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# The TRISTAN detector upgrade for the keV sterile neutrino search with KATRIN

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From indirect observations of the universe, we know that at least 80 % of all matter is made of galactic dark matter. As a minimal extension to the standard model of particle physics, the so-called sterile neutrinos in the keV mass range pose a viable candidate for dark matter. One way to search for these sterile neutrinos in a laboratory-based experiment is via tritium beta decay. A sterile neutrino with a mass of up to 18.6 keV would lead to a spectral shape distortion in the decay spectrum. A high-precision measurement of the entire decay spectrum with more than $10^{16}$ collected electrons is required to search for this shape distortion on the parts-per-million level. This can be achieved with the high electron rates provided by the ultra-luminous tritium source of the Karlsruhe Tritium Neutrino (KATRIN) experiment. A novel multi-pixel silicon drift detector (SDD) and readout system, called the TRISTAN detector, is currently being designed to upgrade the KATRIN detector system and extend its measurement range to search for keV-scale sterile neutrinos. The new detector system itself is segmented into 9 identical detector modules, each hosting a monolithic SDD with 166 independent pixels. To resolve the spectral shape distortion of a sterile neutrino signal, the detector system is designed to provide an excellent energy resolution of 300 eV (FWHM) at 20 keV and a low energy threshold of 2 keV.
This poster will give an overview of the current status of the TRISTAN detector system and the first characterization measurement results obtained with the 166-pixel modules.
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## Poster prize

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