

AGPhil 5: Philosophy of Cosmology V

Zeit: Mittwoch 11:00–12:45

Raum: HS 10

Hauptvortrag AGPhil 5.1 Mi 11:00 HS 10
Is Model Building in Cosmology Special? — •CLAUS BEISBART
 — Institute of Philosophy, University of Bern

Cosmology is a very special endeavor. As has often been argued, it differs from other sciences because it faces some peculiar epistemological challenges: It is in some sense concerned with everything there is; its object, the Universe, is unique; and the latter can only be observed from a particular perspective. Now modelling can deal with such challenges; for instance, models can abstract away from various aspects and thus help to constitute the object of cosmology; and it is common that a model has a unique system as its target. However, it may well be that the special character of cosmology and its epistemological challenges reappear at the level of modeling. The aim of this talk is thus to answer the question of whether modeling in cosmology is beset by special problems. I start with listing the most severe challenges that have been claimed for cosmology. I then discuss how the research strategy of modeling can in principle overcome some of the challenges. After a short proposal to systematize model building in present-day cosmology, I explore in which sense the practice of modeling in cosmology is special. I argue that some challenges to cosmology reappear in the guise of underdetermination problems, but I also show that such problems are not uncommon in other applications of modeling. I further argue that most difficulties and anomalies in present-day modeling in cosmology, e.g. the core-cusp problem or problems that arise due to the interrelationships between processes at several scales, are contingent in that they do not derive from the special character of cosmology.

AGPhil 5.2 Mi 11:45 HS 10
Exploring the Epistemological and Metaphysical Commitments of DM and MG — •ZHEN LIANG — DePaul University, Chicago, IL, USA

Due to the discrepancy between astronomical observations and current theories of gravity, two modifications of general relativity and Newtonian gravity have been proposed: (1) Dark Matter (DM) is posited to compensate for the missing mass that is indicated by the Einstein field

equations; (2) a class of theories under the common name Modified Gravity (MG) is alternatively proposed to avoid the invocation of dark matter (which, of course, has yet to be observed). In this paper, I investigate both theories from a philosophical perspective. Pragmatically speaking, both DM and MG seem to *work*: both theories are capable of producing predictions in conformity with cosmological observations. Nevertheless, if we investigate the structure of both theories, a series of hidden metaphysical, ontological, and epistemological commitments undergirding DM and MG are brought to the fore*commitments that expose important philosophical and scientific implications that may impact the future of both theory-building and experimentation.

AGPhil 5.3 Mi 12:15 HS 10
The constructivist's programme and the problem of pregeometry — •KIAN SALIMKHANI¹ and NIELS LINNEMANN² — ¹University of Bonn — ²University of Geneva

Prominently, Norton (2008) argues against constructivism about spacetime theories, the doctrine that spatiotemporal structure in the dynamics only has derivative status tout court. Particularly, he accuses Brown's dynamical approach to special relativity of being merely half-way constructivist: setting up relativistic fields as presupposed in the dynamical approach to special relativity already requires spatiotemporal background structure, referred to as pregeometry. In response, Menon (2018) recently tried to defend a full constructivist understanding of the dynamical approach in which the dynamical fields are rendered in terms of putatively non-spatiotemporal algebraic structure. But also Stevens (2018) can be read to aim at a full constructivist story based on a non-spatiotemporal ordering structure at its bottom. In this paper, we investigate to what extent a constructivist aiming at reconstructing spacetime from fields and their dynamical laws is able to do without any presupposed spatiotemporal structure. First, we present a reformulation of the challenge for the constructivist. We then argue that previous attempts to address the challenge are either tied to a certain account of natural laws or ill-directed. Finally, we offer a solution based on Stevens' proposal and reevaluate the problem of pregeometry in light of it.