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Production of Heavy Mesons and Quarkonia within Jets

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The production of heavy mesons and quarkonia in jets provides new tests of their production mechanisms. The dependence of the cross section on the energy fraction of the heavy particle, z, and jet angularity, τ_a, is determined by fragmenting jet functions (FJFs). FJFs are convolutions of fragmentation functions, evolved to the jet energy scale, with perturbatively calculable matching coefficients. We apply this formalism to two-jet events in e^+e^- collisions with B mesons, and three-jet events with J/ψ. For B mesons, we use a phenomenological fragmentation function extracted from e^+e^- collisions at the scale $2m_b$, and find the dependence on z and τ_a is consistent with predictions from Monte Carlo event generators. In the case of quarkonia, the fragmentation functions are calculable in Non-Relativistic QCD (NRQCD) and the z dependence of the cross section can be used to perform an independent extractions of NRQCD long-distance matrix elements. For J/ψ we find reasonable agreement with Monte Carlo for the τ_a distributions but the z distributions differ significantly. We also define a boost invariant generalization of τ_a and derive a boost invariant soft function that is necessary for jet cross sections at the LHC.