



Contribution ID: 84

Type: **Contributed talk**

Non-perturbative resummation to study hot and dense nuclear matter

Wednesday, 10 July 2024 14:40 (20 minutes)

Non-perturbative resummation at finite temperature via the Gribov gluon propagator was proposed by D. Zwanziger in 2005 [1]. Later, in 2013, it was used by K. Fukushima and N. Su [2] to study gluon thermodynamics. In 2015, N. Su and T. Tywoniuk showed that a novel massless excitation is ascribable to the magnetic scale in quark dispersion relations.

We recently used the non-perturbative resummation via the Gribov gluon propagator to calculate various quantities relevant to hot and dense nuclear matter. We have studied shear and bulk viscosities [4], heavy quark diffusion coefficient[5], meson screening mass[6], heavy quarkonium potential[7], et. al. In all the cases, we get an improvement over the perturbative result near the transition temperature. In this talk, I will discuss the recent findings we obtained using the non-perturbative resummation.

Ref:

1. Phys.Rev.D 73 (2006) 094504; Phys.Rev.Lett. 94 (2005) 182301
2. Phys.Rev.D 88 (2013) 076008
3. Phys.Rev.Lett. 114 (2015) 16, 161601
4. Phys.Lett.B 811 (2020) 135936; arXiv:2401.08384
5. Phys.Lett.B 838 (2023) 137714
6. Phys.Lett.B 845 (2023) 138143
7. arXiv: 2305.16250[to appear in EPJC]

session

G. Heavy Ion Physics

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Session Classification: G. Heavy Ion Physics