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Three-dimensional Simulations of Stellar Core Collapse using Multiblocks CHRISTIAN REISSWIG, Caltech — Three dimensional simulations without symmetry assumptions are crucial for the proper modeling of stellar core collapse and collapsar formation. These simulations allow to study the 3D dynamics of convection, standing accretion-shock instability, protoneutron star pulsation, rotational effects and hydrodynamic turbulence. Unfortunately, full 3D simulations based on Cartesian meshes are very expensive, even with adaptive mesh refinement. A much more efficient way of discretizing the computational domain is given by multiblock schemes. Multiblock schemes allow to use grids adapted to the topology of the problem. In the context of stellar core collapse, the problem topology is spherical. Hence the application of spherical grids with a fixed angular resolution will lead to a tremendeous performance benefit compared to Cartesian meshes. I present a new general relativistic hydrodynamic multiblock code based on cell-centered adaptive mesh refinement. I apply the scheme to full three dimensional simulations of rotating stellar core collapse.

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