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NLO EW corrections to tau pair production via photon fusion in Pb-Pb UPC

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In this talk, we show the results of NLO EW correction to $\gamma\gamma \to \tau^+\tau^-$ process in Pb-Pb UPC. We find that the EW correction $\delta\sigma_{\rm EW}$ decreases the total cross section $\sigma_{\rm NLO} = \sigma_{\rm LO} + \delta\sigma_{\rm EW}$ by -3% at Pb-Pb center-of-mass energy $\sqrt{s_{NN}} = 5.02$ TeV.

The weak correction plays significant role whose contribution is about -4 times of that of QED. The CMS and ATLAS collaborations use the reaction $\gamma\gamma \to \tau^+\tau^-$ in Pb-Pb and proton-proton UPC to constrain tau's anomalous magnetic moment a_τ. By parameterizing the $\gamma\tau\tau$ vertex with two form factors $F_{1,2}$, the cross section can be written as $\sigma_{a_\tau} = \sigma_{\rm LO} + \delta\sigma_{a_\tau}$, where $\delta\sigma_{a_\tau}$ is proportional to a_τ. The impact of NLO EW corrections on a_τ bounds in a Pb-Pb UPC is limited, as the current experimental bounds are loose. We also find that various differential distributions of the two ratios $\mathrm{d}\sigma_{\rm NLO}/\mathrm{d}\sigma_{\rm LO}$ and $\mathrm{d}\sigma_{a_\tau}/\mathrm{d}\sigma_{\rm LO}$ have different lineshapes. This work is significant to precisely study the interaction of $\gamma\tau\tau$ via $\gamma\gamma \to \tau^+\tau^-$ process.

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