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Heavy Flavour Suppression: Boltzmann vs Langevin

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The propagation of heavy flavour through the quark gluon plasma has been treated commonly within the framework of Langevin dynamics,
i.e. assuming the heavy flavour momentum transfer is much smaller than the light one. On the other hand a similar suppression factor R_AA has been observed experimentally for light and heavy flavor.
We present a thorough study of the thermalization dynamics and of the approximations involved by Langevin equation by mean of a direct comparison with the full collisional integral within the framework of Boltzmann transport equation. We found that it is difficult to achieve thermalization in Langevin dynamics for a realistic momentum dependence of the drag and diffusion coefficients. The nuclear suppression factor, $R_{\rm A\,A}$ and the elliptic flow $v_2^{H\,F}$ of the charm and bottom quarks have been evaluated at RHIC and LHC energies within both the Langevin and Boltzmann approach. We have compared the results obtained in both approaches which can differ substantially leading to quite different values extracted for the the heavy quark diffusion coefficient.

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