

## AGPhil 4: Symposium: Epistemology of Big Data in Physics II

Zeit: Donnerstag 15:45–17:00

Raum: GW2 B2900

**Hauptvortrag** AGPhil 4.1 Do 15:45 GW2 B2900  
**Exploratory data selection and theory-ladenness in the ATLAS experiment at CERN's Large Hadron Collider** — ●KORAY KARACA — University of Twente, Department of Philosophy

Unprecedentedly large amounts of data are produced and analyzed at CERN's Large Hadron Collider (LHC), thus presenting a paradigm case of big data in the context of present-day high-energy physics experiments. In this talk, I will discuss the data selection procedure in the ATLAS experiment currently running at the LHC, where the Higgs boson was discovered in 2012. I will argue that the data sets relevant to the objectives of the ATLAS experiment are acquired through what I shall call an exploratory data selection procedure. I will also argue that this data selection procedure is theory-laden, in the sense that the data selection criteria are determined by considering the conclusions of the theoretical models that the ATLAS experiment is aimed to test. Based on this case study, I will suggest that, contrary to previous studies, theory-ladenness can play an essential role in experimentation being exploratory, and that experimental exploration can serve to test theoretical predictions.

AGPhil 4.2 Do 16:30 GW2 B2900  
**The discovery of elementary particles as a diagnostic causal inference** — ●ADRIAN WÜTHRICH — Technische Universität Berlin

Using the discovery of the  $W$  and the Higgs boson as my case studies, I will propose to interpret the essential part of the discovery of an elementary particle as a diagnostic causal inference. In a diagnostic causal inference, the researchers infer the instantiation of a type of cause from the instantiation of a type of effect. In the case of elementary particles, the type of effect is a characteristic pattern of reactions in the detector material, and the type of cause is the presence of a certain elementary particle, which, often through a long chain of intermediate causes and effects, brought about the reactions under consideration. The interpretation of the discovery of elementary particles as a diagnostic causal inference sheds new light on several issues in the philosophy of science. I will address, in particular, the role of data selection and the role of theoretical predictions as well as the reliability of the discovery claim that results from a diagnostic causal inference.