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Hadron-photon correlations in pp collisions in ALICE using POWHEG and PYTHIA

Outgoing high- p_T partons produced from hard scatterings early in high-energy collisions lead to the creation of jets. Photons are produced copiously in these interactions - directly emitted by the quarks as prompt photons, or through the decay of unstable particles. They are valuable probes to study jet fragmentation and nuclear parton distribution functions (nPDF).

Angular correlations between trigger hadrons, which serve as proxies for the jets, and their associated photons are extracted from ALICE simulations. The photons are reconstructed from conversions in the ALICE material into electrons and positrons using the Photon Conversion Method (PCM). Since direct photons cannot be distinguished individually, their spectra are derived using a statistical approach. The decay photon spectra are derived from neutral hadron measurements, and subtracted from the inclusive measurements to extract the direct photon spectra. In this analysis, proton-proton collisions are simulated in Monte Carlo, using stand-alone PYTHIA at leading order (LO), and PYTHIA in combination with POWHEG at next-to-leading order (NLO), and compared with each other. While prompt photons are well defined at LO, ambiguities are introduced at NLO. This analysis aims to understand better the production mechanisms of prompt photons and hence the nPDF at low p_T .

Category

Experiment

Collaboration (if applicable)

ALICE

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