Andreas Lammer. *The Elements of Avicenna's Physics*. Scientia Graeco-Arabica 20. Berlin/Boston: Walter de Gruyter, 2018. 594 pp. ISBN 9783110543582. Cloth: €133.95

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In this book, Andreas Lammer analyses the central concepts and core issues of Avicenna's physics. Although Lammer draws on all the primary sources relating to Avicenna, his main focus is *al-Samāʿ al-tabīʿī* of *al-Šifā*, and its central concepts: matter and form, nature, motion, place and time. These concepts, as defined in *al-Samāʿ al-tabīʿī*, represent the foundation of Avicenna's physics, which Lammer intends to explain in its entirety. Overall, *The Elements of Avicenna's Physics* describes Avicenna not only as a genuine follower of Aristotle, but also as an innovative developer of Aristotelian thought.

This rich work provides an invaluable interpretation and summary of Avicenna's view on the science of physics as the foundation of natural philosophy. The book is divided into six parts, of which every part represents an extensive study on its own.

The first part, "The Arabic Fate of Aristotle's *Physics*", explains the transmission of Aristotle's *Physics* into Arabic language and civilisation. Here Lammer introduces the importance of analysis of the Arabic translation of Aristotle's physics, as well as the translations of Aristotle's commentators up to the time of Avicenna. Thus, this study is invaluable not only to those interested in Islamic philosophy, but also to those interested in the commentary tradition of Late Antiquity, as it takes into consideration the interpretations of Theophrastus, Galen, Alexander of Aphrodisias, Plotinus, Porphyry, Themistius, Proclus, John Philoponus and Simplicius.

Before anything else, Lammer reminds us of the importance to keep in mind that we do not know Avicenna's source for Aristotle's physics (p. 18), yet that we can be certain that he was aware of the most important translations of that time (p. 19), and certainly developed his understanding of natural philosophy through critical examination of the works of Philoponus and Alexander of Aphrodisias (p. 32). Once we are aware that Avicenna did not rely on only one translation but many in formulating his natural philosophy, whilst also forming his own independent ideas about the world (pp. 40-41), we can understand why various works and contributions of the pre-Avicennian commentators should be examined and compared in the context of the presented study.

At the beginning of the second part of his book, under the title "The Methodology of Teaching and Learning", Lammer highlights certain discrepancies in the methodological approach to the science of physics between Aristotle and Avicenna: while for Aristotle induction represents the approach to grasp "primitives", for Avicenna it simply does not yield certainty – i.e. does not provide necessary knowledge – and thus he develops the concept of "methodic experience" (*taǧriba*) as conditionally universal (pp. 45-49). Yet if

knowledge is conditional in any way, it cannot provide certainty of principles. This is the reason Avicenna introduces the concept of the "Active Intellect" (pp. 49-50).

After extensive examination and analysis of the Commentators' idea regarding the method of physics, the author concludes that in his approach to this science Avicenna follows Philoponus' interpretation of Aristotle, according to which science proceeds from what is universally common as better known to the intellect towards more particular concerns; for this reason physics precedes other branches of natural philosophy (pp. 51-70). In this sense physics deals with the common principles of the sensible body insofar as it is subject to change (p. 71), yet not in a way of scientific demonstration; according to Lammer, "*al-Samā' al-tabī'ī* is no book of research and inquiry but a book of teaching and learning" (p. 71) – it is a book that explains, elaborates and defends what is already established in the science of physics. This simply means that Avicenna explains principles of nature instead of arriving at them; he goes from universals to particulars in the form of a demonstrative deduction (pp. 75-78). For Lammer, with this approach Avicenna anticipated Barnes and Wieland's view of the method of Aristotle's *Posterior Analytics* as didactic (p. 79). In other words, regarding physics Avicenna postulates and defends what Aristotle demonstrated.

