

Dissociation Reactions of Large- p_T Charmonia

In this talk I will discuss dissociation of large-momentum charmonia with light mesons in hadronic matter. Momenta of charmonia created in Pb-Pb collisions at the CERN Large Hadron Collider are so large that three or more mesons may be produced when the charmonia collide with light mesons in hadronic matter. We study the meson-charmonium collision in a mechanism where the collision produces two quarks and two antiquarks; the charm quark then fragments into charmed mesons, and the other three constituents as well as quarks and antiquarks created from vacuum give rise to two or more mesons. The absolute square of the transition amplitude for the production of two quarks and two antiquarks is derived from the S-matrix element, and cross-section formulas are derived from the absolute square of the transition amplitude and charm-quark fragmentation functions. With a temperature-dependent quark potential, we calculate unpolarized cross sections for inclusive D^+ , D^0 , D_s^+ , or D^{*+} production in scattering of charmonia by π , ρ , K , or K^* mesons. At low center-of-mass energies of the charmonium and the light meson, the cross sections are very small. At high energies the cross sections have obvious temperature dependence and are comparable to peak cross sections of two-to-two meson-charmonium reactions. This study has been published in Phys. Rev. C106 (2022) 054901.

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