; tr\, [\frac{1}{2} \dot{\mathrm{F}}_{\nu\mu} \dot{\mathrm{F}}^{\nu\mu} + n \dot{\mathrm{F}}^{\nu\mu} \dot{\mathrm{D}}_{\nu} \lambda\partial/\Delta\nabla\, \delta\, A_{\mu}$$

$$+ \dot{\mathrm{D}}^{\nu} \lambda\partial/\Delta\nabla\, \delta\, A^{\mu} \dot{\mathrm{D}}_{\nu} \lambda\partial/\Delta\nabla\, \delta\, A_{\mu} - \dot{\mathrm{D}}^{\nu} \lambda\partial/\Delta\nabla\, \delta\, A^{\mu} \dot{\mathrm{D}}_{\mu} \lambda\partial/\Delta\nabla\, \delta\, A_{\nu} - i \dot{\mathrm{F}}^{\nu\mu} \dot{\mathrm{F}}_{\nu\mu} [\delta\, A_{\nu}\, , \delta\, A_{\mu}]$$

$$- 2ijk \dot{\mathrm{D}}^{\nu} \lambda\partial/\Delta\nabla\, \delta\, A^{\mu} [\delta\, A_{\nu}\, , \delta\, A_{\mu}] - 1/2 [\delta\, A^{\nu}\, , \delta\, A^{\mu}][\delta\, A_{\nu}\, , \delta\, A_{\mu}]]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \oint_{\nu}^{\mu} d^{\mu\nu}\, n\, tr\, \dot{\mathrm{D}}^{\mu} \lambda\partial/\Delta\nabla\, \delta\, A^{\nu} \dot{\mathrm{D}}_{\nu} \lambda\partial/\Delta\nabla\, \delta\, A_{\mu} = -\oint_{\nu}^{\mu} d^{\mu\nu}\, n\, tr\, \delta A_{\nu} \dot{\mathrm{D}}^{\mu} \dot{\mathrm{D}}^{\nu} A_{\mu}$$

$$= -\oint_{\nu}^{\mu} d^{\mu\nu}\, n\, tr\, \delta A_{\nu} ([\dot{\mathrm{D}}^{\mu} \dot{\mathrm{D}}^{\nu}] + \dot{\mathrm{D}}^{\nu} \dot{\mathrm{D}}^{\mu}) \delta\, A_{\mu}$$

$$= \oint_{\nu}^{\mu} d^{\mu\nu}\, [(\dot{\mathrm{D}}^{\mu}\, \delta\, A_{\mu})\, exp^{u\nu} + ijk\, \delta\, A_{\nu} [\dot{\mathrm{F}}^{\mu\nu}\, , \delta\, A_{\mu}]]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \oint_{\mu}^{\nu} d^{\nu\mu}\, n\, tr\, \dot{\mathrm{D}}^{\nu} \lambda\partial/\Delta\nabla\, \delta\, A^{\mu} \dot{\mathrm{D}}_{\mu} \lambda\partial/\Delta\nabla\, \delta\, A_{\nu} = -\oint_{\mu}^{\nu} d^{\nu\mu}\, n\, tr\, \delta A_{\mu} \dot{\mathrm{D}}^{\nu} \dot{\mathrm{D}}^{\mu} A_{\nu}$$

$$= -\oint_{\mu}^{\nu} d^{\nu\mu}\, n\, tr\, \delta A_{\mu} ([\dot{\mathrm{D}}^{\nu} \dot{\mathrm{D}}^{\mu}] + \dot{\mathrm{D}}^{\mu} \dot{\mathrm{D}}^{\nu}) \delta\, A_{\nu}$$

