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Thermodynamic characterizations of Exotic States: Fluctuations and Correlations of conserved quantities

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Themal shifts and fluctuations at finite temperature below the deconfinement crossover from hadronic matter to the quark-gluon plasma provide a viable way to look for missing states with given quantum number in the hadronic spectrum. We study a realization of the hadron resonance gas (HRG) model in the light quark (uds) flavour sector of QCD to study the fluctuations of baryon number, charge and strangeness, and study from it the thermodynamics characterization of exotic states like the hybrids q-qbar-q from a comparison with lattice data. We find that the highest temperature of agreement between the lattice and the HRG seems to be ˜ 150 MeV [1].

This study is then extended to compute the correlation of these conserved quantities in the confined phase of QCD. We obtain general formulas for the correlators of currents of any spin at zero and finite temperature, and apply them within the HRG model to obtain the correlators in QCD. It is also emphasized an interesting duality between the correlators at zero temperature and large distances, and the fluctuations of integrated quantities at low temperatures.

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