Evolution of Proto-Neutron Stars with Quark Matter

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Abstract

We study the evolution of proto-neutron stars containing a quark-hadron mixed phase. The maximum mass for cold, neutrino-free matter is then less than that for hot neutrino-rich matter. A with a baryonic mass exceeding the former is therefore *metastable*: it will collapse to a black hole during the Kelvin-Helmholtz stage. Its neutrino signal will stop suddenly, generally at a level above background in current detectors for a galactic supernova. The signal of a stable star, conversely, exponentially decays and disappears into the background. We compare the signals from quark-bearing stars to those containing hyperons (ApJ, 513, (1999), 780) or a kaon condensate (astro-ph/0008389).

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