

Prompt neutrinos at the LHC and connections to the prompt atmospheric neutrino flux

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The Large Hadron Collider (LHC) can produce huge numbers of neutrinos into the large rapidity region. New experiments at the LHC, the ongoing FASER ν and SND@LHC and the proposed Forward Physics Facility (FPF) experiments aim to detect such neutrinos, in particular prompt neutrinos which mainly come from charm hadron decays. Prompt neutrinos can be also produced by cosmic ray interactions in the atmosphere which become the main component of the atmospheric neutrino flux at very high energies. Prompt atmospheric neutrinos have not yet been detected and theoretical predictions have large uncertainties, mainly related to charm hadron production. The study of charm production through measurements of prompt neutrinos at the LHC with high statistics will help estimations of the prompt atmospheric neutrino flux. We will present the kinematic regions for prompt neutrinos that can be detected in far-forward neutrino experiments. We discuss the relevance to the prompt atmospheric neutrino flux using collider kinematic variables, the collision energy \sqrt{s} and the center-of-mass rapidity y of the charm hadrons and neutrinos.

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