AGPhil 7: Philosophy of Science

Time: Wednesday 17:15–19:15 Location: H 2033

AGPhil 7.1 Wed 17:15 H 2033

On the Value of Information — •Hans Juergen Pirner — Marsilius Kolleg und Institut fuer Theoretische Physik, Heidelberg

We investigate the role of information with respect to two different kinds of indefinite ("unbestimmte") objects. The elements of the first group appear as random or uncertain reflecting our lack of knowledge. The elements of the second group are vague, unclear or undefined showing our inability drawing boundaries. In order to reduce the uncertainties of the first group we need more information. I will discuss how Shannon's theory quantifies information and how this approach can be used to relate elements via mutual information and infer the probability of outcomes in uncertain circumstances. Building on the paradigm of a structured system and an unknown environment I will introduce a value of information which describes the increase of complexity of the system and the reduction of indefiniteness of the environment.

AGPhil 7.2 Wed 17:45 H 2033

Erhard Scheibes Reduktionsverständnis in Auseinandersetzung mit seinen Vorgängern — •Raphael Bolinger — TU Dortmund

Mitte des vergangenen Jahrhunderts hat sich ausgehend von Nagel und Woodger bzw. Kemeny/Oppenheim eine Debatte um als *Reduktionen* bezeichnete, besonders starke Zusammenhänge wissenschaftlicher Theorien entwickelt. In dieser stellte sich bald heraus, dass ein einziges Reduktionskonzept zur Erfassung aller relevanter Beispiele unzureichend war. Als Konsequenz ergab sich insbesondere im Kontext der Kritik des syntaktischen Theorienverständnisses die Herausarbeitung verschiedener Unterfälle der Reduktionsbeziehung.
In seiner in zwei Bänden erschienenen Arbeit zur Reduktion physikalischer Theorien (1997 bzw. 1999) stellt Erhard Scheibe eine umfassende Taxonomie von Theorienbeziehungen auf, die teils Überlegungen seiner Vorgänger übernimmt, teils wichtige Facetten zu deren Ansätzen hinzufügt, und bringt diese zur Anwendung. Im Rahmen des Vortrags werden einige zentrale Zusammenhänge und Unterschiede zwischen Scheibes Reduktionstheorie und den Ansätzen seiner Vorgänger aufgezeigt.

AGPhil 7.3 Wed 18:15 H 2033

An odd piece of progress: On proposals for a new SI — •Wolfgang Pietsch — Carl von Linde-Akademie, TU München, Germany

Progress in physics is usually supposed to be driven by evidence and thus objective. We will present a case study that violates this intuition but nevertheless regards the very core of physics. It concerns a recent proposal of the major metrology institutes to redefine four of the SI base units, namely kilogram, ampere, mole, and kelvin. We will attempt to make sense of this episode within a general framework of scientific evolution - drawing mainly on the work of the historian of science Thomas Kuhn. The odd features can be traced back to the fact that the episode exhibits characteristics both of normal science and of a scientific revolution.

AGPhil 7.4 Wed 18:45 H 2033

Are classical forces relations or dispositions? — •Johannes Röhl — Universität Rostock, Rostock, Germany

Realists about Newtonian Forces are confronted with the task of assigning an ontological category to these entities. I identify four main features forces must have according to a standard view of Newtonian mechanics: causal efficacy, directionality (vectorial character), superponibility and dependence on non-force entities.

The two main proposals in the debate, forces as relations and forces as dispositions or causal powers, both appeal to intuitions from Newtonian mechanics, but face considerable difficulties in detail. The dispositional conception may not be able to accomodate the directionality and the symmetrical dependence of a force on the bodies between it acts. The relational account seem to lead to revisionary accounts of causation and it is not clear how the superposition of components forces and the resulting force are to be understood.

I suggest an alternative approach that takes forces as intermediaries in a chain of dispositions and their manifestations. A force is a manifestation of a disposition, but has itself dispositional character as it causes accelerations. The relational aspect of forces can be construed as an emergent feature of the whole interaction situation. The component and resultant forces can also be accomodated by this model.