

## Detector developments for high performance muography applications

Imaging with cosmic muons dates back by decades, initiated by searching for hidden structures in the Chephren pyramid by Alvarez. Since then, the term “muography” was coined for this possibility offered by nature’s highly penetrating particles, and can be applied for imaging various large scale objects. As the observation point needs to be below the object of interest, either the detector is placed underground, and can reveal density structures, or, the detector can be on the surface and look sideways, capturing muons closer to the horizon.

In both cases, long term operation must be achieved with high efficiency and at good angular resolution. The presentation introduces the technological possibilities and solutions. The relevance of the out-of-laboratory environment is demonstrated on the example of a 4 square meter telescope targeting the Sakurajima volcano in Japan, and various underground applications including natural caves.

For open air detectors, the suppression of the low energy (non penetrating) muon background can be reached with a telescope using absorber (scatterer) layers between detector layers with good position resolution. The resulting Muography Observation System, using MWPC-s with contemporary solutions, allows muographic imaging through 2 km of rock, with 10 m resolution from a distance of 3 km.

**Primary authors:** Dr VARGA, Dezső (Hungarian Academy of Sciences (HU)); NYITRAI, Gábor (Wigner Research Centre for Physics, Budapest (HU)); Dr HAMAR, Gergő (Hungarian Academy of Sciences (HU)); Dr OLÁH, László (Hungarian Academy of Sciences (HU)); GALGÓCZI, Gábor (Hungarian Academy of Sciences (HU)); Prof. TANAKA, Hiroyuki (Earthquake Research Institute, The University of Tokyo); Dr OHMINATO, Takao (Earthquake Research Institute, The University of Tokyo)

**Presenter:** Dr VARGA, Dezső (Hungarian Academy of Sciences (HU))

**Session Classification:** Poster Session B

**Track Classification:** Astroparticle Detectors