SPELS@WISArD

Spectrum of ^{32}P Electron Shape at WISArD

Author: Anaïs Lépine, LP2iB, on behalf of the WISArD collaboration

The Standard Model (SM) has proven to be a successful theory describing three of the four fundamental interactions. However, some open questions remain and motivate precise measurements to search for evidence of physics Beyond the SM predictions. For instance, the measurement of the shape of the β energy spectrum can be used to search for exotic currents in the weak interaction by extracting the Fierz term b_{F}. To constrain possible extension of the SM at the same level as direct searches at high energy, the required precision on b_{F} must be at the level of a few 10^{-3}. This raises several experimental challenges, in particular the partial energy deposition caused by electron backscattering.

The SPELS (Spectrum of ^{32}P ELectron Shape) project addresses this issue by placing two detectors, facing each other, inside the magnetic field of WISArD's superconducting magnet. This setup ensures a 4π solid angle and guides the backscattered particles from one detector to the opposite one.

Following the first measurement at WISArD in 2020, using scintillators and silicon photomultipliers, significant upgrades have been made. A key improvement is the use of lithium-drifted silicon (Si(Li)) detectors, which provide a higher energy resolution and a lower energy threshold. To cool these detectors down, a new cooling system has been developed in Leuven, based on active glycol circulation and Peltier elements. The setup has been optimized at LP2iB in Bordeaux, a first test was conducted at WISArD in September 2025 and the first calibration campaign will begin end of 2025.