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Assembly and tests of the first TRISTAN detector modules

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Sterile neutrinos are a natural extension of the Standard Model of particle physics. If their mass is in the keV range, they are a viable dark matter candidate. One way to search for sterile neutrinos in a laboratory-based experiment is via tritium beta decay. A sterile neutrino with a mass up to 18.6 keV would manifest itself in the decay spectrum as a kink-like distortion. The objective of the TRISTAN project is to extend the KATRIN experiment with a novel multi-pixel silicon drift detector and readout system to search for a keV-scale sterile neutrino signal. To reach a high sensitivity to the sterile neutrino mixing angle the strong activity of the KATRIN tritium source is required. The resulting high electron rate is one of the greatest challenges for the keV sterile neutrino search with KATRIN. It will be approached by distributing the rate among 3500 pixels, resulting in count rates of 100 kcps per pixel. To resolve the kink-like signature of the keV sterile neutrino signal the detector needs to maintain an energy resolution of 300 eV (FWHM) at 20 keV and a low energy threshold. The new detector system is segmented into 21 identical modules, each hosting 166 independent pixels. Each individual pixel is read out independently from each other.
This presentation will give an overview on the current status of the project and show first characterization measurement results obtained with a 166 pixel module.

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