David Kofroň

Institute for Theoretical Physics; Charles University in Prague

Variations on spacetimes with boost-rotation symmetry

Authors: D. Kofroň, J. Bičák

Various aspects of boost-rotation symmetric spacetimes representing, in general, two rotating charged objects accelerated in opposite directions as, for example, the C-metric describing two accelerating black holes, are summarized and their limits are considered. A particular attention is paid (a) to the special-relativistic limit in which the electromagnetic field becomes the "magic field" of two oppositely accelerated, rotating charged relativistic discs (Gen. Rel. Grav. **41** (2009), 1981); (b) to the Newtonian limit which is analyzed using the Ehlers frame theory. In contrast to some previous discussions, our results are physically plausible in the sense that the Newtonian limit corresponds to the fields of classical point masses accelerated uniformly in classical mechanics. This corroborates the physical significance of the boost-rotation symmetric spacetimes (Gen. Rel. Grav. **41** (2009), 153).

The Ernst method of removing nodal singularities from the charged C-metric representing a uniformly accelerated black hole with mass m, charge q and acceleration A by "adding" an electric field E is generalized. Utilizing the new form of the C-metric found recently, Ernst's simple "equilibrium condition" $mA = qE$ valid for small accelerations is generalized for arbitrary A (Phys. Rev. D **82** (2010), 024006).

The electromagnetic and gravitational radiation of the charged C-metric is also analyzed (work in progress).