

High-precision energy measurement of medium-light ions with the FOOT calorimeter

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FOOT is a portable setup to measure fragmentation cross sections in beam-tissue nuclear interactions typical for hadron therapy, with fragment energies reaching 400 MeV/A. The energy will be measured by a homogeneous calorimeter using 320 BGO scintillating crystals as active material and SiPM for light-detection. A series of tests using energetic proton and Carbon beams at the CNAO facility in Pavia, Italy, were performed to find the optimal configuration of every detector component and have demonstrated a linear response with resolution better than 2% over the wide dynamic range from tens of MeV to a few GeV. This contribution will present the main technical consideration of the calorimeter design, including the SiPM, reflective layer, readout electronics and mechanics, as well as results of the latest performance tests of a 3x3 crystal module. Important challenges including the temperature dependence, non-linear light absorption and scintillation quenching will be also discussed.

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Primary authors: BARTOSIK, Nazar (Universita e INFN Torino (IT)); CERELLO, Piergiorgio (INFN); SCAVARDA, Lorenzo (INFN - National Institute for Nuclear Physics)

Co-authors: SITTA, Mario (Universita del Piemonte Orientale (IT)); RAMELLO, Luciano (Universita del Piemonte Orientale (IT)); PENNAZIO, Francesco (INFN - National Institute for Nuclear Physics); PASTRONE, Nadia (Universita e INFN Torino (IT)); MIGNONE, Marco (INFN Torino); LOPEZ TORRES, Ernesto (Center of Technological Applications & Nuclear Development (CU)); GIRAUDO, Giuseppe (Universita e INFN Torino (IT)); FIORINA, Elisa (INFN - National Institute for Nuclear Physics); Dr FERRERO, Veronica (INFN Torino); ARGIRO, Stefano (Universita di Torino and INFN (IT))

Presenter: BARTOSIK, Nazar (Universita e INFN Torino (IT))

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