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**Abstract**

Over the last decades, new architectures and infrastructures for containing and artificially reproducing the conditions at the very beginning of the Universe have surfaced across the world: a synthetic replica of the early Universe on Earth.

These sophisticated technospaces are sealed chambers that recreate specific and non-existent physical conditions on Earth to reveal the origin of matter. They spread throughout a subterranean global chamber system: an invisible underground network.

New supranational laboratories like CERN transformed physics into a force within politics, creating new spaces of negotiations and agreement. Subatomic particles are questioning the Standard Model of Particle Physics while scientific infrastructures simultaneously challenge previous political and social structures.

The tiny monastic laboratory of the seventeenth century has been replaced by a global technoscientific infrastructure spread across the world. Elementary particle physics infrastructures involve massive urban complexes, buildings, and chambers, designed to host the invisible. These hybrid urban environments are comprised of scientists, particles, liquids, data, politics and technologies working together for the production of knowledge, and to translate a world not perceptible to humans.

The transnational network of particle physics underground laboratories is constructing a new scientific architecture around the world: a sensing architecture, which amplifies new political and material interactions. Maybe, we can say that every new scientific experimental chamber is the architecture of a new époque of hybrid systems of transnational and transhuman collaborations.

*This text is part of a larger project conducted through a practice-led PhD in Arts and Sciences at the BxNU Institute (Baltic Center for Contemporary Art and Northumbria University).*

### Keywords

scientific infrastructures, geopolitics, CERN, sensing architectures, transnational, transhuman.

*Una cuestión de materia. Descomponiendo enlaces microscópicos en el espacio transnacional.*

### Resumen

*En las últimas décadas, han surgido nuevas arquitecturas e infraestructuras para contener y reproducir artificialmente las condiciones presentes durante la creación del Universo: una réplica sintética del Universo primitivo en la Tierra.*

*Estos sofisticados tecno-espacios son cámaras selladas que recrean condiciones físicas específicas e inexistentes en la Tierra para revelar el origen de la materia. Se extienden a través de un sistema de cámaras subterráneas: una red subterránea invisible.*

*Nuevos laboratorios supranacionales como el CERN han transformado la física en una fuerza dentro de la política, creando nuevos espacios de negociaciones y acuerdos. Las partículas subatómicas cuestionan el modelo estándar de la física de partículas, mientras que las infraestructuras científicas desafían a la vez los modelos anteriores de estructuras políticas y sociales.*

*El pequeño laboratorio monástico del siglo XVII ha sido reemplazado por una infraestructura tecnocientífica global repartida por todo el mundo. Las infraestructuras de física de partículas elementales incluyen grandes complejos urbanos, edificios y cámaras, diseñados para contener lo invisible. Estos entornos urbanos híbridos contienen en su interior científicos, partículas, líquidos, datos, políticas y tecnologías trabajando conjuntamente para la producción de conocimiento y para traducir un mundo no perceptible para los humanos.*

*La red transnacional de laboratorios subterráneos de física de partículas está construyendo una nueva arquitectura científica en todo el mundo: una arquitectura sensor que amplifica las nuevas interacciones políticas y materiales.*

*Tal vez, podamos decir que cada nueva cámara experimental científica es el arquitecto de una nueva época de sistemas híbridos de colaboraciones transnacionales y transhumanas.*

*Este texto forma parte de un proyecto más amplio realizado dentro de un doctorado en Artes y Ciencias en el Instituto BxNU (Centro Báltico para el Arte Contemporáneo y Universidad de Northumbria).*

### Palabras clave

*infraestructuras científicas, geopolítica, CERN, arquitecturas sensoras, transnacional, transhumano*

## Introduction, A matter of Matter

*'but I have in mind, by renaming [...], - namely the evocation of a fictive nation-state in place of real ones, so as to better grasp the elusive nature of stately being. After all, it is not only the writer of fiction who fuses reality with dreamlike states. This privilege also belongs, as Kafka taught, to the being-in-the-world of the modern state itself'. Preface to 'The Magic of the State', Michael Taussig.<sup>1</sup>*

Shortly after the Second World War, at the European Cultural Conference in Lausanne in 1949, a group of scientists conceived the idea of a European atomic physics laboratory to avoid resource competition and war in Europe. It was the first proposal for collaboration between European countries.<sup>2</sup>

The European physicists Niels Bohr, Edoardo Amaldi, Pierre Auger, Lew Kowarski and the engineer and politician Raoul Dautry imagined the creation of a future physics laboratory to host new fundamental physics knowledge. This would form an architecture where physicists from different nations would be working together for the production of future ideas and facts across multiple generations.

