

AGPhil 7: Quantum Gravity 1

Time: Thursday 11:00–12:45

Location: H7

Invited Talk

AGPhil 7.1 Thu 11:00 H7

Four Attitudes Towards Singularities in the Search for a Theory of Quantum Gravity — ●KAREN CROWTHER — University of Oslo

Singularities in general relativity and quantum field theory are often taken not only to motivate the search for a more-fundamental theory (quantum gravity, QG), but also to characterise this new theory and shape expectations of what it is to achieve. Here, we first evaluate how particular types of singularities may suggest an incompleteness of current theories. We then classify four different ‘attitudes’ towards singularities in the search for QG, and show, through examples in the physics literature, that these lead to different scenarios for the new theory. Two of the attitudes prompt singularity resolution, but only one suggests the need for a theory of QG. Rather than evaluate the different attitudes, we close with some suggestions of factors that influence the choice between them. [Based on joint work with Sebastian de Haro]

AGPhil 7.2 Thu 11:45 H7

Conditions for Theoretical Equivalence, Duality, and Implications Thereof — ●KONNER CHILDERS — University of Birmingham, UK

Recent attention in philosophy of physics literature has been directed towards dualities between physical theories, furthering the *theoretical

equivalence* questions into a new domain. After re-introducing the distinction between theoretical equivalence and dualities, this paper shall seek to critically assess 1) the sense in which dualities are (not) equivalences, with special attention given to categorical and physical equivalence, 2) the role of semantics and reference in addressing duality relations between theories, and 3) issues regarding the criteria of empirical (in)equivalence and predictions with respect to T-duality and gauge/gravity duality. Finally, these results shall be applied to fermionic particle-vortex and recently proposed 3d bosonization dualities to both elucidate the formal and empirical relations and to suggest further avenues for research.

AGPhil 7.3 Thu 12:15 H7

Composing Spacetime Out of Nowhere — ●BAPTISTE LE BIHAN — University of Geneva

According to a number of approaches in theoretical physics spacetime does not exist fundamentally. Rather, spacetime exists by depending on another, more fundamental, non-spatiotemporal structure. A prevalent opinion in the literature is that this dependence should not be analysed in terms of composition. We should not say, that is, that spacetime depends on an ontology of non-spatiotemporal entities in virtue of having them as parts. But is that really right? On the contrary, a mereological approach to dependent spacetime is not only viable, but promises to enhance our understanding of the physical situation.