

# Energy dependence of the very-forward particle production in pp collisions by the LHCf experiment

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An important and remained problem for the observation of UHECRs by air shower experiments is the uncertainty arising from the hadronic interaction models.

Since we rely on particle production, namely air shower development of UHECRs described by the interaction models, it is necessary to verify these interaction models at accelerators as high energy as possible.

Large Hadron Collider forward experiment (LHCf) has measured forward particle production of proton-proton scattering from collision energy of 900 GeV to 13 TeV at the LHC.

We took two different approaches to understand the energy dependence of the particle production using obtained data.

One is that the pseudorapidity dependence of the energy density of forward gamma-rays.

We are able to measure the differential energy density close to the peak of the energy flow, in which contribution to a shower development is maximized, especially in case of 7 and 13 TeV.

We also tested the scaling hypothesis for the collision energy of the particle production, Feynman scaling, from the point of view of forward gamma-rays.

Obtained data results were compared to the predictions of the post-LHC interaction models, such as QGSJETII-04 and EPOS-LHC.

## Presentation type

oral

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