Contribution ID: **56**   Type: **not specified**

Electrically charged numerical simulations on hyperboloidal slices

Monday 22 July 2024 15:30 (15 minutes)

Gravitational wave radiation is only unambiguously defined at future null infinity: the location in spacetime where light rays arrive and where global properties of spacetimes can be measured. Within the context of numerical relativity we set up simulations reaching future null infinity by using hyperboloidal slices, as opposed to traditional Cauchy slices that reach spacelike infinity. Extending previous work in spherical symmetry, the Einstein-Maxwell-Klein-Gordon system is evolved on hyperboloidal slices, allowing to model gravity coupled to electromagnetism and a complex massless scalar field. This allows us to simulate the evolution of a charged scalar field and/or a Reissner-Nördstrom (electrically charged) black hole, where this last scenario serves as a useful toy model for a rotating (Kerr) black hole. We will report on current progress on these charged evolutions, where we retrieve their emitted signals at future null infinity as they would be seen by detectors on Earth.

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Session Classification: Parallel session 2 (Numerical Relativity)