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GHG for Critical Phenomena simulations with bamps

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We use our adapted pseudospectral code bamps, with its new hp adaptive mesh refinement, to tune close to the barrier between gravitational collapse and dispersed fields, and study the critical phenomena that emerges near that threshold. To achieve that goal and improve our previous results, we introduce adjustments to the generalised harmonic gauge formulation of General Relativity, adapting it to the specific case of near collapse simulations. In particular, we adjust the constraint violation damping scheme, taking into account the collapse of the lapse that occurs in extreme spacetimes. We also prevent coordinate singularities by carefully choosing the gauge source function. As a result of these changes, we manage to improve our threshold estimation results. In spherical symmetry, we show critical phenomena of a massless scalar field minimally coupled to the Einstein field equations. In axisymmetry, we study Brill gravitational waves in vacuum.

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