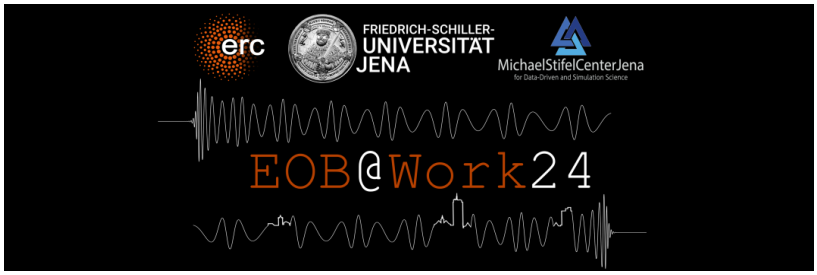


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# Evening Lecture: EOB - offspring of the PN ADM formalism

*Tuesday 11 June 2024 16:30 (1 hour)*

Hamiltonian formalisms provide powerful tools for the computation of approximate analytic solutions of the Einstein field equations. The post-Newtonian computations of the explicit analytic dynamics and motion of compact binaries are discussed within the most often applied Arnowitt-Deser-Misner formalism. The obtention of autonomous Hamiltonians is achieved by the transition to Routhians. Order reduction of higher derivative Hamiltonians results in standard hamiltonians. Tetrad representation of general relativity is introduced for the tackling of compact binaries with spinning components. Compact objects are modeled by use of Dirac delta functions and their derivatives. Consistency is achieved through transition to d-dimensional space and application of dimensional regularization. At the fourth post-Newtonian level, tail contributions to the binding energy show up for the first time. The conservative dynamics of binary systems finds explicit presentation and discussion through the fifth post-Newtonian order for spinless masses. For masses with spin Hamiltonians are known through (next-to)3 -leading-order spin-orbit and spin-spin couplings as well as through next-to-leading order cubic and quartic in spin interactions. Parts of those are given explicitly. Tidal-interaction Hamiltonians are considered through (next-to)2 -leading post-Newtonian order. The radiation reaction dynamics is presented explicitly through the third-and-half post-Newtonian order for spinless objects, and, for spinning bodies, to leading-order in the spin-orbit and spin1-spin2 couplings. The most important historical issues get pointed out.

**Presenter:** Prof. SCHÄFER, Gerhard