

# 10th International Conference on Hard and Electromagnetic Probes of High-Energy Nuclear Collisions



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## Flavor hierarchy of jet quenching in relativistic heavy-ion collisions

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Relativistic heavy-ion experiments have observed similar quenching effects for (prompt)  $D$  mesons compared to charged hadrons for transverse momenta larger than 6-8 GeV, which remains a mystery since heavy quarks typically lose less energies in quark-gluon plasma than light quarks and gluons. Recent measurements of the nuclear modification factors of  $B$  mesons and  $B$ -decayed  $D$  mesons by the CMS Collaboration provide a unique opportunity to study the flavor hierarchy of jet quenching. Using a linear Boltzmann transport model combined with hydrodynamics simulation, we study the energy loss and nuclear modification for heavy and light flavor jets in high-energy nuclear collisions. By consistently taking into account both quark and gluon contributions to light and heavy flavor hadron productions within a next-to-leading order perturbative QCD framework, we obtain, for the first time, a satisfactory description of the experimental data on the nuclear modification factors for charged hadrons,  $D$  mesons,  $B$  mesons and  $B$ -decayed  $D$  mesons simultaneously over a wide range of transverse momenta (8-300 GeV). This presents a solid solution to the flavor puzzle of jet quenching and constitutes a significant step towards the precision study of jet-medium interaction. Our study predicts that at transverse momenta larger than 30-40 GeV,  $B$  mesons also exhibit similar suppression effects to charged hadrons and  $D$  mesons, which may be tested by future measurements.

Reference:

[1] Wen-Jing Xing, Shanshan Cao, Guang-You Qin, and Hongxi Xing, arXiv:1906.00413

### Collaboration (if applicable)

### Track

Heavy Flavor and Quarkonia

### Contribution type

Contributed Talk

**Primary authors:** Ms XING, Wen-Jing (Central China Normal University); Dr CAO, Shanshan (Wayne State University); Prof. QIN, Guang-You (Central China Normal University); Prof. XING, Hongxi (South China Normal University)

**Presenter:** Ms XING, Wen-Jing (Central China Normal University)

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