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The role of quark matter surface tension in dense compact star matter

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Quark matter surface tension plays a key role in the understanding of neutron star (NS) interiors. However, despite its relevance for NS physics, the surface tension is still poorly known for quark matter. We focus on the thermodynamic conditions prevailing in NSs, hot lepton-rich protoneutron stars (PNSs), and binary NS mergers. We explore the role of temperature, baryon number density, trapped neutrinos, droplet size, and magnetic fields within the multiple reflection expansion formalism (MRE), assuming that astrophysical quark matter can be described as a mixture of free Fermi gases composed of quarks u, d, s, electrons, and neutrinos, in chemical equilibrium under weak interactions. Finally, we discuss some astrophysical consequences of our results.

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