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Evidence for light-by-light scattering in ultraperipheral PbPb collisions at s_{NN}=5.02TeV (Article) (Open Access)

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Abstract

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Evidence for light-by-light (LbL) scattering , γγ→γγ in ultraperipheral PbPb collisions at a nucleon-nucleon center-of-mass energy of 5.02 TeV is reported. LbL scattering processes are selected in events with just two photons produced, with transverse energy E_T^{γ}>2GeV, pseudorapidity $|\eta^{\gamma}|$<2.4; and diphoton invariant mass $m^{\gamma\gamma}$>5GeV, transverse momentum $p_T^{\gamma\gamma}$<1GeV, and acoplanarity $(1-\Delta\phi^{\gamma\gamma}/\pi)$<0.01. After all selection criteria, 14 events are observed, compared to 11.1±1.1(theo) and 3.8±1.3(stat) events expected for signal and background processes respectively. The significance of the signal excess over the background-only hypothesis is 4.1σ. The measured fiducial LbL scattering cross section, $\sigma_{fid}(\gamma\gamma\to\gamma\gamma)$=122±46(stat)±29(syst)±4(theo) nb is consistent with the standard model prediction. © 2018

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