



General Relativity and Quantum Cosmology

Canonical Formulation of Spin in General Relativity

Jan Steinhoff

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The present thesis aims at an extension of the canonical formalism of Arnowitt, Deser, and Misner from self-gravitating point-masses to objects with spin. This would allow interesting applications, e.g., within the post-Newtonian (PN) approximation. The extension succeeded via an action approach to linear order in the single spins of the objects without restriction to any further approximation. An order-by-order construction within the PN approximation is possible and performed to the formal 3.5PN order as a verification. In principle both approaches are applicable to higher orders in spin. The PN next-to-leading order spin(1)-spin(1) level was tackled, modeling the spin-induced quadrupole deformation by a single parameter. All spin-dependent Hamiltonians for rapidly rotating bodies up to and including 3PN are calculated.

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