

# APOGEIA CEA (Irfu) activities on Muography

Technology

Methodology

- **Activity 1 : POC & industrialization of muon tomography compact instrument for geoscience applications**
  - Irfu is working since 4 years in a compact Time Projection Chamber capable to fit in boreholes in order to perform 360° muography measurements specially for geoscience applications. (*H. Gómez et al 2019 J. Phys.: Conf. Ser. 1312 012013*)
  - Nowadays the concept has been proved in a laboratory test-bech, but the prototype must be upgraded to be capable to operate on-site, for example developing a more compact readout system.
  - *Collaborators* : CEA / Irfu
  - *Deliverables* :
    - First TPC-based muography instrument prototype capable to operate on-site
    - Proof-of-concept measurements
  - *Companies* : IRIS Instruments for the conception of the final version, choose of the proof-of-concept measurement site and potential industrialization.
- **Activity 2 : New analysis techniques for 2D muography and 3D muon tomography**
  - Considering the wideness of the muography applications, new analysis techniques based on Artificial Intelligence, Machine Learning and Digital Image Processing needs to be developed to improve the performance of the technique, the quality of data exploitation and the analysis time, both for 2D and 3D reolution
  - *Collaborators* : CEA / Irfu
  - *Deliverables* :
    - Analysis tools based on Digital Image Processing for 2D muography
    - Algorithm for 3D muon tomography of objects from single muography measurements
- **Funding (for both activities) : 510 kEuros**
  - Personnel : 1 ETP during 2 years to coordinate and develop Activity 1 and 2
  - Hardware : 150 kEuros (TPC Prototype, DAQ development) + 50 kEuros (Computing resources, Software, ...)

No preference about the site to perform the PoC measurements