GR 402 Quantenfeldtheorie auf gekrümmten Raumzeiten

Zeit: Donnerstag 11:50–12:30 Raum: K

Hauptvortrag GR 402.1 Do 11:50 K

Quantum Fields in Curved Space — •Stefan Hollands — Universität Göttingen

While the principle of general covariance is, of course, the cornerstone of general relativity, and of many modern physical theories, it is not obvious how to implement this idea in the context of quantized fields on a curved spacetime. This is mainly because quantum field theory is traditionally formulated in terms of concepts ("vacuum", "particles", etc.) that are tied to the very rigid structures of Minkowski space. Recently, it has been understood how to implement the general covariance principle in quantum field theory. This has opened the door—together with new mathematical methods from microlocal analysis—to many important new developments. For example, it has led to an understanding of the renormalization of perturbative interacting quantum field theory on general Lorentzian spacetimes, and to the proof of important general theorems in quantum field theory (spin-statistics, CPT) in the curved spacetime setting. I will review the main new ideas in this field in a pedagogical way, addressed to an audience of non-experts, and outline the prospective directions for future research, especially with regards to applications to the physics of the Early Universe.