$$= \oint_{\mu}^{\nu} d^{\nu\mu}\, [(\dot{\mathrm{D}}^{\nu}\, \delta\, A_{\nu})\, exp^{\nu u} + ijk\, \delta\, A_{\mu} [\dot{\mathrm{F}}^{\nu\mu}\, , \delta\, A_{\nu}]]$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \oint_{\nu}^{\mu} D\omega\, \delta(G(\breve{\underset{\cdot}{A}}^{\omega}, \delta A^{\omega}))\, \det\, (\partial G(\breve{\underset{\cdot}{A}}^{\omega}, \delta A^{\omega})/\partial\omega)$$

$$= \xi_{\lambda\Omega\psi}^{\sigma\varsigma\zeta} \Sigma \iiiint \text{ħфѬǮҖДКѱӜѪ} \varsigma \pi m c^{\mathbb{R}4}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \oint_{\mu}^{\nu} D\omega\, \delta(G(\breve{\underset{\cdot}{A}}^{\omega}, \delta A^{\omega}))\, \det\, (\partial G(\breve{\underset{\cdot}{A}}^{\omega}, \delta A^{\omega})/\partial\omega)$$

$$= \xi_{\lambda\Omega\psi}^{\sigma\varsigma\zeta} \Sigma \iiiint \text{ħфѬǮҖДКѱӜѪ} \varsigma \pi m c^{\mathbb{R}4}$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle det(\partial G(\breve{\underset{\cdot}{A}}^{\omega}, \delta A^{\omega})/\partial\omega)$$

$$= \oint_{\nu}^{\mu} DcDc^{\dagger}\, exp(-1/g^{\mu\nu} \oint_{\nu}^{\mu} d^{\mu\nu}\;\; tr[-e^{\dagger} (\dot{\mathrm{D}}^{\mu\nu\rho\sigma} c + ijkc^{\dagger} [(\dot{\mathrm{D}}^{\mu\nu\rho\sigma} \delta A_{\mu\nu\rho\sigma}, c]])$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle det(\partial G(\breve{Ạ}^\omega, \delta A^\omega)/\partial\omega)$$

$$= \oint_{\mu}^{v} DcDc^\dagger\, exp(-1/g^{v\mu} \oint_{\mu}^{v} d^{v\mu}\ tr[-e^\dagger(\dot{D}^{v\mu\rho\sigma}c + ijkc^\dagger[(\dot{D}^{v\mu\rho\sigma}\delta A_{v\mu\rho\sigma}, c]])$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle 1/g^{\mu v} \oint_{v}^{\mu} d^{\mu v}\ n\, tr[1/2\dot{F}_{\mu v}\ \dot{F}^{\mu v} + n\ \dot{F}^{\mu v}\dot{D}_\mu \delta A_v + \dot{D}^\mu \delta A^v \dot{D}_\mu \delta A_v - nijk\dot{F}^{\mu v}[\delta A_\mu, \delta A_v]$$

$$+ \dot{D}_\mu c^\dagger \dot{D}^\mu c - nijk\dot{D}^\mu \delta A^v[\delta A_\mu, \delta A_v] - 1/2[\delta A^\mu, \delta A^v]\ [\delta A_\mu, \delta A_v] + ic^\dagger[\dot{D}^\mu \delta A_\mu, c]]$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle 1/g^{v\mu} \oint_{\mu}^{v} d^{v\mu}\ n\, tr[1/2\dot{F}_{v\mu}\ \dot{F}^{v\mu} + n\ \dot{F}^{v\mu}\dot{D}_v \delta A_\mu + \dot{D}^v \delta A^\mu \dot{D}_v \delta A_\mu - nijk\dot{F}^{v\mu}[\delta A_v, \delta A_\mu]$$

$$+ \dot{D}_v c^\dagger \dot{D}^v c - nijk\dot{D}^v \delta A^\mu[\delta A_v, \delta A_\mu] - 1/2[\delta A^v, \delta A^\mu]\ [\delta A_v, \delta A_\mu] + ic^\dagger[\dot{D}^v \delta A_v, c]]$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle e^{-S_{eff}[\breve{Ạ},\delta,A,c]} = \oint_{v}^{\mu} D\delta ADcDc^\dagger\ e^{-S[\breve{Ạ},\delta,A,c]} = e^{-S_{eff}[\breve{Ạ}]}$$

