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Neutron Stars with a Crossover Equation of State

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The question of whether quark matter exists in neutron stars is a long standing one. Generally one finds that a first order phase transition from baryons to quarks softens the equation of state so much that the star would collapse into a black hole. We consider a crossover equation of state, similar to the crossover that is found in lattice QCD studies at finite temperature and zero or small baryon chemical potentials. We find that with reasonable parameters it may be possible to support neutron stars up to about 2.2 solar masses. In that case 1 to 10% of the pressure would be contributed by quark matter in the central core of the highest mass stars.

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