

On the philosophical meaning of gravitation.

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Abstract:

Whereas science asks the question how space and time can be measured, i.e. theoretically constructed, philosophy of nature is interested in the question, what we can say about space and time prior to any mathematical construction. The philosophical-scientific working group at the Univ. of Vienna has worked out the formulation: “Space is the condition for the possibility that a body can be external to another body.”¹ However, this has to be amended for two reasons: First, since the unification of space and time by Minkowski following Einsteins special relativity theory, space cannot be thought of as separate from time, the difference between spacelike and timelike event pairs is more fundamental than the difference between space and time.

Second, the fact that a body is external to another one has to be communicated by the bodies themselves, otherwise the notion of space remains transcendental (in the sense of Kant).

When we base our thoughts on the difference between spacelike and timelike event pairs rather than space and time, the notion of an elementary object in space and time becomes obsolete. The basic entity becomes an object-pair as “self-divided” unity. Thus we cannot give meaning to an object separated from its communication with other objects (at least one other object). (In the language of physics: a particle cannot be separated from its interactions, i.e. the notion of “bare particle” is purely technical and belongs only to the mathematical model.) To cope with this view, I have invented the notion of “Aporon” (after the greek $\alpha\pi\omega\rho\alpha$)². Aporon bridges the notion of “particle” (as in physics) and the Leibnizian “monade”. It is the self-contradictory unity of particle and communication (or monade and communication). It is designed in analogy to the basic idea of entanglement in quantum mechanics; this is NOT a derivation from quantum mechanics, but a guideline of thinking, stimulated by quantum mechanics! An aporon is thus NOT an element of microcosme, it can be a star as well as any other body in spacetime. Essential is the unity of object and communication.

In this picture, gravitation is the communication of two (spacelike) bodies to ensure their external existence and thus to create space. The extension to

¹ Gerhard Schwarz: Raum und Zeit als naturphilosophisches Problem.

WUV Universitätsverlag Wien (1992). (Erste Auflage: Herder Verlag, Wien, 1972).

² Herbert Pietschmann: Phänomenologie der Naturwissenschaft, 2nd Edition, Ibero Verlag, Wien (2007) Appendix A3.

spacetime requires yet another thought, for “external to each other” refers here only to spacelike pairs. Among timelike pairs we have to select those which define the identity of a certain aporon. This identity is assured by “self-communication” of the aporon. (Again, a guiding line is the fact well-known in physics that to each interaction belongs a “self-interaction” which produces “self-energy” and “self-mass”.)