

Status and Prospects of the LHCf and RHICf experiments

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Precise understanding of hadronic interactions at high energies is a key to improve chemical composition measurements of very high energy cosmic-rays and to solve the muon excess issue observed in high energy cosmic-ray experiments using air-shower technique. The LHCf and RHICf experiments measure the differential production cross sections of very forward neutral particles as photons, neutral pions and neutrons at LHC and RHIC, respectively. These data are critically important to test and tune hadronic interaction models used for air-shower simulations.

In this presentation, we introduce the recent results of both the experiments as well as our future operation plans. LHCf published an updated result of forward neutron measurement at pp , $\sqrt{s} = 13$ TeV. From the observed neutron energy spectra, we also obtained the average inelasticity, which is one of the key parameters for air shower development, as $0.536 + 0.031 - 0.037$. In addition, several analyses are on-going; neutral pion measurement at pp , $\sqrt{s} = 13$ TeV, central-forward correlation analysis with LHCf+ATLAS, photon measurement by RHICf.

LHCf plans to have operations at pp and pO during the LHC-Run3 period. At pp collisions, a new silicon readout system will be introduced to improve the read-out speed, and 10 times more statistics of the previous operation in 2015 will be obtained. Thanks to high statistics, rare particles such as η , K_s^0 and Λ will be addressed also. We also plan another operation at RHIC in 2024 with a new detector. The detector, a calorimeter composed of tungsten, Si pad and pixel layers, will have a much wider acceptance and higher sensitivity of K_s^0 measurement than the current detector.

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Collaboration

other (fill field below)

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LHCf and RHICf

Subcategory

Experimental Results

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