The third part, entitled "The Subject-Matter of Physics" identifies the starting point of Avicenna's natural philosophy. This is "the sensible body insofar as it is subject to change" (p. 111). Lammer notices that Avicenna does not start his elaboration from the analysis of the phenomenon of motion and change, but from corporeality (p. 113). This further supports his identification of *al-Samā' al-tabī'ī* as a didactic work. Avicenna divides his analysis into that of the essential constituents of the natural body, and that of the body's engagement with motion and change (p. 114). For him the most common thing to every body is extension: bodies are essentially extended (pp. 128-132), i.e., something which is essentially continuous in three dimensions (p. 136). Also, as corporeal reality a natural body is constituted of two principles: matter and form: matter as the underlying principle is in itself non-extended, pure potency receptive of form; the corporeal form on the other hand is the source and principle of corporeality (pp. 153-154). In addition, Avicenna identifies privation as a principle of change inasmuch as it explains change, but not as a principle of causing change (p. 209). Privation does not cause change, but without it change is unintelligible. From this we can see that in *al-Samā' al-tabī'ī* Avicenna begins with what is most common and proceeds towards what is more particular (p. 114) and does not discuss the principles of natural things on the basis of an analysis of change, like Aristotle, but through examination of the notion of corporeality (p. 201).

The fourth part, "Nature and Power", deals with these two concepts, and presents Avicenna's critique of the Aristotelian commentators, as well as his own defence of Aristotle. Avicenna criticises both the entire Greek commentary tradition and the Arabic tradition of his time. In order to identify Avicenna's position and elaborate upon his criticism, Lammer once again offers an extensive comparison of the commentary tradition. He argues that the main problem with the teachings of Avicenna's predecessors was aligning the Aristotelian soul with nature. The problem starts with Philoponus whose interests were to highlight the

inner coherence of Aristotle's work (pp. 218-225) mixing it with his own Neoplatonic elements (pp. 220-222).

Lammer shows that Avicenna was clearly influenced by the ancient Aristotelian commentators, but also successfully distanced himself from the preceding tradition by providing a clear distinction between philosophical concepts such as "nature", "inclination" and "motion" (p. 252). According to Avicenna, nature is a simple principle for motion and rest (p. 228). Nature is what always acts according to a single course and cannot be altered nor transformed (p. 230), as it is an internal efficient principle which causes motion from within. Nature causes inclination in things, and the inclination then manifests itself in motion (p. 247).

The main problem of Neoplatonism is their view of nature as a universal entity (*ḏāt*) that is independent from beings in motion which are moved by it; thus nature is regarded as a cosmic self-sufficient substance (p. 278). Contrary to this idea, in *al-Samāʿ al-tabīʿī* I.5 Avicenna sees nature as a single universal and common principle of motion, which governs all things in the world (p. 269-271). He rejects the universal notion of nature that exists outside of conception; instead, all natural things have their own nature, just as they have their own matter and form (p. 279). In accordance with their natures things are acting and resting (p. 280), and moving along a rectilinear line, as it is in accordance to a natural inclination that a thing moves along the shortest distance (p. 283). For this reason a circular motion of the heavens is not natural, but due to the soul, or volition (pp. 284-285). Only inanimate bodies move due to their natures in the strict sense. Living beings, on the contrary, move by their souls: celestial, animal or vegetative (pp. 287-290). Therefore, there is no universal nature; nature is a general principle that belongs to every natural body individually insofar as it is subject to change (p. 306).

The fifth part "Putting Surface Back into Place" deals with Avicenna's revival of Aristotle's idea of space against Philoponus' objections. The two rival theories were extensively analysed by Avicenna. Regarding this issue Lammer says: "if Philoponus' *Corollarium de loco* constitutes the greatest attack on Aristotle's account, Avicenna's *al-Samāʿ al-tabīʿī* contains its greatest defence" (p. 308). Having this in mind the author is very critical of the fact that Avicenna's account of place is so underrated and not adequately understood in current scholarship. For this reason, his main intention in this part of the book is to show that "Avicenna's discussion of place remains by all means the most comprehensive, the most rigorous, and the most ingenious vindication of the Aristotelian position" (p. 310).

Avicenna's revival of Aristotle's theory rests on the statement that "place is the surface which is the limit of the containing body and nothing else" (p. 346). It is the combination of all the surfaces that are in contact with the body (p. 348). Having a place entails being a body (p. 352), and through its surface the body as a whole is in contact with place (p. 354). However, there is one important point where Avicenna abandons Aristotle's account: place itself can be in motion while the body is in a state of rest, because rest is only a privation of motion (pp. 362-363). Lammer argues that in this way Avicenna improves upon Aristotle's physics by following his definitions and conception (p. 366). The place of a body depends on

two bodies: one which is in place and the one which provides the place (p. 367). Such a conception allows Avicenna to maintain that extension always belongs to the contained body – and this is the main reason why the existence of void is impossible (pp. 398-401). Besides, if void exists in any sense, it would be something that can be defined – this means that it would have a specific difference which would distinguish it within the assumed genus in the form of a positive statement; no such statement about the void is possible (p. 402).