Eight years later, the 'European Atomic Energy Community' was created at the same time as the 'European Economic Community. The 'Euratom Treaty' was signed for the coordination of research in atomic energy and the creation of the European Organization for Nuclear Research (CERN<sup>3</sup>), an elementary particle laboratory in Geneva, Switzerland.



Image 1. Building works begin under the eyes of Geneva officials and members of CERN staff, 1954. (Image from CERN's historical archive, © 1954 CERN)

What if elementary Particles are at the nucleus of the formation of the European Union? Since the proposal for a nuclear collaboration laboratory in 1949, the bases of the nation-state were surpassed.

The Euratom Treaty agreement built a new architecture of the territory in the name of scientific knowledge and peace, a new political entity based on a multinational political union, a supranational political form with negotiated power.

## A Synthetic replica of the Universe on Earth

Over the last decades, new architectures and infrastructures for containing and artificially reproducing the fundamental laws of nature have surfaced across the world: a synthetic replica of the early Universe on Earth.

During the seventeenth century, a new containment architecture appeared: a Vacuum Chamber that would define the relationship with science over the coming years<sup>4</sup>. The Vacuum Chamber is an enclosed space from which gases and matter are removed to avoid interferences during the experiments. From Boyle's Vacuum Chamber experiment humans have built containment architectures in an attempt to contain nature's behaviour while reproducing extreme and impossible physical conditions on Earth.

The empty chamber is paradoxically filled with scientific experimental knowledge.

Experiments in laboratories attempt to contain non-existent conditions on Earth, such as non-gravity chambers or sterilised rooms; contemporaneously, they aim to reproduce extreme states, such as Sun plasma, within sealed chambers in order to understand these facts before encountering them, taking advantage of these facts before this first encounter.

CERN could be considered to be a huge microscope to look at the interactions that took place at the beginning of our Universe formation, a trillionth of a second after the Big Bang. At CERN, physicists and engineers are using the most complex scientific equipment to study the fundamental structure of the Universe and fundamental particles, the building blocks of matter. Inside the Large Hadron Collider (LHC) ring, a 27 km diameter vacuum chamber placed about 175 m underground, the particles are accelerated to almost the speed of light in order to understand the fundamental laws of nature through their collisions. To avoid interferences in the results, the LHC is the most complete vacuum in the largest chamber ever built. The superconducting dipole magnets surrounding the vacuum

1. Taussig, Michael T. 1997. *The Magic of the State*. UK: Routledge
2. The first signed Treaty, The European Coal and Steel Community (ECSC) was first proposed by French foreign minister Robert Schuman on 9 May 1950. It was formally established in 1951 by the Treaty of Paris, signed by Belgium, France, Italy, Luxembourg, the Netherlands, and West Germany.
3. Acronym of French *Conseil Européen pour la Recherche Nucléaire*.
4. Shapin, Steven, and Simon Schaffer. 1985. *Leviathan and the Air Pump*. Princeton: Princeton University Press.

ring guide the particle beam, creating a magnetic field more than 100,000 times stronger than that found on the Earth. This process occurs at a temperature of  $-271\text{ }^{\circ}\text{C}$ , nearly absolute zero ( $-273\text{ }^{\circ}\text{C}$ ). It is to date the coldest place in the known Universe. Moreover, the energy generated by the collisions is the highest energy ever obtained on Earth<sup>5</sup>.

At CERN, within its 27 km circumference, a thousand billion particles are accelerated every ten seconds to nearly the speed of light and hurtled against an iron wall. Only the selected particles reach the targets in the observatory area for experiments.

The event is artificially produced. The accident is finally controlled.

## The Laboratory, Witnessing Matter Speak

Scientific chambers are the architectures of experimental scientific knowledge.

Chamber means *camera*, an enclosed space that confines a proper ecosystem within its borders. This confinement occurs via the membrane that separates the interior from the exterior; it does not allow for permeation between. This isolation produces an internally conditioned state.

