

Density Imaging of Volcanoes With Atmospheric Muons using GRPCs

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Their capability to penetrate through large depths of material renders high-energy atmospheric muons a unique probe for geophysical studies. Provided the topography is known, the measurement of the attenuation of the muon flux permits a cartography of density distributions revealing spatial and possibly also temporal variations.

A Collaboration between volcanologists, astroparticle- and particle physicists, TOMUVOL, has been formed in 2009 to study tomographic muon imaging of volcanoes with high-resolution, large-scale tracking detectors. By exploiting Glass Resistive Plate Chambers (GRPCs) with a semidigital readout developed for ILC hadronic calorimetry within the CALICE collaboration, TOMUVOL aims to improve the understanding of volcanic processes and may finally contribute to reducing volcanic hazards. Presently TOMUVOL is operating a muon telescope at the flank of the Puy de Dôme, an inactive volcanic dome situated in the Massif Central (south-central France). Three GRPC planes are in continuous operation, controlled remotely through a long-range Wifi link.

This contribution presents the geophysical motivation for muon imaging as well as the results after several months of data taking at the Puy de Dôme including measurements of the horizontal muon flux and first radiographic images.

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