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Results on photon-photon scattering processes in ultra-peripheral Pb+Pb collisions with ATLAS

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In ultra-relativistic heavy-ion collisions, large rates of $\gamma\gamma$ processes occur through the interaction of the large electromagnetic fields of the nuclei. These $\gamma\gamma$ interactions enable the study of processes potentially sensitive to physics beyond the Standard Model. In ultra-peripheral collisions (UPCs), characterized by large impact parameter between the nuclei, the outgoing particles exhibit back-to-back production in the transverse plane, which provides precise and efficient identification. This talk presents an overview of recent ATLAS measurements potentially sensitive to physics beyond the Standard Model, including the production of tau leptons, light-by-light scattering, or the production of magnetic monopoles. Measurements of tau lepton production help to constrain its anomalous magnetic moment, a quantity potentially sensitive to physics beyond the Standard Model. Results will be presented on measurements of light-by-light scattering which may be used to set limits on the existence of axion-like-particles (ALPs). Also presented is a more recent search for monopole-pair production in UPCs with monopole masses ranging from 20–150 GeV. The results are compared with a leading-order model of spin-1/2 particle production from photon-photon fusion and a recently developed semi-classical model that includes non-perturbative cross section calculations.

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