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Condensation of lighter-than-physical pions in QCD

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We report on the results of the 2+1 flavour QCD simulations at nonzero isospin chemical potential performed at half the physical light quark mass. At low temperatures and large isospin chemical potential Bose-Einstein Condensation (BEC) occurs, creating a pion condensed phase, separated from the hadronic and quark-gluon plasma phases by the BEC transition line. We show that for lighter than physical pions the hadronic/pion condensed section of the BEC line remains vertical, and goes to zero chemical potential linearly with the pion mass, giving a prediction of the phase diagram in the chiral limit.

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