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Silicon Detectors for Kaonic Atom X-Ray Measurements at DAFNE

The SIDDHARTA-2 experiment at DAΦNE, aiming to precisely measure the $2p \rightarrow 1s$ transition in kaonic deuterium atoms to study the low-energy regime of QCD, utilises two different kinds of novel silicon detectors. For the detection of the K^-d X-rays, newly developed arrays of Silicon Drift Detectors are used. The CUBE, a MOSFET based preamplifier, allows for a more stable operation and a lower temperature of the SDDs as compared to the JFET technology used for the K^-p measurement done by SIDDHARTA, leading to faster drift times ($< 1\ \mu s$) and a lower energy resolution of ~ 150 eV at 6 keV.
In addition, the experiment uses Silicon Photomultipliers as part of the active veto system. A barrel of plastic scintillators closely behind the SDDs is read out by the SiPMs to suppress hadronic background. Additionally, this veto system is equipped with a system consisting of pulsed LEDs for the in-situ calibration of the SiPMs. Both detector systems and their characteristics are discussed in detail.

Primary experiment

SIDDHARTA-2

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