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Resummation for photon isolation

Wednesday, 29 March 2023 16:30 (20 minutes)

To separate the energetic photons produced in hard scattering processes from those from other sources, measurements impose isolation requirements which restrict the hadronic radiation inside a cone around the photon. In our talk we explain that for small cone radius R, photon isolation effects can be captured by a fragmentation function describing the decay of a parton into a photon accompanied by hadronic radiation. We solve the associated renormalization group equations to resum logarithms of R. For small isolation energy, the cone fragmentation function factorizes further, into collinear functions describing energetic quarks and gluons near the cone boundary and functions encoding their soft radiation emitted into the cone. Based on this factorization we also resum the non-global logarithms of the ratio of the photon energy and the isolation energy, so that we control all logarithmically enhanced terms in the cross section. Finally, we provide a simple formula to convert NNLO cross section results from smooth-cone isolation to fixed-cone isolation.

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