$$= det^m \Delta_{gauge}\nabla_{gauge} det^n \Delta_{ghost}\nabla_{ghost}\, e^{\overline{\frac{1}{2g^{\breve{Ạ},\delta,A,c} \oint_v^\mu d_v^\mu\, n\, tr\dot{F}_{\mu v}\dot{F}^{\mu v}}}} = \Delta_{gauge\, gauge}^{\mu v\qquad \mu v}\nabla$$

$$= \dot{D}^{\mu v}\delta^{\mu v} + 2ijk\ [\dot{F}^{\mu v}\Delta_{ghost\, ghost}^{\mu v\qquad \mu v}\nabla - c^\dagger = S_{eff}[\breve{Ạ}, \delta, A, c]$$

$$= 1/2g_v^\mu \oint_{v}^{\mu} d_v^\mu\, n\, tr\ \dot{F}_{\mu v}\ \dot{F}^{\mu v} + 1/2Trlog\Delta_{gauge\, gauge}^{\mu v\qquad \mu v}\nabla - Trlog\Delta_{ghost\, ghost}^{\mu v\qquad \mu v}\nabla$$

$= \xi_{\lambda\Omega\psi}^{\sigma\varsigma\zeta}$ ∑∬∬ħɸѢѪѮЖДКҵӁѪϚ$\pi mc^{\mathbb{R}4}$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle e^{-S_{eff}[\breve{Ạ},\delta,A,c]} = \oint_{\mu}^{v} D\delta ADcDc^\dagger\ e^{-S[\breve{Ạ},\delta,A,c]} = e^{-S_{eff}[\breve{Ạ}]}$$

$$= det^m \Delta_{gauge}\nabla_{gauge} det^n \Delta_{ghost}\nabla_{ghost}\, e^{\overline{\frac{1}{2g^{\breve{Ạ},\delta,A,c} \oint_\mu^v d_\mu^v\, n\, tr\dot{F}_{v\mu}\dot{F}^{v\mu}}}} = \Delta_{gauge\, gauge}^{v\mu\qquad v\mu}\nabla$$

$$= \dot{D}^{v\mu}\delta^{v\mu} + 2ijk\ [\dot{F}^{v\mu}\Delta_{ghost\, ghost}^{v\mu\qquad v\mu}\nabla - c^\dagger = S_{eff}[\breve{Ạ}, \delta, A, c]$$

$$= 1/2g_\mu^v \oint_{\mu}^{v} d_\mu^v\, n\, tr\ \dot{F}_{v\mu}\ \dot{F}^{v\mu} + 1/2Trlog\Delta_{gauge\, gauge}^{v\mu\qquad v\mu}\nabla - Trlog\Delta_{ghost\, ghost}^{v\mu\qquad v\mu}\nabla$$

$= \xi_{\lambda\Omega\psi}^{\sigma\varsigma\zeta}$ ∑∬∬ħɸѢѪѮЖДКҵӁѪϚ$\pi mc^{\mathbb{R}4}$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle \Delta^{\mu\nu}_{ghost\,ghost}{}^{\mu\nu}\nabla = -\partial^\mu_\nu + \Delta\nabla_\mu - \Delta\nabla_\nu\,, \Delta\nabla_\mu = ijk\partial^{\mu\nu}\breve{A}_{\mu\nu} + ijk\breve{A}_{\mu\nu}\partial^{\mu\nu}, \Delta\nabla_\nu = [\breve{A}^{\mu\nu}, [\breve{A}_{\mu\nu}]]$$

$$= Trlog\Delta^{\mu\nu}_{ghost\,ghost}{}^{\mu\nu}\nabla = Trlog(-\partial^{\mu\nu} + \Delta\nabla_\mu - \Delta\nabla_\nu)$$

