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Combined constraining power of jet and hadron quenching on the jet transport parameter

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We found that collisional and radiative processes affect hadron and jet R_{AA} with different p_T dependence. It is then interesting to analyze the combined constraining power from both jet and hadron quenching to the jet transport parameter $\hat{q}$.

We conduct the study with the improved transport model (LIDO), including elastic and radiative processes, and a simple treatment of jet-medium response. The model only applies in the ''transport regime": hard partons with virtuality less than a characteristic momentum broadening scale $Q^2_{\rm med} \approx \langle \Delta k_t^2 \rangle$ in a medium with temperature greater than $T_f \approx T_c$. $\hat{q}$ is determined by a temperature dependent jet-medium coupling $g_s(\mu\pi T)$.

We used a Bayesian analysis to determine the temperature and momentum dependence using hadron (light and heavy) and $R = 0.4$ jet R_{AA} at RHIC and LHC for the first time [1]. Experimental uncertainty and ambiguity from μ, $Q_{\rm med}$ and T_f are propagated to the final $\hat{q}$. Then, we made predictions with quantified uncertainty to the jet-cone-sized dependence of R_{AA}, modified jet shape, and fragmentation functions.

[1] Weiyao Ke and Xin-Nian Wang JHEP 05 (2021) 041

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