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Nuclear matter and related systems: from the hottest and the coldest places in the universe to the densest

Monday 23 October 2017 10:00 (55 minutes)

Our knowledge of the states of nuclear matter under extreme conditions has advanced significantly in recent years through developments along numerous interrelated paths. This talk will describe this progress by focusing on new understanding of the densest matter in the universe, that deep inside neutron stars. Recent advances driving a better picture of neutron star interiors include observations of heavy neutron stars with masses just twice that of the sun; ongoing observational simultaneous determinations of neutron star masses and radii; an emerging understanding in QCD of how nuclear matter can turn into deconfined quark matter in the interior; and the creation of new states of quantum matter in the laboratory, including quark-gluon plasmas in ultrarelativistic heavy ion collisions, and new Bose and Fermi superfluids in ultracold trapped atomic clouds. The importance of a better understanding of dense nuclear matter is strongly underlined by the observational discovery of gravitational radiation, since merging of neutron stars with black holes or neutron stars will be a principal source of future gravitational radiation events.

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