

Open heavy-flavor measurements at high-energy hadron colliders

R. Averbeck¹

¹ *Research Division and ExtreMe Matter Institute EMMI, GSI Helmholtzzentrum für Schwerionenforschung,
D-64291 Darmstadt, Germany*

Contact email: *R.Averbeck@gsi.de*

Hadrons carrying heavy flavor, *i.e.* charm or beauty quarks, are unique probes in particle and nuclear collisions at high energies. Given their large masses, charm and beauty quark-antiquark pairs are produced almost exclusively via hard partonic scattering processes. As such, the measurement of heavy-flavor hadron production cross sections in proton-proton (pp) collisions at high energies serves as a sensitive test for perturbative quantum chromodynamics, the theory of strong interactions.

In proton-nucleus (pA) collisions heavy-flavor hadron yields and kinematical distributions are subject to cold nuclear matter effects such as modifications of the parton densities in nuclei with respect to nucleons, parton scattering in the initial state, or energy loss in cold nuclear matter.

Measurements in pp and pA collisions provide a mandatory reference for heavy-flavor studies in high-energy nucleus-nucleus (AA) collisions, where the heavy quarks propagate through and interact with the produced hot and dense medium. The investigation of medium modifications of heavy-flavor observables can shed light on the nature of the interaction of partons with the medium and, furthermore, it will help to constrain the properties of the medium.

Systematic measurements of heavy-flavor hadron production in pp, pA, and AA collisions are conducted at the high energy frontier at the CERN Large Hadron Collider and, at lower energies, at the BNL Relativistic Heavy-Ion Collider. Current results from these studies will be reviewed.