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## Multi-stage jet evolution and mass hierarchy of heavy quark energy loss in heavy-ion collisions

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Heavy quarks serve as valuable probes of the QGP properties as well as the mass hierarchy of parton energy loss. Experimental data at the LHC indicate significant nuclear modification of heavy flavor ( $D$  &  $B$ ) meson production that is comparable to light flavor hadrons, which seem contradictory to one's earlier expectation of  $\Delta E_g > \Delta E_q > \Delta E_c > \Delta E_b$ . We extended the Linear Boltzmann Transport (LBT) model coupled to hydrodynamic medium to heavy quark jet evolution in the QGP including both elastic and inelastic scattering processes [1,2]. Within the LBT model, we obtain good descriptions of heavy flavor meson suppression, elliptic and triangular flow coefficients observed at the LHC and RHIC.

The time-ordered transport model is further combined with a virtuality-ordered parton shower scheme into a multi-stage evolution approach [3,4] that includes a rare-scattering multiple emission formalism at momentum large compared to heavy quark mass (sensitive only to the transverse diffusion coefficient), and a single scattering induced emission formalism at momentum comparable to mass (sensitive to the transverse diffusion as well as longitudinal drag and diffusion coefficients). This multi-stage approach reduces the difference of energy loss between  $c$  and  $b$  quarks and simultaneously describes  $D$  and  $B$  meson  $R_{AA}$ . In addition, the mass (or velocity) dependence of jet-induced medium excitation is explored for the first time. Its effects on the mass hierarchy of parton energy loss and heavy-light hadron correlation functions are investigated.

- [1] S. Cao, T. Luo, G.-Y. Qin, and X.-N. Wang, Phys. Rev. C94 (2016) 1, 014909.
- [2] S. Cao, T. Luo, G.-Y. Qin, and X.-N. Wang, arXiv:1703.00822.
- [3] S. Cao, A. Majumder, G.-Y. Qin, and C. Shen, arXiv:1711.09053.
- [4] S. Cao, et al., Phys. Rev. C96 (2017) 2, 024909.

### Content type

Theory

### Collaboration

### Centralised submission by Collaboration

Presenter name already specified

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