

The POKERINO prototype

Wednesday, 29 May 2024 08:35 (1 minute)

The POKER (POsitrone resonant annihilation into dark matter) project aims to perform a missing-energy measurement employing a positron beam impinging on an active thick target. The beam interaction with the target could produce feebly interacting massive particles, exiting from the detector and carrying away a significant fraction of the primary positron energy. The crucial element of the POKER project is a high-resolution PbWO_4 electromagnetic calorimeter used as the active thick target. POKERINO is a prototype of this new high-resolution electromagnetic calorimeter. It is a 3×3 matrix of PbWO_4 crystals, each with dimensions $2 \times 2 \times 25\text{-cm}^3$; four SiPMs, directly glued to one of the two $2 \times 2\text{-cm}^2$ crystal faces, acquire the scintillation light from each crystal. The nine crystals are embedded in a copper structure, connected to an external, water-based cooling system, and inserted in a black, light-tight box. After the commissioning with cosmic rays, the POKERINO response to high-energy particles was measured at the H8 beamline of the Super Proton Synchrotron (SPS) at CERN. This facility can provide electron, positron, muon or hadron beams with energies ranging from 10 GeV to over 100 GeV, thus allowing investigation of the POKERINO's response to various particle beams over a wide energy range. In particular, the energy resolution and linearity of the detector were studied. In my contribution, I will discuss the results obtained during the test beam of POKERINO at CERN, highlighting how this study influenced the design of the final calorimeter and the future perspective of the POKER project.

Collaboration

Role of Submitter

I am the presenter

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Session Classification: Calorimetry - Poster session

Track Classification: T4 - Calorimetry