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PROMPT PHOTON PRODUCTION IN SUB-PROCESSES $qg \to q\gamma$ AND $q\gamma \to q\gamma$ OF COMPTON SCATTERING IN COLLISION OF LONGITUDINALLY POLARIZED PROTONS AT NICA ENERGIES

\documentclass{article}

\usepackage{amssymb}
\usepackage{amsmath}
\usepackage[dvips]{graphicx}
% \textwidth=13cm
\usepackage[left=3cm,right=3cm,top=2cm,bottom=2cm]{geometry}
\begin{document}

\begin{center}
\textbf{LXXIV International conference Nucleus-2024: Fundamental problems and applications}
\end{center}

\noindent Abstract ID:

\begin{center}
\textbf{PROMPT PHOTON PRODUCTION IN SUB-PROCESSES $qg \to q\gamma$ AND
$q\gamma \to q\gamma$ OF COMPTON SCATTERING IN COLLISION OF
LONGITUDINALLY POLARIZED PROTONS AT NICA ENERGIES}
\end{center}

\noindent \textbf{Content}

\noindent \textbf{Author:} M.R.Alizada (Baku State University, Baku, Azerbaijan)

\noindent \textbf{Abstract:} Photons are of particular importance in the study of hadronic and nuclear interactions at high energies. The process of prompt photon production plays an important role in determining the distribution of gluons in the proton and testing some aspects of perturbative quantum chromodynamics.

The dependence of the differential cross-section of the production of prompt photons with sub-processes of mixed chromo-electrodynamic $qg \to q\gamma$ and pure electrodynamic $q\gamma \to q\gamma$ Compton scattering in collision of longitudinal polarized protons on the sum of the energies of colliding protons $\sqrt{s}$, the transverse momentum p_T of photons, the cosine of the scattering angle $Cos(\theta)$ and the rapidity of photons \textit{y} and x_T was investigated.

Investigation of differential cross-section on on the sum of the energies of colliding protons $\sqrt{s}$, the transverse momentum p_T of photons showed that influence of polarization of the initial particles can increase or decrease the differential cross- section depending on the helicity. With different signs of the helicity of the initial particles, the total cross-section decreases, and with the same signs of the helicity, the total cross-section increases compared to the non-polarized case. The polarization of the initial particles strongly influence the subprocess $qg \to q\gamma$ which contribution dominate the contribution of the subprocess $q\gamma \to q\gamma$.

The dependence of the differential cross-section on the cosine of the prompt photon scattering angle for subprocesses $qg \to q\gamma$ and $q\gamma \to q\gamma$ shows that polarization has not changed the character of the dependence. The maximum value of the differential cross-section is achieved at departure angles close to 16 and 164 degrees. This indicates that the probability that the photon will be scattered along the collision axis is highest. As the scattering angle increases, the differential cross-section decreases.

The value of the differential cross-section has a maximum value at $y = \pm 1.95$ and decreases with changes in the value of y. The differential cross-section has a minimum value at $y = 0$.

The investigation of double-spin asymmetry of the processes showed that the helicity of the initial particles affects the double-spin asymmetry of the sub-process $qg \to q\gamma$ and $q\gamma \to q\gamma$ in different ways.

Thus, we can conclude that it is necessary to take into account the influence of the subprocess $q\gamma \to q\gamma$ when modeling and analyzing experimental data of proton-proton collisions at NICA energies. \\

\textbf{Section}

`Nuclear structure: theory and experiment`

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\textbf{Presenter: }Mohsun R. Alizada

\textbf{Contribution type: } Plenary

Submitted by Alizada Mohsun, 16 April 2024

\end{document}

Section

Nuclear structure: theory and experiment

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Session Classification: Heavy ion collisions at Intermediate and high energies