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QCD chiral phase transition from a (axial) vector meson extended PQM model

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Chiral phase transition is investigated in the SU(3)_L x SU(3)_R symmetric (axial)vector meson extended Polyakov Quark Meson model, which includes beside the usual scalar and pseudoscalar nonets, the vector and axial vector nonets, constituent quarks and Polyakov loop variables. For the determination of the model parameters at zero temperature we apply a hybrid approach, in which mesons treated at tree-level, while the constituent quarks at 1-loop level. At finite temperature and/or densities, the temperature and baryochemical potential dependence of the order parameters (two scalar condensates and two Polyakov loop variables) are calculated from the hybrid 1-loop level field equations resulting from the first derivatives of the grand canonical potential. The order of the phase transition along the T=0 and mu_B=0 axes are determined for various parameterization scenarios. We find that in order to have a pseudo critical temperature at mu_B=0, which is consistent with lattice results and a first order phase transition at T=0 as a function of mu_B a light isoscalar particle is needed. We investigate the behavior of different thermodynamical quantities like pressure, entropy or energy density. The T/mu_B dependence of the scalar meson curvature masses are also determined. Here we take into account the exact fermion contribution to the meson masses.

Primary authors: WOLF, Gyorgy (Hungarian Academy of Sciences(KFKI-RMKI)); KOVACS, Peter (Wigner Research Centre for Physics, Hungary); Dr SZEP, Zsolt (MTA-ELTE Statistical and Biological Physics Research Group, Budapest, Hungary)

Presenter: KOVACS, Peter (Wigner Research Centre for Physics, Hungary)

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