

## A systematic study on the rescattering of heavy flavor hadrons

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There is currently no agreed-upon description of the interactions that heavy flavored hadrons undergo in the late stages of a heavy ion collision. Although a significant effort is being done to study heavy flavor creation and diffusion during the partonic evolution, the same cannot be said about the hadronic rescattering stage. This leaves open questions such as how much anisotropic flow of heavy hadrons is enhanced, how much quarkonia are suppressed by hadronic processes, and what the consequences on dilepton measurements are. In light of the incoming precision era of measurements, it becomes imperative to understand and quantify the mechanisms that affect such observables also after hadronization.

In this work, we build this understanding step-by-step, in a systematic way: with the hadronic transport approach SMASH, we create the most basic approximation of a hadronic afterburner – a thermalized and expanding sphere of hadron gas –, where we observe the “pion wind” phenomenon and its dependence on the cross section assumption, which we base on the Additive Quark Model but take the proportionality constant of the charm quark as a free parameter. While the cross section is initially only elastic, we later introduce inelastic processes via resonance formation and string excitation, along with fast-moving heavy mesons. These are slowed down nearly independently of the initial momentum, characterizing thermalization. They are also deflected in the medium by an amount that depends on which cross sections are used, hinting at the mechanism for anisotropic flow generation. Within this setup, we also see a depletion in charmonia due to the  $J/\Psi(+N) \rightarrow D\bar{D}(+N)$  process. Furthermore, due to the large (semi)leptonic branching ratio, the rescattering of heavy hadrons decrease the phase space of resulting dileptons, so we investigate how this affects their opening angle and invariant mass spectra. This systematic study of hadronic rescattering effects, on a comprehensive set of observables related to heavy flavor hadrons, is the first step for higher precision predictions from full dynamical hybrid approaches.

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