The experimental scientific method requires the construction of conditions of reproducibility and witnessing, even though these can often only be seen under simulations. At the same time, there is a need to design conditions of containment and isolation.

## The Restricted Public Space

In *We Have Never Been Modern*, Bruno Latour<sup>6</sup>, following what was advanced in Steven Shapin and Simon Schaffer's *Leviathan and the Air Pump* (Shapin and Schaffer 1985), expands on the notion that the laboratory of the seventeenth century became the space of concealment for independent scientific opinion beyond state control. Thus, "the Modern Constitution invents a separation between the scientific power charged with representing things and political power responsible for representing subjects. [...] The former translate their principals, who cannot all speak at once; the latter translate their constituents, who are mute from birth. The former can betray; so can the latter." (Latour 1993, 28)

This event is at the core of the separation of Nature and Society.

Before that, secret societies emerged to hide dangerous scientific knowledge from the religious society of the Middle Ages. Thus, at the moment Nature became Natural and Cultural, these communities

became eligible for the safe-guarding of the new knowledge and the will to disclose nature's difference from the previous mythical understanding of the world. These practices have been established since the Enlightenment and led up to today's spaces of concealment as the basis of the technoscientific society of the contemporary moment.

These architectures are at the beginnings of the contemporary scientific and political condition of modernity. From Boyle's Vacuum Chamber until now, events and truth have been artificially produced within the restricted and protected space of the laboratory.

Science and politics became contained and safeguarded spaces only permeable to experts able to witness these processes. "A public space with restricted access", as Shapin and Schaffer elucidate. (Shapin and Schaffer 1985, 336).

Henceforth, only experts can be witnesses and mediums. They are able to collect information and evidence. They also have the expertise to translate and inscribe a new fact into human knowledge and politics. The scientist is a witness and medium of a world that speaks for itself and is constituted by matters of fact.

*"Boyle insisted that witnessing was to be a collective act. In natural philosophy, as in criminal law, the reliability of testimony depended upon its multiplicity."* (Shapin and Schaffer 1985, 56)

However, although the condition of restricted public space is still operating, new subatomic research has induced a change in these spaces. The tiny monastic laboratory of the seventeenth century has turned into a global technoscientific infrastructure spread across the world.

Perhaps we can say the Earth is a laboratory in itself, endlessly monitored from within and from outer space.

These major scientific spaces and networks, in turn, have expanded the idea of the lone scientist's lab to large cities of scientists working on the same dilemmas. Just as the factory towns of the nineteenth century, or the secret cities of scientists and engineers during the Cold War, these urban infrastructures are comprised of a number of scientists, particles, politics and technologies working together for the production of knowledge.

## Witnessing, Evidence and Trial: Containment and Translation

*'Boyle invented the empirical style that we still use today. He relied his work on a parajudicial metaphor: credible witnesses gathered at the scene of the action can attest to the existence of a fact, the matter of fact, even if they do not know its true nature. A laboratory transformed into court. 'Les faits sont faits': 'Facts are fabricated,' as*

5. Randall, Lisa. 2011. *Knocking on Heaven's Door*. New York: Ecco Press.

6. Latour, Bruno. 1993. *We Have Never Been Modern*. Cambridge: Harvard University Press. (Translated from: *Nous n'avons jamais été modernes: Essai d'anthropologie symétrique*. 1991. France: La Découverte)

*Gaston Bachelard would say. But are facts that have been constructed by man artificial for that reason? No. We know the nature of the facts because we have developed them in circumstances that are under our complete control. Inert bodies, incapable of will and bias are capable of showing, signing, writing, and scribbling on laboratory instruments before trustworthy witnesses.* (Latour 1993, 18)

Thus, the matter of fact is truth until the contrary is proven, as innocence should be considered on trial. Falsifiability and error are at the nucleus of scientific experimentalism. As the philosopher of science Karl Popper<sup>7</sup> resolved at the beginning of the twentieth century, following the fallibilist ideas of other philosophers, such as Charles Sanders Peirce in the nineteenth century and Pyrrho in the third century BC, the condition of falsifiability distinguishes science from pseudoscience.

