Contribution ID: **120** Type: **oral**

Development of a novel detector system for the keV sterile neutrino search with KATRIN

Monday, 22 May 2017 16:00 (18 minutes)

Sterile neutrinos are a well-motivated extension of the Standard Model of Particle Physics. They are experimentally accessible via the mixing with the known active neutrinos.

A sterile neutrino with a mass of $\mathcal{O}$(keV) is a promising dark matter candidate possibly solving the too big to fail and the cusp vs core problem. In addition to astrophysical searches by X-ray telescopes, several laboratory measurement have been proposed. One is the TRISTAN project pursued in the framework of KATRIN. The KATRIN (KArsrluhe TRItium Neutrino Experiment) investigates the energy endpoint of the tritium beta-decay to determine the effective mass of the electron anti-neutrino with a precision of 200 meV (90 % C.L.) after an effective data taking time of three years.

The signature of a sterile neutrino would be a kink-like structure in the tritium beta-decay spectrum originating from the mixing with the active neutrino states.

The TRISTAN project will proceed in two phases. Phase-0 will use the standard KATRIN setup. Whereas Phase-I will use a greatly improved detector system which will reduce systematics and allow a high count rate ($\mathcal{O}$(Mcps)) on the detector, increasing available statistics. This novel detector system will consist of $\mathcal{O}$(5000) silicon drift detectors (SDDs) with separate read-out and digitisation of each channel. To minimise the impact of electron backscattering on the spectrum the unavoidable inactive entrance window has to be thinned to below 30 nm. First measurements with a down-scaled prototype will be shown. In addition an overview of the two measurement phases and their respective experimental sensitivities will be given.

Primary author: BODE, Tobias (M)

Presenter: BODE, Tobias (M)

Session Classification: R1-Dark Matter Detectors

Track Classification: Dark Matter Detectors