GR 14: Hauptvorträge Donnerstag: Dynamik ausgedehnter Körper 1

Zeit: Donnerstag 14:00–16:15 Raum: JUR K

Hauptvortrag GR 14.1 Do 14:00 JUR K

Motion of extended bodies in General Relativity — •Dirk Pützfeld — Albert-Einstein-Institut, Golm

The description of the motion of extended bodies represents a long-standing problem in the context of Einstein's theory of gravity.

In general, the study of extended self-gravitating objects in General Relativity requires the use of different approximation techniques. Many applications in gravitational physics, e.g. the detection of gravitational waves, crucially depend on our theoretical understanding and mastery of such approximation techniques.

In this talk we provide a brief review of the so-called 'problem of motion' in General Relativity. In particular, we focus on multipolar approximation methods and their use in the description of the motion of extended test bodies.

Hauptvortrag GR 14.2 Do 14:45 JUR K

Spinning test particles in black-hole space-times — •Oldřich Semerák — Institute of Theoretical Physics, Faculty of Mathematics and Physics, Charles University in Prague, Czech Republic

In general relativity, the behaviour of spinning test particles is usually treated within 'pole-dipole' approximation, represented by Mathisson-Papapetrou equations. The system has to be closed by a 'spin supplementary condition' whose role is to select a representative worldline with respect to which the test body's mass and spin are determined. We illustrate the effect of spin-curvature coupling and of the supplementary condition on numerical trajectories obtained in black-hole space-times. We also mention that non-zero spin turns the particle dynamics chaotic. What remains to be clarified is the validity of pole-dipole approximation and the relevance of spin in astrophysical situations.

Hauptvortrag GR 14.3 Do 15:30 JUR K

Black holes with spin in numerical general relativity — •Bernd Brügmann — TPI, Uni Jena, Germany

Solving the Einstein equations of general relativity for black hole binary systems is of particular interest for gravitational wave astronomy. Numerical simulations are now possible that cover the highly non-linear, dynamical phase of the last few orbits and the merger. Binary mergers involving spinning black holes pose additional challenges, in particular for precessing spins. We discuss results for gravitational wave predictions as well as surprises regarding black hole recoil due to spin effects.