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Viscous Evolution of Hypermassive Neutron Stars in Full General Relativity MATTHEW DUEZ, YUK TUNG LIU, STUART SHAPIRO, BRANSON STEPHENS, University of Illinois at Urbana-Champaign — Hypermassive neutron stars may form from merging binary neutron stars or stellar core collapse. While they are dynamically stable due to extra centrifugal support from differential rotation, their structure changes on a secular timescale when magnetic fields and/or viscosity gradually remove the differential rotation support. We evolve these stars with viscosity using a fully general relativitic hydrodynamics code based on the BSSN formulation of Einstein's equations. We find that viscosity operating in a hypermassive star generically leads to the formation of a compact, uniformly rotating core surrounded by a low-density disk. These uniformly rotating cores are often, but not always, unstable to gravitational collapse. We follow the collapse in such cases and, using black hole excision, determine the mass and the spin of the final black hole and ambient disk. In all cases studied, the rest mass of the resulting disk is found to be 10-20% of the original star, whether surrounding a uniformly rotating core or a rotating black hole.

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