$$= Trlog(-\partial^{\mu\nu}) + Trlog\,(1 + (-\partial^{\mu\nu})exp^{-n}(\Delta\nabla_\mu - \Delta\nabla_\nu))$$

$$= Tr\log(-\partial^{\mu\nu}) + Tr\,((-\partial^{\mu\nu})exp^{-n}\,(\Delta\nabla_\mu - \Delta\nabla_\nu))\,1/2Tr((-\partial^{\mu\nu})exp^{-n}\,(\Delta\nabla_\mu$$

$$- \Delta\nabla_\nu))\,exp^\infty \ldots \omega\delta\lambda\varphi\theta\Omega\eta\xi\phi \oiiint_\infty^\infty \partial\pi^\infty_\infty = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\Sigma\iiiint ħ\text{ɸѬӜЖДҞփӜѪ}\zeta\pi mc^{\mathbb{R}4}$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle \Delta^{\nu\mu}_{ghost\,ghost}{}^{\nu\mu}\nabla = -\partial^\nu_\mu + \Delta\nabla_\nu - \Delta\nabla_\mu\,, \Delta\nabla_\nu = ijk\partial^{\nu\mu}\breve{A}_{\nu\mu} + ijk\breve{A}_{\nu\mu}\partial^{\nu\mu}, \Delta\nabla_\mu = [\breve{A}^{\nu\mu}, [\breve{A}_{\nu\mu}]]$$

$$= Trlog\Delta^{\nu\mu}_{ghost\,ghost}{}^{\nu\mu}\nabla = Trlog(-\partial^{\nu\mu} + \Delta\nabla_\nu - \Delta\nabla_\mu)$$

$$= Trlog(-\partial^{\nu\mu}) + Trlog\,(1 + (-\partial^{\nu\mu})exp^{-n}(\Delta\nabla_\nu - \Delta\nabla_\mu))$$

$$= Tr\log(-\partial^{\nu\mu}) + Tr\,((-\partial^{\nu\mu})exp^{-n}\,(\Delta\nabla_\nu - \Delta\nabla_\mu))\,1/2Tr((-\partial^{\nu\mu})exp^{-n}\,(\Delta\nabla_\nu$$

$$- \Delta\nabla_\mu))\,exp^\infty \ldots \omega\delta\lambda\varphi\theta\Omega\eta\xi\phi \oiiint_\infty^\infty \partial\pi^\infty_\infty = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\Sigma\iiiint ħ\text{ɸѬӜЖДҞփӜѪ}\zeta\pi mc^{\mathbb{R}4}$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle S_{quad} = 1/2g^\mu_\nu \oint_\nu^\mu d^\mu_\nu\, n\, tr\,(\partial_\mu\breve{A}_\nu\partial^\mu\breve{A}^\nu - \partial_\mu\breve{A}^\nu\partial_\nu\breve{A}^\mu$$

$$= 1/2g^{\mu\nu} \oint_\nu^\mu d^{\mu\nu}k/(n\pi^{\mu\nu})\, tr\,[\breve{A}_\mu(k)\,\breve{A}_\nu(-k)]\,(k^\mu k^\nu - k_\mu k_\nu + k^\mu_\nu\delta^\mu_\nu)$$

$$= Trlog\,\Delta^{\mu\nu}_{ghost\,ghost}{}^{\mu\nu}\nabla$$

$$= C(adj)/8\pi^2(16\pi^2) \oint_\nu^\mu d^\mu_\nu\, k^\rho_\sigma\delta\Omega\lambda^\dagger/8\pi^2\, tr[\breve{A}_\mu(k)\,\breve{A}_\nu(-k)]\,(k^\mu k^\nu - k_\mu k_\nu + k^\mu_\nu\delta^\mu_\nu)$$

