

Gravitational radiation and the evolution of gravitational collapse in cylindrical symmetry

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Abstract

Using the Sparling form and a geometric construction adapted to spacetimes with a 2-dimensional isometry group, we analyse a quasi-local measure of gravitational energy. We then study the gravitational radiation through spacetime junctions in cylindrically symmetric models of gravitational collapse to singularities. The models result from the matching of collapsing dust fluids interiors with gravitational wave exteriors, given by the Einstein-Rosen type solutions. For a given choice of a frame adapted to the symmetry of the matching hypersurface, we are able to compute the total gravitational energy radiated during the collapse and state whether the gravitational radiation is incoming or outgoing, in each case. This also enables us to distinguish whether a gravitational collapse is being enhanced by the gravitational radiation. [1]

References

- [1] Alfonso García-Parrado and Filipe C. Mena, *Gravitational radiation and the evolution of gravitational collapse in cylindrical symmetry*, *Differential Geometry and its Applications* **64** (2019), 29–46.