AGPhil 2: Philosophy of Science

Time: Tuesday 16:00–18:00 Location: A 060

AGPhil 2.1 Tue 16:00 A 060

Die Reduktion physikalischer Theorien nach Erhard Scheibe und die Reduktionsdebatte in der aktuellen Wissenschaftsphilosophie — •Raphael Bolinger — TU Dortmund

Der deutsche Philosoph Erhard Scheibe hat in seinem zweibändigen Werk zur Reduktion physikalischer Theorien (1997 bzw. 1999) eine umfassende Taxonomie intertheoretischer Beziehungen aufgestellt, mit der sich Elemente relevanter physikalischer Theorien auf formaler Ebene miteinander in Beziehung setzen lassen. Als philosophischen Ausgangspunkt seines Ansatzes führt Scheibe unter anderem Arbeiten von Nagel und Woodger bzw. Kemeny/Oppenheim an, auf die sich auch an anderer Stellen in der Reduktionsdebatte der Wissenschaftsphilosophie im Allgemeinen berufen wird. Im Rahmen des Vortrags wird aufgezeigt werden, dass beide Verständnisse des Begriffs einer Theorienreduktion trotz des gemeinsamen Ursprungs kaum miteinander in Einklang gebracht werden können. Es werden Implikationen für den künftigen Umgang mit Theorienreduktionen in der Philosophie der Physik aufgezeigt werden.

AGPhil 2.2 Tue 16:30 A 060

Simplicity to its Extreme - Why Physics Needs to Question the Notion of Space and Time — •Alexander Unzicker — Pestalozzi-Gymnasium München

The question whether the laws of nature must be simple and how simplicity can be defined, definitely touches the border between physics and philosophy. Inspired by the little known correspondence between Albert Einstein and Ilse Rosenthal-Schneider, it is argued that the number of fundamental constants is a key element of simplicity and must be as small as possible. In this view, one must also ask why the most fundamental constants of physics, the speed of light c and Planck's constant h, do exist at all.

Plainly speaking, both c and h presented anomalies to Newtonian physics that were neither necessary nor predicted by the founder of classical physics. As a consequence, we must ask whether the axiomatic postulates of Newton, space and time, have actually been falsified by the appearance of c and h. Taking this point of view, also relativity and quantum physics would be just workarounds that left fundamental problems untouched. Though it seems to be an unsettling perspective, space and time itself, the very basis of both classical and modern physics, may be inappropriate notions for describing reality.

AGPhil 2.3 Tue 17:00 A 060

Reid's Foundation of the Geometry of Visibles — •Dieter Suisky — Humboldt University Berlin, dsuisky@physik.hu-berlin.de

It is well-known that the Scottish philosopher Thomas Reid (1710-1796) traced back his methodology to the rules which had been established by Bacon and Newton, especially Newton's *regulae philosophandi* which "are maxims practised every day in common life". Analyzing Reid's *Geometry of Visibles* (GOV), there is another corner stone being of Newtonian origin which had not been regarded to be equally important for the interpretation of Reid's theory. It is Newton's natural philosophy whose role in Reid's new approach to geometry had been only little investigated until now. In this contribution it will be argued that there are two forms of non-Euclidean geometry which may be distinguished according to their historically determinate difference: (i) the Proclus-Barrow-Newton version which is related to idea that the geometrical objects are generated by a *continual flux* and (ii) the Lambert-Gauß-Lobatschewsky-Bolyai version which is related to the definition and investigation of *parallel lines*. Reid's GOV is currently, however, preferentially interpreted in terms of the second version which was unknown to Reid. It will be demonstrated that Reid made use advantageously of Newton's foundation who considered geometrical objects to be "generated by a continual motion". Reid also accentuated the temporal features. "Prop. 1. Every right line being produced, will at last return into itself." This idea is sufficient to establish a non-Euclidean version which is related to the interior of a sphere whereas it is incompatible with the geometry of an infinite plane.

AGPhil 2.4 Tue 17:30 A 060

from kant's theory of time to relativistic spacetime and causal sets — •riccardo pinosio — institute for logic, language and computation, university of amsterdam

In the context of his work on the foundations of relativity, A. G. Walker developed an axiomatization of Milne's kinematical relativity whose primitive entities are extended durations. These can be thought of as extended timelike subpaths of the world-line of a particle; point-like instants are then defined in terms of durations, and signal axioms on these are imposed so as to recover Milne's kinematical relativity and a large class of models of general relativity.

Walker's analysis of temporal order, particularly in the category-theoretical formulation given to it by Thomason, bears strong similarities to Immanuel Kant's; thus, we used it to develop a mathematical formalization of Kant's theory of time. To achieve this, the axiomatic approach had to be supplemented by a topological treatment, to formalize various notions crucial to Kant's theory, such as continuity and connectedness of time.

As it turns out, using this formalization one can specify precisely those assumptions which make Kant's theory of space and time Newtonian. Furthermore, lifting these assumptions yeilds a generalization of Walker's construction applicable to arbitrary spacetime manifolds, which can provide an approach to discretizing spacetime related to that developed within the causal set framework.