$$= log\,\Lambda^{\mu\nu}_{UV}/k^\rho_\sigma\lambda\Omega\phi\xi\delta\varphi\eta c^\dagger\theta$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle S_{quad} = 1/2 g_v^\mu \oint_\mu^v d_\mu^v n\, tr\, (\partial_v \breve{A}_\mu \partial^v \breve{A}^\mu - \partial_v \breve{A}^\mu \partial_\mu \breve{A}^v$$

$$= 1/2 g^{v\mu} \oint_\mu^v d^{v\mu} k/(n\pi^{v\mu})\, tr\, [\breve{A}_v(k)\, \breve{A}_\mu(-k)]\, (k^v k^\mu - k_v k_\mu + k_\mu^v \delta_\mu^v)$$

$$= Trlog\, \Delta_{ghost\, ghost}^{v\mu\quad v\mu} \nabla$$

$$= \ C(adj)/8\pi^2(16\pi^2) \oint_\mu^v d_\mu^v\, k_\rho^\sigma \delta\Omega\lambda^\dagger/8\pi^2\, tr[\breve{A}_v(k)\, \breve{A}_\mu(-k)]\, (k^v k^\mu - k_v k_\mu + k_\mu^v \delta_\mu^v)$$

$$= log\ \Lambda_{VU}^{v\mu}/k_\rho^\sigma \lambda\Omega\phi\xi\delta\varphi\eta c^\dagger\theta$$

$$\hat{H} \mid \psi\rangle = E_\psi \mid \psi\rangle \Delta\nabla_{gauge}^{\mu v} = \Delta\nabla_{ghost}^{\mu v} \partial\delta_{v\rho}^{\mu\sigma} + nijk[\dot{F}^{\mu v}, \infty] = Tr\ log \Delta\nabla_{gauge}^{\mu v}$$

$$= 16 Tr\ log \Delta\nabla_{ghost}^{\mu v} + \dot{F}_{\mu v} terms$$

$$= -1/2(2ijk) exp^{\mu v} Tr((-\partial^{\mu v}) exp^{-\mu v} [\dot{F}_{\mu v}, [(-\partial^{\mu v}) exp^{-\mu v} \dot{F}^{\mu v}, \infty]])$$

$$= 1/2 \oiiint_v^\mu d_v^\mu k_\rho^\sigma/(16\pi^2)\, tr_{adj}[\breve{A}_\mu(k)\, \breve{A}_v(-k)] \oiiint_v^\mu d_v^\mu p_\rho^\sigma\, /(16\pi^2) - 16(k^\rho \delta^{\mu\sigma}$$

$$- k^\sigma \delta^{\mu\rho})\, (k_\sigma \delta_\rho^v - k_\rho \delta_\sigma^v))/\rho^{\mu v} \sigma^{\mu v} (\rho_v^\mu + k_v^\mu) = \dot{F}_{\mu v} terms$$

$$= 16 C(adj)/(32\pi^2) \oiiint_v^\mu \frac{d^{\mu v} d_{\mu v} k_v^\mu}{16\pi^2} tr[\, \breve{A}_\mu(k)\, \breve{A}_v(-k)]\, (k^\mu k^v - k_\mu k_v$$

$$+ k_v^\mu \delta_v^\mu)\ log\ \Lambda_{UV}^{\mu v}/k_\sigma^\rho \lambda\Omega\phi\xi\delta\varphi\eta c^\dagger\theta = 1/2\, Tr\, \log\ \ \Delta\nabla_{gauge}^{\mu v}$$

$$= 1/2[16/4 - 8]\, C(adj)/16\pi^2 \oint_v^\mu d_v^\mu\, k_\rho^\sigma \delta\Omega\lambda^\dagger/8\pi^2\, tr[\breve{A}_\mu(k)\, \breve{A}_v(-k)]\, (k^\mu k^v - k_\mu k_v$$

$$+ k_v^\mu \delta_v^\mu) = log\ \Lambda_{UV}^{\mu v}/k_\rho^\sigma \lambda\Omega\phi\xi\delta\varphi\eta c^\dagger\theta$$

