## **Initial Stages 2021**



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## First measurement of the forward rapidity gap distribution in pPb collisions at 8 TeV

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We present the forward rapidity gap spectra from proton-lead collisions for both pomeron-lead and pomeronproton topologies measured at CMS. The analysis is performed over 10.4 units of pseudorapidity at a centerof-mass energy of  $\sqrt{s}_{NN} = 8.16$  TeV, i.e. almost 300 times higher than previous measurements of diffractive production in proton-nucleus collisions. For the pomeron-lead topology, the cross-section predicted by EPOS-LHC is a factor of two lower than the measured data while the model gives a reasonable description of the shape of the spectrum. For the pomeron-proton topology, the EPOS-LHC, QGSJET II, and HIJING generator predictions are lower than the data by at least a factor of five. This effect can be explained by a significant contribution of ultra-peripheral photoproduction events mimicking the signature of diffractive processes. The obtained data may be of significant input for understanding the high energy limit of QCD and modeling cosmic ray air showers.

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