This condition requires experiments to prove or negate scientific theories. Moreover, to enlarge the witness community, these experiments need to be replicable. As Boyle already established in the seventeenth century, the laboratory chamber is a space for proving and witnessing within an environment that recreates specific conditions. These chambers also allowed for pure observation of physical condition without interference on the part of the scientist. Furthermore, these spaces create a set of pre-conditions for knowledge.

Laboratories became “theatres of persuasion” (Haraway 1997, 270<sup>8</sup>)

Since Boyle determined that science speaks in the name of things, the scientist, as a medium, observes, translates and interprets what things show.

Following the trace of elementary particles we can recognise several new interdependent ecosystems. They have introduced a series of modifications in laboratories and political pacts to enable new elementary particles to speak for themselves. This has represented a transformation in spaces and partnerships. Thus, it is producing hybrid systems of transnational and transhuman collaborations.

## Elementary particle Laboratories: Collision and Sensing Architectures

Certainly, elementary particle detection and production is extremely difficult and sensitive. These architectures require highly specific and controlled conditions. Any small interference can largely vary the

results. Thus, these chambers need to be placed where the natural cosmic radiation and artificial radioactive isotopes of human-made nuclear reactors or nuclear weapons have less impact.

These sophisticated technospaces are sealed chambers that recreate specific and non-existent physical conditions on Earth. They spread throughout a subterranean global chamber system: an invisible underground network.

These collider and sensing architectures, are formed by a network of torus and rings within huge underground chambers: The Large Hadron Collider at the European Organization for Nuclear Research, or CERN, the Tevatron at Fermilab in the US, and future structures such as the ‘Super Proton-Proton Collider’ that will be built in the People’s Republic of China, or a forthcoming Neutrino Factory in the UK, in collaboration with the EU, the US and Japan.

In *We Have Never Been Modern*, Latour reckons that “the modern Constitution allows the expanded proliferation of the hybrids whose existence, whose very possibility, it denies” (Latour 1993, 34).

Elementary particles require another perspective to perceive the world through scientific experimentation. Human senses must collaborate within a cyborg structure. A hybrid human-machine-liquid-organism-particle generates a whole new translation of a world not perceptible to humans. This generates a series of new mechanisms based on collected data by processes of fragmentation, repeatability and simulation which forces mute matter to speak through a subsequent process of translation. Machines are witnesses that capture information from nature and translate this data into a human range of understanding.

Perhaps the scientist is not the only medium of Nature, it also relies on the machine.

If we observe these hybrid structures in which metal, particles, scientists, liquids and data gather together, we cannot see architectures of purification. Today, elementary particle chambers are constructing a new scientific architecture.

These chambers designed to host the invisible, analyse the subject helping the observation of things beyond human range. Alfred North Whitehead argued that “nature is perception through senses”<sup>9</sup>, and now we rely on techno-senses as well.

“Unassisted senses were limited in their ability to discern. [...] Scientific instruments enlarged the senses. [...] In Hooke’s<sup>10</sup> view, [...] (t)he aim was the enlargement of the dominion, of the Senses.” (Shapin and Schaffer 1985, 36).

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7. Karl Popper. 1959. *The Logic of Scientific Discovery*. Great Britain: Routledge. (Translated from: *Logik der Forschung. Zur Erkenntnistheorie der modernen Naturwissenschaft*, 1934. Germany: Mohr Siebeck)
  8. Haraway, Donna J. 1997. *Modest\_Witness@Second\_Millennium .FemaleMan©\_Meets\_oncoMouse™. Feminism and technoscience* -. New York, London: Routledge.
  9. Whitehead, Alfred North. 1920. *The concept of nature*. Great Britain: Cambridge University Press.
  10. Shapin, Steven, and Simon Schaffer. 1985. *Leviathan and the Air Pump*. Princeton: Princeton University Press. Citing Hooke, Robert. 1665. *Micrographia*. Great Britain: The Royal Society.

As Latour affirms, experimental science uses forms of purification in its analysis, but it needs to be hybridised into a technoscientific ecosystem. Human forms of perception are so limited that, as Donna Haraway states, the human body is the prosthetic body *par excellence*. It relies on tools in order to evolve.

Elementary particles reconfigure a net of frictions full of paradoxes and unstable propositions that are constantly changing.

