

Status and perspectives of the POKER detector for Dark Sector searches

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The search for Dark Matter is currently one of the open questions in physics research beyond the Standard Model. The light Dark Matter hypothesis foresees particle candidates with a mass lower than a few GeV/c^2 , interacting with ordinary matter through a force; among the various possible models, that of the “dark photon” postulates the existence of a new $U(1)$ type interaction mediated by a massive vector boson.

The NA64 experiment at CERN investigates the existence of light Dark Matter via the “missing energy” technique through a 100 GeV electron beam impacting an active fixed target (ECAL). In this context, the POKER project proposes using a lower energy positron beam (tens of GeV) to exploit resonant annihilation with atomic electrons as a signal production mechanism. POKER plans to exploit the existing NA64 setup, with some upgrades required by the different measurement conditions. In particular, a new high-resolution active target will be used, consisting of scintillating crystals of lead tungstate (PbWO_4).

These crystals undergo radiation damage which can lead to a worsening of their optical properties. Furthermore, the peculiarities of the SPS beam at CERN require developing a custom readout and bias system to compensate for short-term variations of the beam intensity, that could potentially affect the photosensors gain and thus the detector resolution. In this context, I will present the work carried out to characterize the POKER crystals and the light signal readout system.

Collaboration

Role of Submitter

I am the presenter

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