GR 11: Numerische Relativitätstheorie

Zeit: Donnerstag 16:45–17:45 Raum: 30.45: 101

GR 11.1 Do 16:45 30.45: 101

Motion of test particles in the cosmic string space-time with dark string — Betti Hartmann[1] and •Valeria Kagramanova[2] — [1]Jacobs University Bremen — [2]Carl von Ossietzky Universität Oldenburg

We study geodesics in the space-time of an Abelian-Higgs string coupled to a dark string. The dark strings are a prediction of dark matter models that could explain the excess of electronic production in the galaxy. The Abelian-Higgs string and the dark string are coupled through the U(1) fields. We investigate the influence of the parameters of the model on the properties of the test particles motion and on the classification of orbits.

GR 11.2 Do 17:05 30.45: 101

GPU computing for numerical relativity — •Andreas Weyhausen, Bernd Brügmann, and Jason Grigsby — Theoretisch-Physikalisches Institut, FSU Jena

Numerical Relativity (NR) allows to study physically interesting space times like binary black hole systems by solving Einsteins equations using numerical methods. As this is computationally expensive NR always looks for ways to speed up the simulations. At the moment it is popular in high performance computing to use graphics cards to speed up applications. These have developed from special purpose devices to powerful highly parallel accelerators which outnumber the theoretical peak floating point operations per second performance of CPUs by a factor up to two magnitudes. In my talk I will give an introduction to Numerical Relativity and GPU Computing and I will discuss the question if NR can benefit from using graphics cards.

GR 11.3 Do 17:25 30.45: 101

Numerical simulations of neutron stars — •Marcus Thierfelder, Sebastiano Bernuzzi, David Hilditch, and Bernd Brügmann — Theoretisch-Physikalisches Institut, FSU Jena

Numerical relativity simulations are of fundamental importance for the theoretical modelization of the gravitational signal emitted. In this talk we present a new code designed to study binary neutron star mergers in full general relativity. We discuss several tests that validate the code and describe our recent results on the gravitational collapse to black-hole obtained with the puncture gauge. We present preliminary results on the accuracy of the gravitational waves emitted by binary neutron star mergers in our computations.