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Possible neutrino signature of hadron-quark phase transition in failing core-collapse supernovae

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We study the consequences of the hadron-quark phase transition in failing core-collapse supernovae, which lead to the stellar-mass black-hole formation. For progenitor models with a range of compactness, the supernova core collapses and bounces for a second time due to the appearance of quarks. However, this second bounce cannot overcome the ram pressure of the envelope and result in the revival of the supernova shock. The core oscillates with the excess kinetic energy, which leads to periodic neutrino emissions with a period of ms. Black-hole formation takes place in a third collapse after hundreds of ms. The periodic neutrino signal can be strong evidence of the hadron-quark phase transition in failing core-collapse supernovae.

Abstract Track

Astroparticle physics

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