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Quarkyonic matter: theory, and phenomenology at FAIR and neutron stars

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We examine the quark percolation transition at finite density, discovered in [1] and generalized to the full phase diagram in [2].

We show that this transition has many of the characteristics claimed for quarkyonic matter as defined in [3]. The percolation transition should arise, in our physical world (3 colors, 2-3 flavors) at densities parametrically larger than normal nuclear density but smaller than the densities required for deconfinement. Both FAIR and neutron stars are therefore ideal laboratories for looking for such a percolation transition.

We sketch the effective theory of the percolating Yang-Mills matter and suggest phenomenological signatures in both neutron stars and FAIR-energy collisions.

Based on [1] and [2].

[1] S.Lottini and G.Torrieri, Phys.Rev.Lett. 107 (2011) 152301

[2] S.Lottini and G.Torrieri, <http://arxiv.org/abs/1204.3272>

[3] L.McLerran and R.Pisarski <http://arxiv.org/abs/0706.2191>

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