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Single dissociative diffraction at $\sqrt{s}=13$ TeV with the ATLAS detector

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I will be presenting an overview of the ATLAS analysis of the single dissociative diffraction cross-section in p-p collisions at 13 TeV. I am the main analyser for this measurement and it will be the topic of my PhD thesis.

Single dissociative diffraction (pp→pX) occurs when there is a t-channel exchange with the quantum numbers of the vacuum with one proton remaining intact and the other dissociating into a diffractive system 'X'. Its cross-section is approximately 10-20% of the total p-p cross-section at $\sqrt{s}=13$ TeV but this is not well constrained.

The aim of the analysis is to measure the differential cross-section as a function of the squared four-momentum exchanged in the t-channel and the fractional energy loss of the intact proton. This will enable tests of models based on different approaches to soft strong interactions and the calculation of parameters that are important in the tuning of MC models.

The analysis has several novel components. The data are from a low pile-up, high β^* optics run of the LHC. The ALFA roman pot detectors, situated ~240m away from the interaction point, are used to provide tagging and kinematic reconstruction of intact protons. At the time of writing there are no public LHC diffractive results that use proton tagging.

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