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Binary Neutron Stars, Core Collapse Supernovae and the Nuclear Equation of State

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The properties of nuclear matter at extremely high densities and temperatures remain a mystery. This talk discusses two environments for which the nuclear matter can be found at the highest densities. These are: during the collapse of the core of a massive star to form a supernova or black hole; and during the merger of two neutron stars to form a black hole. Here, we highlight recent progress by our group toward exploring the nuclear equation-of-state effects in these environments. In particular, we describe new insight into the explodability of supernova progenitors and a probe of the the non-perturbative regime of quark matter in the gravitational radiation emitted during binary neutron-star mergers.

Primary author: MATHEWS, Grant (University of Notre Dame)

Co-authors: Dr KEDIA, Atul (Univ. Notre Dame); BOCCIOLI, Luca (Univ. Notre Dame)

Presenter: MATHEWS, Grant (University of Notre Dame)

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