19th International Conference on QCD in Extreme Conditions (XQCD 2023)

Contribution ID: **16** Type: **Talk**

Speed of Sound beyond the High-Density Relativistic Limit in Dense Two-Color QCD: Lattice Simulation Results

Friday 28 July 2023 14:00 (25 minutes)

We obtain the equation of state (EoS) for two-color QCD at low temperature and high density from the lattice Monte Carlo simulation. Two-color QCD is a good toy model of real three-color QCD. The advantage to study this model is that the sign problem is absent even in finite density regime because of the pseudo-reality of quark field. We find that the speed of sound exceeds the relativistic limit (c_sˆ2/cˆ2=1/3) after BEC-BCS crossover in the superfluid phase. Such an excess of the sound velocity is previously unknown from any lattice calculations for QCD-like theories. This finding might have a possible relevance to the EoS of neutron star matter revealed by recent measurements of neutron star masses and radii. This talk is based on PTEP 2022 (2022) 11, 111B01 (e-Print: 2207.01253) and its further updates.

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Session Classification: Parallel session A