

NONIDEAL QUARK PLASMA IN COMPACT STAR ASTROPHYSICS AND AT NICA/FAIR HEAVY-ION COLLISIONS

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We outline the role that pairing correlations in quark matter play for strong phase transitions from normal nuclear matter to a nonideal, color superconductivity quark-gluon plasma phase in the equation of state (EOS) for compact star matter, from vanishing to moderately high temperatures that become accessible in the BM(a)N and MPD experiments at NICA as well as for CBM at FAIR. We study the connection of such hybrid EOS with the mass-radius relation of cold compact stars, including the intriguing possibility of additional families, as a consequence of the presence of an early and strong phase transition. Special emphasis is devoted to eventually detectable signatures which can be directly related with the occurrence of a sufficiently strong phase transition. Therefore dynamical scenarios are being considered, such as binary compact star mergers including the subsequent emission of gravitational waves and supernova explosions of massive supergiant stars where neutrinos play the role of messengers.