Contribution ID: **523** Type: **Poster**

A flexible setup for low-energy electron measurements of interest to neutrino physics

Friday, 21 June 2024 17:30 (2 hours)

KATRIN (KARlsruhe TRItium Neutrino experiment) plans to perform a high-precision differential measurement of the entire tritium β spectrum to search for keV-sterile neutrinos. To sustain the very high rate, KATRIN's detector will be upgraded with a multi-pixel Silicon Drift Detector (SDD). The new detector response must be accurately tested in laboratory conditions, and therefore an ideal electron source is needed. We developed a photoelectric-based electron gun that can go up to 20 keV and reach a rate of O(10^4 cps) with a spot size of a few hundred micrometers. We designed and built a vacuum chamber to house this source and an SDD matrix, where the efficiency loss at the detector entrance window or at the boundaries can be probed. Furthermore, by slightly modifying the setup, backscattering coefficients and spectra of different materials can be measured by using this electron source. These data are important for the design of the new KATRIN phase and also provide a benchmark for low-energy MC simulations.
This setup is also used for the ASPECT-BET (An sdd-SPECTrometer for BETa decay studies) project, where SDDs are used to measure several allowed and forbidden β decays, with the goal of helping to find a theoretical nuclear framework able to reproduce all the measured spectra, which is mandatory for future neutrinoless double beta decay experiments and reactor oscillation experiments.
Scintillators read with a SiPM, used as a veto detector in the ASPECT-BET measurements, and a Timepix sensor, used to monitor the e-gun beam spot, are also installed in the vacuum chamber.
In this contribution, we will show the main results achieved using this setup.

Poster prize

No

Given name

Andrea

Surname

Nava

First affiliation

University of Milano-Bicocca

Second affiliation

INFN Milano-Bicocca

Institutional email

a.nava35@campus.unimib.it

Gender

Male

Collaboration (if any)

Primary authors: NAVA, Andrea (Istituto Nazionale di Fisica Nucleare); Mr GAGLIARDI, Giulio (University of Milano-Bicocca); BIASSONI, Matteo (Istituto Nazionale di Fisica Nucleare); Mr BRADANINI, Tommaso (University of Milano-Bicocca)

Presenter: NAVA, Andrea (Istituto Nazionale di Fisica Nucleare)

Session Classification: Poster session and reception 2

Track Classification: New technologies for neutrino physics