$$\hat{\mathrm{H}} \mid \psi\rangle = E_{\psi} \mid \psi\rangle \Delta\nabla^{\nu\mu}_{gauge} = \Delta\nabla^{\nu\mu}_{ghost}\partial\delta^{\nu\sigma}_{\mu\rho} + nijk[\dot{\mathrm{F}}^{\nu\mu},\infty] = Tr\ log\Delta\nabla^{\nu\mu}_{gauge}$$

$$= 16Tr\ log\Delta\nabla^{\nu\mu}_{ghost} + \dot{\mathrm{F}}_{\nu\mu}terms$$

$$= -1/2(2ijk)exp^{\nu\mu}Tr((-\partial^{\nu\mu})exp^{-\nu\mu}[\dot{\mathrm{F}}_{\nu\mu},[(-\partial^{\nu\mu})exp^{-\nu\mu}\dot{\mathrm{F}}^{\nu\mu},\infty]])$$

$$= 1/2 \oint\!\!\!\iiint_{\mu}^{\nu} d^{\nu}_{\mu}k^{\rho}_{\sigma}/(16\pi^2)\ tr_{adj}[\breve{\mathrm{A}}_{\nu}(k)\ \breve{\mathrm{A}}_{\mu}(-k)] \oint\!\!\!\iiint_{\mu}^{\nu} d^{\nu}_{\mu}p^{\rho}_{\sigma}/(16\pi^2) - 16(k^{\sigma}\delta^{\nu\rho}$$

$$- k^{\rho}\delta^{\nu\sigma})\ (k_{\rho}\delta^{\mu}_{\sigma} - k_{\sigma}\delta^{\mu}_{\rho}))/\rho^{\nu\mu}\sigma^{\nu\mu}(\rho^{\nu}_{\mu} + k^{\nu}_{\mu}) = \dot{\mathrm{F}}_{\nu\mu}terms$$

$$= 16C(adj)/(32\pi^2) \oint\!\!\!\iiint_{\mu}^{\nu} \frac{d^{\nu\mu}d_{\nu\mu}k^{\nu}_{\mu}}{16\pi^2} tr[\breve{\mathrm{A}}_{\nu}(k)\ \breve{\mathrm{A}}_{\mu}(-k)]\ (k^{\nu}k^{\mu} - k_{\nu}k_{\mu}$$

$$+ k^{\nu}_{\mu}\delta^{\nu}_{\mu})\ log\ \Lambda^{\nu\mu}_{VU}/k^{\sigma}_{\rho}\lambda\Omega\phi\xi\delta\varphi\eta c^{\dagger}\theta = 1/2\ Tr\log\ \Delta\nabla^{\nu\mu}_{gauge}$$

$$= 1/2[16/4 - 8]\ C(adj)/16\pi^2 \oint_{\mu}^{\nu} d^{\nu}_{\mu}\ k^{\rho}_{\sigma}\delta\Omega\lambda^{\dagger}/8\pi^2\ tr[\breve{\mathrm{A}}_{\nu}(k)\ \breve{\mathrm{A}}_{\mu}(-k)]\ (k^{\nu}k^{\mu} - k_{\nu}k_{\mu}$$

$$+ k^{\nu}_{\mu}\delta^{\nu}_{\mu}) = log\ \Lambda^{\nu\mu}_{VU}/k^{\rho}_{\sigma}\lambda\Omega\phi\xi\delta\varphi\eta c^{\dagger}\theta$$

