GR 5: Relativistic astrophysics I

Zeit: Mittwoch 11:00–12:30 Raum: NW-Bau - HS3

Hauptvortrag GR 5.1 Mi 11:00 NW-Bau - HS3

Formation of Double Neutron Stars and their Merger Rates — •Thomas Tauris — AIfA, University of Bonn — MPIfR

In recent years, the discovery rate of the exotic double neutron star (DNS) systems has increased rapidly. The coming decade will even greatly enhance the number of both radio pulsar DNS systems, with the completion of the Square Kilometre-Array, and DNS mergers from detections of high frequency gravitational waves using LIGO/Virgo. This calls for a new investigation of the formation and evolution of DNS systems. In this talk, I will summarize the beautiful journey of binary stars leading to the production of DNS systems and discuss their key parameters. This includes correlations between spin period, orbital period and eccentricity, based on theoretical modelling. I discuss NS masses and present Monte Carlo simulations of supernovae (SNe) to extrapolate the pre-SN stellar properties and probe the explosions. Finally, I will discuss the merger-rate densities of DNS systems and double black hole systems in the local Universe and compare with LIGO/Virgo detections.

Hauptvortrag GR 5.2 Mi 11:45 NW-Bau - HS3

Accretion-Driven Growth of Super-Massive Black Holes — •Wolfgang J. Duschl — Astrophysik Kiel, Christian-Albrechts-Universität zu Kiel, Leibnizstr. 15, 24118 Kiel, Germany

The first super-massive black holes (SMBHs) with masses of the order of a billion solar masses in the nuclei of galaxies are observed at redshifts of 7.5, corresponding to an age of the Universe of around 700 million years. In my talk, I will first show how such large amounts of mass can be accreted into black holes within sufficiently short periods of time, and will, in particular, discuss the importance of self-gravity of the accreting material for a sufficiently fast accretion. The second part will be devoted to the question of how in the near future details of this accretion process can be used as tracers of physics in strong gravitational fields.