

# Effects of perturbative and non-perturbative heavy quark transport on $B_c$ production in heavy-ion collisions

Tuesday 24 September 2024 18:10 (20 minutes)

Recent measurement on nuclear modification of  $B_c$  mesons at the LHC serves as a novel probe of heavy quark interaction with the QGP in relativistic heavy-ion collisions. Within a linear Boltzmann transport model that incorporates both Yukawa (perturbative) and string (non-perturbative) interactions between heavy quarks and the QGP, we study dissociation and regeneration of  $B_c$  in these energetic nuclear collisions. A  $B_c$  bound state dissociates while one of its constituent heavy quark scatters with the QGP with momentum transfer greater than its binding energy, while medium modified charm and bottom quarks can recombine into  $B_c$  according the coalescence model on the QGP boundary. We find sensitivities of both dissociation and regeneration processes to the interaction dynamics of heavy quarks with the QGP. Within the current kinematic range observed at the LHC, the string interaction leads to much larger dissociation rate of  $B_c$  than the Yukawa interaction. Different types of interactions also yield different medium-modified spectra of open heavy quarks, which further affect the  $B_c$  spectrum from regeneration. Our model provides a satisfactory description of the nuclear modification factor of  $B_c$  in Pb+Pb collisions at 5.02 ATeV. More precise experimental data on  $B_c$  in the future can provide a more stringent constraint on heavy quark dynamics in high-energy nuclear collisions, and may also shed light on the inner structure of  $B_c$  mesons.

## Category

Theory

## Collaboration

**Authors:** Ms ZHANG, Lejing (Shandong University); Ms XING, Wen-Jing (Shandong University); Mr CAO, Shanshan (Shandong University); Ms ZHANG, Lejing (Shandong University)

**Presenter:** Ms ZHANG, Lejing (Shandong University)

**Session Classification:** Poster Session

**Track Classification:** 3. Heavy quarks and quarkonia