In the sixth part, "Time and Temporality in the Physical World", Lammer moves on to explain Avicenna's theory of time, stating that time is his "least Aristotelian concept" (p. 427). While according to the Aristotelian account time is that which measures motion, Platonists view motion as something that measures time. It was the Platonist account that was followed by some Peripatetics like Boethius, Alexander and Ibn ʿAdī (pp. 455-456).

The starting point of Lammer's analysis is that time cannot be identified with motion (p. 439). For Avicenna, time is a magnitude of a non-integral disposition which is the motion from place to place (p. 440). It is the disposition which is never fully realised as a whole in the thing of which it is a disposition. Time is the magnitude of motion (p. 441). It is the measure of what is prior and posterior in the motion, or number of motion when it is differentiated into what is prior and what is posterior (p. 442). Up to this point Avicenna follows Aristotle's account: time is a name for measure which describes the size of motion (pp. 443-449).

Avicenna certainly put emphasis on Aristotle's view, but his notion of time as magnitude allows for the partial inclusion of the Neoplatonic conception as well: as the magnitude of motion time numbers that motion, but time is also numbered by motion in the sense of motion's essential differentiation into what is prior and what is posterior (p. 460). In other words, motion provides the units for measuring time when differentiated by the prior and posterior (p. 461). Essentially time is "the before and after" from which other things derive their temporality – their "beforeness and afterness" in the magnitude of motion (pp. 474-476).

Lammer argues that in Avicenna's system the existence of time is proven ontologically, from the time's essence. States of existence and non-existence are individually characterised as "before and after" thus ordered as prior and posterior to one another (p. 487). In other words, things associated with the states of existence and non-existence "derive their beforeness and afterness through these states' relation to time" (p. 488). We cannot explain beforeness and afterness nor priority and posteriority without a thing that is essentially before and after (p. 488). Thus the fact of temporality implies the existence of time (p. 491).

We should keep in mind that from the motion of the outermost heavenly sphere we derive the conception of days, hours, months and years due to the correspondence between motion, distance and time (p. 461). Only through motion time exists as having the before and after through itself – the before and after is a relation of temporal states as the result of a concrete thing undergoing motion (p. 480). Thus the existence of time depends on motion,

but it is through itself divisible into the before and after (p. 481). The before and after belong to concrete things only through time (p. 482). Motion causes time, but time has its own essence. Without circular motion there would be no motion at all, thus the magnitude of motion would not exist. But as in Avicenna, as well as in the whole Aristotelian tradition before him, the circular motion is caused by the celestial soul, then without soul there would be no time (pp. 492-497). Thus time exists due to the circular motion (pp. 502-506).

If we keep this in mind we understand why according to Lammer "the most remarkable achievement of Avicenna's temporal theory is that it gets the best of both worlds, Neoplatonic and the Aristotelian" (p. 512). This is the author's last major point, by which he shows that Avicenna is both a philosopher who synthesizes all main ideas before him as well as an original thinker who produces the all-encompassing philosophical system. In the particular case of his *al-Samā' al-tabī'ī*, Avicenna firmly advocates that time depends on motion ontologically. However, as time is the result of the motion of the outermost sphere, all motions depend on time in terms of their temporality; the motion of the outermost sphere is due to the soul, thus the soul produces time – this is the most important Neoplatonic element upon which every particular motion depends (pp. 513-514).

Lammer's study as a whole provides us with a deep understanding of the role of the main problems in Avicenna's physics, as well as with comparisons and references to all main works (and possible sources) which he used in constructing his theories. It gives us, as much as the sources allow, the most complete picture we can obtain so far regarding the relation between Avicenna and his predecessors in the context of natural philosophy. In short, it is the most comprehensive philosophical and philological analysis of the mentioned problems that we have so far. I highly recommend this great work to all who wish to expand their knowledge and understanding of not only Avicenna's physics, but also of ancient and medieval natural philosophy in general.