Contribution ID: **1020** Type: **Oral**

RADIATION CORRECTIONS TO PROMPT PHOTON PRODUCTION IN COMPTON SCATTERING OF QUARK-GLUON $qg \longrightarrow q\gamma$ AND ANNIHILATION OF QUARK-ANTIQUARK PAIR $q\overline{q} \longrightarrow g\gamma$ PROCESSES

Tuesday, 25 October 2022 15:30 (15 minutes)

\documentclass{article}

\usepackage{amssymb}
\usepackage{amsmath}
\usepackage[dvips]{graphicx}

\begin{document}

\begin{center}
\textbf{RADIATION CORRECTIONS TO PROMPT PHOTON PRODUCTION IN
COMPTON SCATTERING OF QUARK-GLUON }$qg \rightarrow q\gamma$ \textbf{AND ANNIHILATION OF
QUARK-ANTIQUARK PAIR }$q\bar{q} \rightarrow g\gamma$\textbf{PROCESSES }

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\end{center}

Radiation corrections to processes of Compton scattering of quark-gluon:
1. $q\gamma \rightarrow q\gamma$, 2. $q\gamma \rightarrow qg$, 3. $g\gamma \rightarrow q\bar{q}$,
4. $q\gamma \rightarrow qg\gamma$, 5. $qg \rightarrow g\gamma\gamma$, 6. $qg \rightarrow qg\gamma$ and
7. $g\gamma \rightarrow q\bar{q}\gamma$ and annihilation of quark-antquark pair:
1. $q\bar{q} \rightarrow \gamma\gamma$, 2. $q\bar{q} \rightarrow q\bar{q}\gamma$,
3. $q\bar{q} \rightarrow g\gamma\gamma$ and 4. $q\bar{q} \rightarrow gg\gamma$ without and
with taking into account of polarization of quark was considered.
Dependencies of differential cross section of subprocesses on energy
of colliding protons $\sqrt{s}$, transverse momentum p_T, cosine of
scattering angle \textit{cos(θ)} and \textit{y} of photons,
x_T were investigated.

Differential cross section of considered subprocesses decreases as the
transverse momentum increases. The following results were obtained:
$\frac{d\sigma_1}{dydp_T^2}$\textit{>}$\frac{d\sigma_2}{dydp_T^2}$\textit{>}\\ $\frac{d\sigma_3}{dydp_T^2}$ and
\textit{ }$\frac{d\sigma_4}{dydp_T^2}$\textit{>}$\frac{d\sigma_5}{dydp_T^2}$\textit{>}$\frac{d\sigma_6}{dydp_T^2}$\textit{>}
$\frac{d\sigma_7}{dydp_T^2}$\textit{ }for\textit{ }
Compton scattering process and $\frac{d\sigma_2}{dydp_T^2}$\textit{>}$\frac{d\sigma_3}{dydp_T^2}$\textit{>}$\frac{d\sigma_4}{dydp_T^2}$\textit{}for\textit{}annihilation of quark-antiquark pair process.
It was been determined that, contributions of corrections to differential cross
section of Compton scattering of quark-gluon process is significant than
contributions of corrections to differential cross section of annihilation
of quark-antquark pair process.

The doublespin asymmetry A_{LL} of subprocesses $q\bar{q} \rightarrow \gamma\gamma$,
$q\bar{q} \rightarrow g\gamma\gamma$ and $q\bar{q} \rightarrow gg\gamma$ of annihilation process
are independent of $\sqrt{s}$, p_T and \textit{cos(θ)}.
The doublespin asymmetry expression for these subprocesses is as follows

$A_{LL} = -\lambda_1\lambda_2$. Doublespin asymmetry A_{LL} of
subprocess $q\bar{q} \to q\bar{q}\gamma$ of annihilation process increases
(decreases) with increasing transverse momentum for \textit{$\lambda_1\lambda_2$ }<0 (\textit{$\lambda_1\lambda_2$}>0) and reach plateu at
certain p_T.
The value of this p_T increases with increasing of absolute value of
\textit{λ_1 λ_2}.

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Session Classification: High Energy Physics

Track Classification: High Energy Physics