

A novel cylindrical detector for borehole muon radiography

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Muography (or muon radiography) is a recent inspection methodology that uses cosmic muons to investigate the mass distribution in large objects, such as volcanoes or mines, or to detect the presence of cavities in the subsoil or within buildings such as the pyramids. In recent years detectors with different geometries, sizes and technologies have been developed. In particular detectors with reduced size, that can be inserted in a borehole, are of particular interest in geophysical applications. We have developed, and patented, an innovative detector for well applications consisting of plastic scintillators with arc shape and rectangular section bars. Good spatial resolution was achieved with a reasonable number of channels. Detailed simulations based on Monte Carlo methods have shown excellent performance in cavity detection. Preliminary results of a prototype show good performance in terms of the number of photoelectrons produced by cosmic muons and track reconstruction.

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Primary authors: SARACINO, Giilio (Universita e sezione INFN di Napoli (IT)); CIMMINO, Luigi (University of Naples "Federico II"); D'ERRICO, Mariaelena (INFN); AMBROSINO, Fabio (Universita e sezione INFN di Napoli (IT)); Mr MASONE, Vincenzo (INFN); Mr ROSCILLI, Lorenzo (INFN)

Presenter: CIMMINO, Luigi (University of Naples "Federico II")

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