CONCLUSIONES

En mérito al análisis de campo antes descrito – marco praxeológico (campos de gauge y campos fantasma), bajo el marco metodológico de las teorías de Yang-Mills y bajo un esquema estrictamente hamiltoniano, sin perjuicio de las demás variables conjugadas (verbigracia, sistemas lagrangiano y algebra de Lie, etc), que conforman el sistema de campos de Yang-Mills, queda demostrado: **(i)** que, las excitaciones más bajas de una teoría pura de Yang-Mills (es decir, sin campos de materia) tienen una brecha de masa finita con respecto al estado de vacío; **(ii)** que, la propiedad de confinamiento en tratándose de física de partículas; y, **(iii)** que, para un hamiltoniano cuántico relativo a un campo de Yang-Mills no abeliano, en efecto existe un valor positivo mínimo de energía, calculado a través de la siguiente constante universal[2]:

$$\mu := \inf \mathrm{Spec}(\hat{H})\backslash 0 > 0 = \xi^{\sigma\varsigma\zeta}_{\lambda\Omega\psi}\Sigma\iiiint \text{ħɸѬǯҖДҚψӜѪ}\zeta\pi mc^{\mathbb{R}4}$$

En consecuencia, este trabajo, demuestra que la teoría gauge no abeliana de Yang – Mills, describe otras fuerzas en la naturaleza, especialmente la fuerza débil (responsable, entre otras cosas, de ciertas formas de radiactividad) y la fuerza fuerte o nuclear (responsable, entre otras cosas, de la unión de protones y

[2] *C. N. Yang & R. L. Mills, Physical Review, 96, 191 (1954).*

neutrones en núcleos), sin perder las premisas esenciales de la teoría de campos de Yang – Mills, esto es, por fuera de la teoría electrodébil de Glashow-Salam-Weinberg o la teoría del "campo de Higgs".

Si bien es cierto, constituyese en una propiedad notable de la teoría cuántica de Yang-Mills, la nominada "*libertad asintótica*", la misma que, permite determinar, que a distancias cortas el campo muestra un comportamiento cuántico muy similar a su comportamiento clásico; sin embargo, a largas distancias, la teoría de Yang – Mills, como queda demostrado, también aplica a largas distancias en el campo.

Finalmente, queda demostrado concluyentemente, que: **(i)** en los campos de Yang – Mills, existe una "brecha de masa", es decir, $\Delta >$ constante, por lo que, cada excitación del vacío tiene energía de al menos Δ; **(ii)** en los campos de Yang – Mills, existe un confinamiento de quarks, partiendo de la premisa de que, los estados físicos de las partículas, como el protón, el neutrón y el pión, son invariantes; y, **(iii)** en los campos de Yang – Mills, existe una ruptura de simetría quiral, lo que significa que el vacío es potencialmente invariante bajo un cierto subgrupo de simetría completa que actúa sobre los campos de quarks.

REFERENCIAS BIBLIOGRAFICAS

O'Raifeartaigh. L., and Straumann. N. (2000). Gauge theory: Historical origins and some modern developments. Reviews of Modern Physics. 72(1), 1-23. https://doi.org/10.1103/RevModPhys.72.1

Tong, D. (2018). Gauge Theory. *Cambridge University*. United Kingdom. http://www.damtp.cam.ac.uk/user/tong/gaugetheory.html

Baggott, J. (2017). La historia del cuanto: una historia en 40 momentos. *Ed. Intervención Cultural*. España.

Wilson. R., and Gray. J. (2000). Mathematical Conversations: Selections from The Mathematical Intelligencer. *Springer Ed*.

Straumann, N. (2000). On Pauli's invention of non-abelian Kaluza-Klein Theory in 1953. https://doi.org/10.48550/arXiv.gr-qc/0012054

Hooft. G., and Veltman. M. (1972). Regularization and renormalization of gauge fields. *Nuclear Physics B. 44*(1). 189-213. https://doi.org/10.1016/0550-3213(72)90279-9

Frampton, P. (2008). Gauge Field Theories. Weinheim, Alemania : Wiley-VCH Verlag GmbH & Co. KGaA. 3ra Edición.

Yang. C. N. and Mills, R. L., (1954). Conservation of Isotopic Spin and Isotopic Gauge Invariance. *Physical Review. 96*(1), 191-195. https://doi.org/10.1103/PhysRev.96.191