



Contribution ID: 409

Type: **Poster**

## LHCf experiment; astrophysics connection of high-energy nucleus collisions

*Tuesday, 29 September 2015 16:30 (2 hours)*

Ultrarelativistic nucleus-nucleus collisions take place not only in the particle accelerators but also in the earth's atmosphere, namely cosmic rays interacting with the atmospheric molecules. Majority of cosmic-ray nuclei is known to vary from proton to iron, and their target in the atmosphere is light nuclei such as nitrogen and oxygen. To study the high-energy cosmic rays with low flux, atmospheric air showers are observed instead of primary particles. To interpret the air shower observation to the properties of primary particles, the knowledge of the high-energy interaction is indispensable.

The Large Hadron Collider forward (LHCf) experiment was designed to study the particle production at LHC. Though the ultimate target of the experiment is the ultrarelativistic nucleus collisions, LHCf has so far measured precise cross sections in the LHC proton-proton collisions. LHCf has measured particle production at pseudo-rapidity  $>8.4$ , where the secondary particles carry a large fraction of collisions energy, with the LHC  $\sqrt{s}=0.9, 2.76, 7$  and  $13$  TeV proton-proton collisions. To study the nuclear effect at an extreme condition, measurements with the  $\sqrt{s_{NN}}=5$  TeV proton-lead collisions were also performed.

The observed production cross sections of  $\pi^0$ 's and neutrons, nuclear effect of the  $\pi^0$  production in p-Pb collisions are so far well explained by the major interaction models used in the cosmic-ray physics. These data are important inputs to estimate the nuclear interaction in the atmosphere. In this talk, we will present the general introduction to the LHCf experiment together with the experimental results. Some ideas of the next experiment including the measurements at RHIC are also presented.

### On behalf of collaboration:

[Other]

**Primary author:** SAKO, Takashi (Nagoya University (JP))

**Presenter:** SAKO, Takashi (Nagoya University (JP))

**Session Classification:** Poster Session

**Track Classification:** Quark Matter in Astrophysics