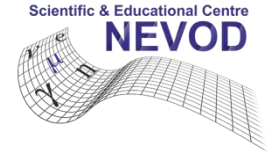# Muon excess in ultra-high energy inclined EAS according to the NEVOD-DECOR data

R.P. Kokoulin, N.S. Barbashina, A.G. Bogdanov, S.S. Khokhlov, V.V. Kindin, K.G. Kompaniets, G. Mannocchi, A.A. Petrukhin, V.V. Shutenko, G. Trinchero, I.I. Yashin, E.A. Yurina, E.A. Zadeba

*National Research Nuclear University MEPhI (Moscow Engineering Physics Institute); Osservatorio Astrofisico di Torino – INAF*

## Executive Summary

**What is this contribution about?**

Abundance of multi-muon events in ultra-high energy inclined EAS is measured, and its excess in comparison with simulations (so-called "muon puzzle") is discussed.

**Why is it relevant/interesting?**

Method of local muon density spectra (LMDS) allows exploration of a very wide primary energy interval (from few PeV to few EeV) in frame of a single experiment.

**What has been done?**

LMDS at various zenith angles have been reconstructed and compared with the expectation based on two hadronic interaction models (SIBYLL 2.3c and QGSJET II-04) in terms of the z-scale.

**What is the result?**

For the two models, new LMDS data indicate a fast growth of the muon abundance at primary energies above $10^{17}$ eV. Around $10^{18}$ eV, data are close to expectation for iron nuclei, which contradicts the $X_{max}$ air fluorescence data, which favor a light PCR composition at these energies.

$$z = (\log F^{\mathrm{obs}} - \log F_{\mathrm{p}}^{\mathrm{sim}}) / (\log F_{\mathrm{Fe}}^{\mathrm{sim}} - \log F_{\mathrm{p}}^{\mathrm{sim}})$$