

Updates on the HIBEAM/NNBAR Prototype Calorimeter at Stockholm

Monday 22 November 2021 12:00 (15 minutes)

The HIBEAM/NNBAR experimental program will be the cutting-edge free neutron search for $n \rightarrow \bar{n}$ and $n \rightarrow \text{sterile } n$ oscillations, with an ultimate sensitivity gain of more than three orders of magnitude compared to what was previously achieved. A key component of the program is the annihilation detector which will identify a neutron-antineutron annihilation event within a carbon foil target through the reconstruction of a number pions with kinetic energies below ~ 500 MeV. This low energy regime is a challenge for calorimetry due large fluctuations in energy depositions from showers created in traditional sampling calorimeters. A novel, hybrid calorimeter design is proposed for the detector: a hadronic range measurement using scintillating plastic staves and wavelength shifting fibres followed by an energy measurement using lead glass blocks. A prototype calorimeter system is under construction at Stockholm University. The prototype includes 50 scintillator staves and 12 lead glass blocks. Both detectors are read out with silicon photomultipliers. This talk will present the design, construction, and readout electronics of the prototype system. A short description will also be given of plans to supplement the calorimeter prototype with a Time Projection Chamber. The combined system will be studied at test beams at the ESS and elsewhere.

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