

Probing positivity at LHC with exclusive photon-fusion processes

Saturday, 18 November 2023 08:50 (20 minutes)

By tagging one or two intact protons in the forward direction, it is possible to select and measure exclusive photon-fusion processes at the LHC. The same processes can also be measured in heavy ion collisions, and are often denoted as ultraperipheral collisions (UPC) processes. Such measurements opens up the possibility to probe certain dimension-8 operators and their positivity bounds at the LHC. As an demonstration, we perform a phenomenological study on the $\gamma\gamma \rightarrow \ell^+\ell^-$ processes, and find out that the measurements of this process at the HL-LHC provides reaches on certain dimension-8 operator coefficients that are comparable to the ones at future lepton colliders. We also point out that the $\gamma q \rightarrow \gamma q$ process could potentially have better reaches on similar types of operators due to its larger cross section, but a more detailed experimental study is need to estimate the background of this process. The validity of effective field theory (EFT) and the robustness of the positivity interpretation are also discussed.

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Session Classification: Theory