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K_1/K^* enhancement as a signature of chiral symmetry restoration in heavy ion collision

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K_1 and K^* are chiral partners, both with vacuum widths smaller than 100 MeV, making them a suitable pair that can be realistically measured.

Based on the fact that the mass difference between the chiral partners is an order parameter of chiral phase transition and that the chiral order parameter reduces substantially at the chemical freeze-out point in ultra-relativistic heavy ion collisions, we argue that the production ratio of K_1/K^* in such collisions should be substantially larger than that predicted in the statistical hadronization model. We further show that while the enhancement effect might be contaminated by the relatively larger decrease of K_1 meson than K^* meson during the hadronic phase, the signal will be visible through a systematic study on centrality as the kinetic freeze-out temperature is higher and the hadronic life time shorter in peripheral collisions than in central collisions. The work is based on PLB819 (2021) 136388 and arXiv:2310.11434.

session

G. Heavy Ion Physics

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