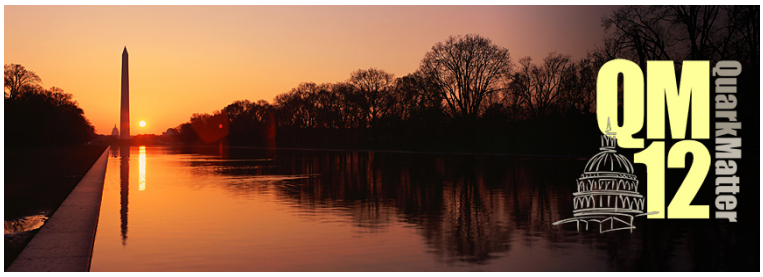

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Theory and phenomenology of quarkyonic percolation of finite density QCD matter

Thursday 16 August 2012 16:00 (2 hours)

We generalize the percolating transition discovered in [1] to the full phase diagram, exploring the onset of "quarkyonic percolation" for SU(N) Yang-Mills matter when baryon density, temperature and number of colors are varied.
We show that percolation's dependence on number of colors is different from deconfinement, suggesting that the two phases are generally distinct, with the percolating phase being similar to the quarkyonic phase conjectured in [2].
We find that, in our world (3 colors, 2-3 flavors) a percolating but confined phase can arise at 2-3 times nuclear density and moderate temperature. The new phase is confined and contains baryons, yet quark-hole states can propagate to arbitrary distances due to the onset of percolation of tunneling transitions across baryons.
We conclude by sketching an effective theory of percolating matter, and suggesting experimental signatures of it in lower energy heavy ion collisions (FAIR,NICA and the RHIC low energy scan) as well as within neutron stars and supernovae.

Based on [1] and [3]

[1] S.Lottini and G.Torrieri, Phys.Rev.Lett. 107 (2011) 152301
[2] L.Mclerran, R.Pisarski, Nucl.Phys.A796:83-100,2007
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