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Quark nucleation in compact stars

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At the extreme densities reached in the core of neutron stars and related astrophysical phenomena, quark deconfined matter may take place. The formation of this new phase of strongly interacting matter is likely to occur via a first-order phase transition for the typical temperatures reached in astrophysical processes. For example, quark deconfinement could occur within the hot remnant of a neutron star merger or within a newly born proto-neutron star. Also, it could possibly represent the mechanism leading to the explosion of massive blue supergiants.
Within these scenarios, the first seeds of quark matter would form through a process of nucleation within the metastable hadronic phase. I will address the role of the thermal fluctuations in the hadronic composition on the nucleation of two-flavor quark matter and its implication for the phenomenology of compact stars. I will discuss in particular how those fluctuations (up to now disregarded in the literature) could substantially increase the rate of nucleation. Moreover, I will also consider the possibility
of nucleation of absolutely stable three-flavor quark matter that could give birth to stars entirely composed of strange quark matter.

Presenter: GUERRINI, Mirco (University of Ferrara)