"[...] Tecnoscience extravagantly exceeds the distinction between science and technology as well as those between nature and society, subjects and objects, and the natural and the artificial that structured the imaginary time called modernity." (Haraway, 1997, 3)

## Colliding political alliances and treaties

The invisible underground network of particle physics infrastructures around the world is a sensing architecture, which amplifies not only material, but also, new political interactions. Transnational elementary particles are creating new forms of alliances and global networks.

After the nuclear fission era and the Cold War, the sub-atomic particles époque has been created by a new configuration of alliances. Alternative forms of energy and knowledge are creating new forms of political and scientific alliances.

What if there was a nuclear treaty at the nucleus of the alliances between nations?

## Euratom Treaty: fundamental agreement at the nucleus of the EU

As previously mentioned, in 1949, shortly after the Second World War, a group of scientists conceived the idea of a European atomic physics laboratory to avoid resource competition and war in Europe.

The first resolution about the founding of a European Council for Nuclear Research was signed in 1951, at an intergovernmental meeting in the UNESCO in Paris, only eight months after 'The Six' (Belgium, France, Italy, Luxembourg, the Netherlands and West Germany) signed the 'European Coal and Steel Community' Treaty, for the regulation of a Common Market of natural resources in Europe; the first agreement towards what became the European Union (EU). In 1957, the 'European Economic Community' was created at the same time as the 'European Atomic Energy Community'. The Euratom Treaty was signed to instigate the creation of CERN, a particle detector and collider.



Image 2. Sala degli Orazi e Curazi, Palazzo dei Conservatori on Capitoline Hill.



Image 3. 'Treaties of Rome' signature, 1957, and Signature's Anniversary, 2017.

"CERN is not concerned on nuclear power and does not military work (sic)", the Media highlighted in 1957. At the moment of the signature, the 'Euratom Treaty' was not included in the general 'European Economic Community' treaty due to the disapproval of the word 'atomic' within the civil society for its connotations after the War and the raising menace of nuclear weapons. In order that the research collaboration into atomic energy would not create suspicion surrounding the European Economic Community, it was written in a separate document under its own conditions. When in 2009 the Lisbon Treaty transformed the European Economic Community to the legal personality of the European Union (EU)<sup>11</sup>, – a requirement in International law to be able to sign International Treaties in its own name - the Euratom Treaty was not merged and still has a separate legal personality.

The supranational form proposed for the laboratory transcended physics to affect the political structures and spaces of negotiations and agreements.

11. The European Union (EU) has legal personality since the Lisbon Treaty entered into force on 1 December 2009. That the EU has legal personality is a prerequisite for the EU to join the European Convention on Human Rights (ECHR).

During the signing of the Treaty of Rome, in 1957, in the *Palazzo dei Conservatori* on Capitoline Hill, the *Sala degli Orazi e Curazi* had to receive political representatives from all the participant states. For the symbolic moment of the signature of the 'European Economic Community' and the 'European Atomic Energy Community' (Euratom Treaty), a new disposition of the space was required to maintain an equitable position among all the member states and to share the process through international press. For the occasion, the *Sala degli Orazi e Curazi* takes the form of a Roman theatre, with a frontal point of view from where the event was broadcast by a multitude of media. A long table hosted a line of political representatives and the two treaties were moved along the table to be signed.

"European unity started as the dream of a few, it became the hope of the many. Then Europe became one again. Today, we are united and stronger: hundreds of millions of people across Europe benefit from living in an enlarged Union that has overcome the old divides." *The Rome Declaration 25 March 2017, Signature's Anniversary.*

Not by chance, Geneva was the site chosen in 1952 to build CERN, although Switzerland is not a member of the EU. The reasons were geological and also political. The Swiss Confederation maintained armed neutrality and was a stable state surrounded by the conflict during World War I and II. Science needs long-term stable conditions to carry out experiments and long periods of research. CERN became in itself a surrounded/enclosed space with particular and controlled conditions.

CERN is an interstate organization that is not administratively linked to the country within which it is sited. France and Switzerland are 'host countries' but do not apply their modes of government at CERN. A fence with checkpoints that you need to be accredited to cross surround the area of the laboratory. In its interior, a borderline separates Swiss sectors and French sectors. CERN, as an independent state, has its own regulations.

It creates stable and specific conditions in a bounded and unique habitat.

