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Evolution of the Magnetized, Neutrino-Cooled Accretion Disk in the Aftermath of a Black Hole Neutron Star Binary Merger FATEMEH HOSSEIN NOURI, IUCAA, MATTHEW DUEZ, Washington State University, FRANCOIS FOUCART, University of New Hampshire, M. BRETT DEATON, North Carolina State University, ROLAND HAAS, University of Illinois at Urbana-Champaign, MILAD HADDADI, Washington State University, LAWRENCE KIDDER, Cornell University, CHRISTIAN OTT, Kyoto University, HARALD PFEIFFER, University of Toronto, MARK SCHEEL, BELA SZILAGYI, California Institute of Technology, SXS COLLABORATION — Black hole-accretion disk systems from compact binary mergers are possible engines for short duration gamma-ray bursts (GRBs). In this scenario the evolution of the post-merger remnant torus is determined by a combination of neutrino cooling and magnetically-driven heating processes. We study the post-merger evolution of a magnetized black hole-neutron star binary system using results from a previous numerical relativity simulation and Einstein's Spectral Code's MHD module. We use finite-temperature tabulated equation of state, and leakage scheme to study the neutrino effects. In order to check the reliability of our results, we evolve the system with two different numerical methods: 1) using the cubed-sphere multipatch grids with an improved method for thermal evolution, dealing with supersonic accretion flows more accurately, and 2) using the cartesian grid with SpEC's conservative MHD formalism. We find that a seed magnetic field triggers a sustained source of heating, but its thermal effects are largely cancelled by the advection cooling and expansion of the torus from the MHD-related effects.

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