GR 9: Hauptvorträge Donnerstag: Klassische Allgemeine Relativitätstheorie

Zeit: Donnerstag 14:00–15:30 Raum: 30.45: 101

Hauptvortrag GR 9.1 Do 14:00 30.45: 101

Using numerical relativity to explore fundamental physics and astrophysics — •Luciano Rezzolla — Albert Einstein Institute, MPI for Gravitational Physics, Potsdam

Recent years have seen a major progress in numerical relativity and the solution of the simplest and yet among the most challenging problems in classical general relativity: that of the evolution of two objects interacting only gravitationally. I will review the results obtained so far when modelling binaries of black holes or of neutron stars and also discuss the impact these studies have in detection of gravitational-waves, in astrophysics, and in our understanding of general relativity.

Hauptvortrag GR 9.2 Do 14:45 30.45: 101

The initial value problem of general relativity — •David Hilditch — Theoretical Physics Institute, University of Jena, 07743 Jena, Germany

I will give an overview of general relativity from the point of view of partial differential equations (PDEs). A crucial fact to establish about a given PDE system is whether or not it is well-posed, that is, whether or not unique solutions that depend continuously on given data exist. I will focus in particular on the gauge freedom of general relativity and the freedom it brings to the formulation of the initial value problem. Well-posedness of the initial value problem depends on whether or not the PDE system is in some sense wave-like. I will describe how the wave-like nature of gauge choices can be characterized, and how they may be coupled to the Einstein field equations. I will furthermore highlight the restriction that insisting on a Hamiltonian formulation brings to the system and the relationship between Hamiltonian structure and the PDE properties of the system. Finally I will consider the question: what are the set of gauge conditions that may be coupled to general relativity to form a wave-like PDE system?