As subatomic particles question the Standard Model of Particle Physics, scientific infrastructures simultaneously challenge previous models for political and social organisation.

Although Boyle's and Hobbes' debate end with the separation between experimental science and civil society, our society is entirely based on the collaboration between the two. Science permeates our social, psychological and physical structures, and technoscientific supports are fundamental to our daily life.

CERN is one of the biggest scientific infrastructures underground. It is formed by 22 member states of the European Union - Israel is the only non-European country that has full participation - and more than eleven thousand scientists from 110 different countries work together in the production of knowledge. It is the largest assembly of scientists in the world.



Image 4. Prof Felix Bloch laying CERN's foundation stone.

10 June 1955. (Image from CERN's historical archive, © 1955 CERN)

Seventy years after the dream of a future laboratory by a small group of scientists, CERN is now the largest particle physics laboratory in the world, analysing unknown particles, using future physics to explain the distant past.

## Building blocks

A few months after the beginning of construction work, CERN's foundation stone was buried underground. This first stone, isolated in the interior of the earth, anticipated the largest experimental science machine ever built underground. The building works began in 1954 and it was not until 2012 that the expected first results from the Large Hadron Collider (LHC) arrived. It took 54 years and various generations of scientists, engineers and construction workers to finish the entire infrastructure.

CERN is underneath two countries. Billions of subatomic particles cross the French-Swiss border about 11,000 times each second.

Although the Large Hadron Collider ring, a 27 km circumference at a depth varying from 50 to 175 metres underground, is imperceptible from the surface, it organizes the land above it.

In 1974, twenty years after the first digging works started in Geneva, CERN laboratory entered French territory, trespassing across the threshold of the nation-state. The construction of the first large accelerator Super Proton Synchrotron (SPS), with a circumference of 6.9 kilometres, at an average depth of 40 metres below the surface, crossed underneath the Franco-Swiss border.

The free circulation of the Elementary Particles in 1983, pre-dated by twelve years the Schengen agreement for the abolition of internal border controls in Europe - implemented in 1995 - and Switzerland's incorporation to it by twenty-six years.

During the CERN construction works, not only was the horizontal nation-state border surpassed but it also challenged vertical private property laws. Although the experimental machine was built underground to avoid radiation and damaging the properties and land existing along the tunnel's location, in France the landowner's property rights are from their surface land to the Earth's centre. Therefore, the French authorities had to Declare of Public Utility and turn the underlying rock down to the Earth's nucleus into Public Property.

CERN is an assembly of parts of several teams, disciplines, agreements and countries. Moreover, the local isolation to recreate specific conditions for the production of knowledge turns to a larger global stable network of scientific exchanges. As a large organism, the transnational laboratory of elementary particle observatories and colliders establishes global collaborations and assemblages of scientists, materials or construction techniques.

It is an architecture of wire and sensor networks able to detect the subatomic particles enlarging the physical space to a virtual architecture of worldwide interconnections. The data is shared among elementary particle infrastructures spread across the world, which are simultaneously storing and processing the collected results. CERN is a massive producer of data and images. This massive amount of information requires an international computing collaboration for its storage and processing. Both the computers and communications need increased capacity and speed to store, analyse and share the results with the community of scientists and experts around the world. From this culture of collaboration and connection it is not by coincidence that a scientist from CERN, Tim Berners-Lee, created the World Wide Web (www) in 1989<sup>12</sup>.

Thus, the traces of Elementary Particles are subdivided in a consensual and common scientific language of tables, colour coded diagrams and graphs. This allows the sharing and discussion of discoveries within the scientific community.

'Science is a natural way to build bridges between cultures and nations, because of its common language', Dr. E. Rabinovici.<sup>13</sup>

This is the claim for the new elementary particle laboratory in the Middle East SESAME (Synchrotron-Light for Experimental Science Applications in the Middle East). It was inaugurated in May 2017 after being proposed in 1993, after the Oslo Accords, and the Israeli-Palestinian peace process. This new laboratory is based on the institutional structure of CERN, and also established by UNESCO making the claim for regional peace through science. Located in Jordan, SESAME, aims to build 'scientific and cultural bridges between neighbouring countries, promoting mutual understanding and

tolerance through international cooperation, and fostering a regional community of scientific users who will work together'<sup>14</sup>. The founding members are Bahrain (not currently a member), Cyprus, Egypt, Iran, Israel, Jordan, Pakistan, the Palestinian Authority, and Turkey. Brazil, China, the European Union, France, Germany, Greece, Italy, Japan, Kuwait, Portugal, the Russian Federation, Spain, Sweden, Switzerland, the UK and the US are observers.

