

The study of backgrounds in direct photon production at SPD NICA energies.

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The direct photon production in proton-proton collisions, both inclusive and heavy-meson-associated, is an important source of information on gluon distribution function inside the proton. Through the studies of transverse single-spin and double longitudinal asymmetries in polarized-beam collisions one can extract the information of the spin gluon content [1,2]. Since the study of direct photon production is one of the important tasks of the physical program at Spin Physics Detector (SPD) at NICA Collider [3] one faces a problem to recognize the direct photons from the background. Primary decay photons from π^0 would be a main source of the background to direct photons at NICA energies of $\sqrt{s} = 27$ GeV and $\sqrt{s} = 20$ GeV.

At first step in our work we study the set of existing data in pp collisions at energies from 19.4 GeV to 630 GeV on direct photon and π^0 inclusive production. We calculate the inclusive neutral pion and photon production differential cross sections in the leading order of Particle Reggeization Approach [4] to extract the NLO to LO K-factors. Then we simulate these spectra using Pythia8 to obtain photon-to-neutral pion ratios.

At the next step we simulate the spectra of decay photon candidates at NICA energies on different kinematic variables to obtain the form of distributions, which allow us to apply a number of cuts to distinguish signal events from π^0 decay background at the generator level. Finally we propose the cuts which increase significantly the signal to background ratio.

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