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A portable, gas-tight, and compact glass-RPCs telescope for muon imaging

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Imaging techniques that use atmospheric muons, collectively named under the neologism “muography”, have seen a tremendous growth in recent times, mainly due to their diverse range of applications. The most well-known ones include but are not limited to: volcanology, archaeology, civil engineering, nuclear reactor monitoring, nuclear waste characterization, underground mapping, etc. These methods are based on the attenuation or deviation of muons to image large and/or dense objects where conventional techniques cannot work or their use becomes challenging.

In this context, we have developed a muography telescope based on “mini-gRPC” planes using the same principles as the gRPC detectors used by TOMUVOL and by the CMS and CALICE experiments, but with smaller active area (16x16 cm²). The compact size makes it an attractive choice with respect to other detectors previously employed for imaging on similar scales. An important innovation in this design is gas-tightness. This makes the detector more portable and solves the usual safety and logistic issues for gas detectors operated underground and/or inside small rooms. In this talk, we will give an overview on the detector development along with why RPC technology has been chosen for the project, spanning the numerous advantages and the drawbacks we encountered during its operation.

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