'I don't know how many places there are where all these governments have representatives who have the opportunity to come and talk to each other,' said Giorgio Paolucci, the scientific director of SESAME.<sup>15</sup>

The increasing dimensions and sophistication of the new scientific experimental laboratories increasingly require an excess of energy and financial resources from the participating countries. With costs exceeding most national budgets - even more so if these countries are small - these projects need to partner nations and agencies, a combination of public and private sources.

Hence, scientific knowledge is now simultaneously fragmented and assembled. The former laboratory is an assembly of parts of several teams, disciplines and countries. The infrastructures are built and designed in different parts of the world. Scientific teams are made up of large global collaborations of experts. The high costs of research generate agreements between different nations. Partial and specific amounts of data are collected and assembled to generate new images. As Latour explains, the Modern project is both purification and hybridisation.

Scientific and political infrastructures collide and generate new bonds surrounding new nuclear synthesis. The Subatomic particles create a specific political form. Treaties, alliances, joint ventures and collaborations through scientific infrastructures and knowledge are made within nations on a planetary scale. They have generated a new infrastructure and a series of political pacts are made on the scientific field. Hence, science is participating actively in political treaties and agreements in the name of peace and scientific knowledge. Despite the apparent separation between quantum physics and civil society, science permeates our political, social and physical structures.

With the rise of a new scientific era a parallel need to develop new political architectures that surpass the nation state to build transnational pacts have emerged. It is possible that scientific architecture is a driver of political progress. Science struggles against ideology in a very particular way. Science is about trying to destroy the models and create new provisional ones. It refutes logic through experimentation. Thus, science is producing the conditions for the transformation of political models.

12. CERN website. n.d. "The birth of the web." Accessed November 2, 2019. <https://home.cern/science/computing/birth-web>

13. Overbye, Dennis. *A Light for Science, and Cooperation, in the Middle East*. The New York Times. Retrieved 8 May 2017.

14. UNESCO website. n.d. "SESAME." Accessed November 2, 2019. <http://www.unesco.org/new/en/natural-sciences/science-technology/basic-sciences/international-basic-sciences-programme/sesame/>

15. Shaheen, Kareem, *Open SESAME: particle accelerator project brings Middle East together*, The Guardian. Tuesday 30 August 2016.



Paraphrasing Isabelle Stengers, “every new machine is a new époque”<sup>16</sup>. Perhaps, we can also say that every new scientific chamber is also the architecture for a new époque.

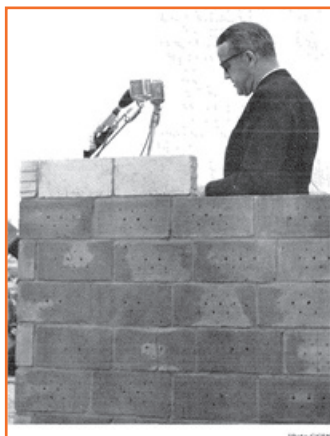


Image 5. “First stone” ceremony at the SC. Max Petitpierre speaks 10 Jun 1955. (image from CERN’s historical archive, © 1955 CERN)

