

Air shower development and hadron production at very forward region

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Since cosmic ray was discovered about 100 years ago, the mechanism which generates huge energy has been always the subject of interest.

In order to study the origin of the extremely high energy cosmic ray, highly precise data of extended air shower has been acquired by two huge detectors

(Telescope Array and Pierre Auger Observatory) which have started observation from the beginning of the 21st century.

The knowledge of the hadron interaction is essential to estimate the primary composition and the energy of primary cosmic rays from the air shower phenomenon.

But the recent air shower observation results which show the clear excess of muons on the ground suggest that the hadronic interaction models at extremely high energy region is not perfect.

To improve the hadronic interaction models for cosmic ray study, Large Hadron Collider forward (LHCf) group measures the hadron production at the very forward region where the energy flux is large.

Their results show that the energy flux of neutron component at the very forward region is much larger than the expectations of recent hadron interaction models.

In this paper, the hadronic interaction model is modified to reproduce the LHCf results. The influence of the model modifications in the shower development will be presented.

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