Contribution ID : **163** Type : **Oral talk**

GAN for prediction of direct photons in longitudinally polarized proton-proton collisions at energy $\sqrt{s}$ = 27 GeV

Wednesday, 23 October 2024 18:05 (15)

A study of direct photon production in longitudinally polarized proton-proton collisions presents a valuable opportunity to investigate the contribution of gluons to the total proton spin. This contribution is described in terms of a gluon helical distribution function, $\Delta g(x)$. An investigation of this function forms part of the experimental program scheduled for the SPD experiment. The extraction of $\Delta g(x)$ is achieved through the measurement of double longitudinal spin asymmetry (DLSA) in direct photon production.

The study of direct photons presents certain challenges. Due to their relative rarity, it is difficult to distinguish direct photons from those produced by other sources. Consequently, it is challenging to obtain a substantial sample size. One potential solution is the application of generative machine learning models, such as generative adversarial networks (GANs). The model can be trained to predict the outcome of longitudinally polarized proton-proton collisions without modeling the entire experiment in detail, but only the relevant process.

As the SPD experiment is still under construction, a PYTHIA8 Monte Carlo generator with polarized NNPDFpol11 was selected for testing the potential of using GAN to predict the production of direct photons in longitudinally polarized proton-proton collisions.

The present report is devoted to an investigation of the capabilities of GAN in predicting the outcomes of direct photon production in both polarized and unpolarized proton-proton collisions at a center-of-mass energy of $\sqrt{s} = 27$ GeV.

We acknowledge support from Russian Ministry of Education and Science. State assignment for fundamental research (code FSEG-2024-0033)

Primary author(s) : LOBANOV, Andrey (SPbPU); Prof. BERDNIKOV, Yaroslav (Peter the Great St.Petersburg Polytechnic University); KOTOV, Dmitriy (Peter the Great St.Petersburg Polytechnic University)

Presenter(s) : LOBANOV, Andrey (SPbPU)

Session Classification : HEP Experiment

Track Classification : High energy physics: experiment