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Heavy Flavour Energy Loss in Small and Large Systems

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We present novel predictions for high-p_T heavy flavour D and B meson suppression in $p+p$, $p+A$, $d+A$ and $A+A$ collisions at RHIC and the LHC. These predictions are made using a one-parameter convolved elastic and radiative energy loss model, which receives small system size corrections to both the elastic and radiative energy loss. We simultaneously predict the observed light flavour pion R_{AA} in both Au + Au and d + Au collisions at RHIC, providing additional supporting evidence that QGP is formed in high-multiplicity d + Au collisions at $\sqrt{s} = 200$ AGeV. Our results are also consistent with the suppression of both light and heavy flavours in Pb + Pb collisions at the LHC. We are unable to reproduce the observed lack of suppression in high-multiplicity p + Pb collisions at the LHC. We propose that a system size scan will help separate radiative and elastic dominated suppression, as well as various theoretical uncertainties in HTL-based elastic energy loss. Predictions, along with a detailed theoretical uncertainty analysis, are presented for such a future system size scan including $p+p$, $p+A$, $d+A$, $^3\mathrm{He}+A$, $p+\mathrm{O}$, $\mathrm{O}+\mathrm{O}$, $\mathrm{Xe}+\mathrm{Xe}$, and $\mathrm{Pb}+\mathrm{Pb}$ collision systems.

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