

# Role of hard-sphere repulsive interactions in a comparison to lattice QCD simulations: small strange states from fluctuations of conserved charges

Repulsive baryon and meson interactions in HRG models show sizable effects on higher order fluctuations of conserved charges. When compared to lattice QCD simulations, a point-particle formulation of the Hadron-Resonance Gas model is unable to describe the observables as calculated in Lattice GT, even when hitherto undetected Quark Model States are implemented into the hadronic spectrum used in the ppt-HRG.

Higher order fluctuations of conserved S/Q/B charges point towards the need for a distinctly different description of light quark hadrons and strange particles: the LQCD results are compatible with reduced strange hadron hardcores, in agreement with their smaller cross sections.

Implementing this different behaviours of light and strange hadrons into a HRG model allows also to reproduce the measured hadron yields from Heavy-Ion Collisions.

In particular, this treatment completely removes the so-called 'proton anomaly' supposedly found by the ALICE collaboration - it is just the neglect of the distinction of the eigenvolume terms which causes this non-anomaly.

Repulsive interactions furthermore allow for a consistent inclusion of exotic resonances, as the kappa meson, which influences key observables, especially in the strange sector.

## Preferred Track

New Theoretical Developments

## Collaboration

Not applicable

**Primary author:** ALBA, Paolo Giuseppe

**Presenter:** ALBA, Paolo Giuseppe

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