## Bibliografia

- Bataille, Georges. 1988. *The Accursed Share: An Essay On General Economy. Volume I: Consumption*. New York: Zone Books.
- Beck, Ulrich and Anthony Giddens and Scott Lash. 1994. *Reflexive modernization: politics, tradition and aesthetics in the modern social order*. California: Stanford University Press-Social Science.
- Bennett, Jane. 2010. *Vibrant Matter: A Political Ecology of Things*. Durham: Duke University Press.
- Cern Archive. [http://library.cern/archives/CERN\\_archive](http://library.cern/archives/CERN_archive).
- Daston, Lorraine. 2004. *Things That Talk: Object Lessons from Art and Science*. New York: Zone Books.
- Daston, Lorraine. 2010. *Objectivity*. Cambridge: The MIT Press.
- Foucault, Michel. 1966. *The Order of Things: An Archaeology of the Human Sciences*. London and New York: Routledge Classics.
- Haraway, Donna. 1990. *Simians, Cyborgs, and Women: The Reinvention of Nature*. London: Free Association Books.
- Haraway, Donna J. 1997. *Modest\_Witness@Second\_Millennium .FemaleMan@\_Meets\_oncoMouse™. Feminism and technoscience* -. New York, London: Routledge.
- Foucault. 1966. “The Order of Things: An Archaeology of the Human Sciences”.
- Latour, Bruno. 1993. *We Have Never Been Modern*. Cambridge: Harvard University Press.
- Karl Popper. 1959. *The Logic of Scientific Discovery*. Great Britain: Routledge. (Original 1934. *Logik der Forschung. Zur Erkenntnistheorie der modernen Naturwissenschaft*, Germany: Mohr Siebeck)
- Randall, Lisa. 2011. *Knocking on Heaven’s Door*. New York: Ecco Press.
- Shapin, Steven. 2007. *Science and the modern world*. In *The Handbook of Science and Technology Studies*, 3rd Ed., ed. E. Hackett, O. Amsterdamska, M. Lynch, and J. Wajcman, 433-448. Cambridge, MA: MIT Press.
- Shapin, Steven, and Simon Schaffer. 1985. *Leviathan and the Air Pump*. Princeton: Princeton University Press.
- Stengers, Isabelle. 2010. *Cosmopolitics I*, Bononno, R (trans.), Minneapolis: University of Minnesota Press.
- Stengers, Isabelle. 2011. *Cosmopolitics II*, Bononno, R (trans.), Minneapolis: University of Minnesota Press.
- Taussig, Michael T. 1997. *The Magic of the State*. UK: Routledge
- Virilio, Paul, and Sylvère Lotringer. 1997. *Pure War*. US: Semiotext(e)/ Foreign Agents.
- Whitehead, Alfred North. 1997. *Science and the modern world*. US: The Free Press.
- Whitehead, Alfred North. 1920. *The concept of nature*. Great Britain: Cambridge University Press.

16. ‘The Insistence of the Possible: Symposium with Isabelle Stengers’ . Goldsmiths. 18 May 2016. Around Stengers’ development of a speculative philosophy concerned with a risky and situated experimentation with possibles, as well as her plea for slow science. Discussants: Luciana Parisi (Cultural Studies), Martin Savransky (Sociology), and Alberto Toscano (Sociology).

## CV

**Blanca Pujals**

PhD Candidate in Arts and Sciences

Blanca Pujals (Barcelona – London) is an architect, spatial researcher and critical writer. She got her BA in Architecture at Barcelona School of Architecture (Spain). She completed her studies with an MA in Critical Theory and Museum Studies at the Independent Studies Program of MACBA Museum tutored by the philosopher Paul B. Preciado. She was recently a postgraduate at the Centre for Research Architecture (Visual Cultures Department) directed by Eyal Weizman and Susan Schuppli, at Goldsmiths University of London. She is currently developing her practice-led PhD in Arts and Sciences at the BxNU Institute (Baltic Centre for Contemporary Art and Northumbria University) and Cultural Negotiation of Science research group, about the geopolitics and aesthetics of the Fundamental Science infrastructures, based at Baltic 39. Her cross-disciplinary practice approaches geographies of power on bodies and territories. Her research is led through a critical spatial practice as a form of research to engage with questions of contemporary culture, philosophy of science and transnational politics, developing tools for undertaking analysis through different visual and aural devices. Her work is not limited to one medium; rather, it encompasses film, architecture as well as lectures, curatorial projects and critical writing. Her last recent film projects are ‘Specular Technologies’ (2015), ‘Bodily cartographies: Pathologizing the body and the city’ (text published in *The Funambulist* n°7, 2016) and ‘A Synthetic Universe’ (2016. Text Published in *The Live Creature and Ethereal Things: Physics in Culture*, by Arts Catalyst, 2018), and the curatorial project ‘Geographies and forms of power’ in Tabakalera (2017-2018). Blanca has worked on projects in Colombia, Iraq, UK, Afghanistan, Spain, Italy, US and Switzerland and she is also a regular contributor to art projects and exhibitions in Spain and UK. She gives lectures, teaches and publishes internationally.