Very-forward π^0 production cross section in proton-proton collisions at $\sqrt{s}$ = 13 TeV measured with the LHCf experiment

The LHCf experiment, situated at the LHC accelerator, is composed of two independent detectors located at 140 metres from the ATLAS interaction point (IP1) on opposite sides along the beam axis. Each detector is made of two sampling and position sensitive calorimeters. LHCf covers the pseudorapidity region above 8.4, with the capability to measure zero-degree neutral particles. The physics motivation of the experiment is to test the hadronic interaction models commonly used in ground-based cosmic rays experiments to simulate air-showers induced by ultra-high-energy cosmic rays (UHECR) in the Earth atmosphere. The data from accelerator experiments are very important for the tuning of these phenomenological models in order to reduce the systematic uncertainty of UHECR measurements. A precise measurement of the π^0s produced in the very-forward region in high energy collisions provides the possibility to study the electromagnetic component of secondary particles produced in the first interaction of a UHECR with the atmosphere.
In this contribution the preliminary results from the π^0 analysis of the data acquired in proton-proton collisions at $\sqrt{s}$ = 13 TeV will be presented. Two typologies of π^0 events can be recorded by the detectors: “Type I” events with a photon in each calorimeter, and “Type II” events with two photon in the same calorimeter. The analyses of the different detectors and event types are carried out independently. During the analysis the π^0s are selected defining a signal window in the invariant mass distribution of the two decay photons, then the background is subtracted with a “sideband method”, and finally the spectrum is unfolded to correct selection efficiency and resolution effects. The analysis has been done on the data acquired in the LHC fill #3855. A dedicated low-luminosity setup was used with a luminosity of ~10^{29} cm^{-2} s^{-1}. The achieved integrated luminosity is 2.1 nb^{-1} for Type I events (with a dedicated trigger) and 0.8 nb^{-1} for Type II events. The Feynman-X and transverse momentum spectra obtained with the two detectors and with different event types are found to be consistent with each other. The consistency of results from different detectors and event types is fundamental since they provides complementary information covering different regions of the p_T-X_F phase space.