Poster session 1 - Monday 4 July

P1.050 **Thermal properties of the KATRIN source section**

M Hackenjos

Karlsruhe Institute of Technology, Germany

on behalf of KATRIN collaboration

Since 1980, several Nobel Price crowned experiments showed with the detection of the Neutrino oscillation a non-vanishing Neutrino mass. The Karlsruhe Tritium Neutrino (KATRIN) Experiment is targeted to determine the effective mass of the electron-antineutrino $m_{\nu e}$ with a sensitivity of 200 meV/c^2 (90% C.L.) by investigating the kinematics of tritium β-decay. The setup of the 70-m long experiment consists of two major parts, the Source and Transport Section (STS), where molecular tritium gas will be injected and decay, and the Spectrometer and Detector Section (SDS) where the energies of the decay electrons are measured with high accuracy.

A total all of 10^{11} β-decays per second will take place in the Windowless Gaseous Tritium Source (WGTS) of the STS, in a 10-m long section of the beam tube. Superconducting solenoids surrounding the beam tube and will create a magnetic flux tube, which is guiding the electrons adiabatically. The uncertainties of the $m_{\nu e}$-measurement are closely related to the thermal stability and homogeneity of the WGTS beam tube. These key operating parameters have to be stabilized at a challenging 0.1% level. The beam tube itself will be operated at 30 K, to prevent effects like Doppler broadening and cluster formation.

Feasibility tests with a demonstration, which includes the original 2-phase neon cooling system and beam tube, showed already the functionality and stability of the system. The thermal dependent resistors (PT500) are directly influenced by the high magnetic field of the superconducting solenoids. The result is an offset in the temperature measurement, which can be corrected, due to the fact that the PT500 can be recalibrated by a series of vapour pressure sensors. This poster will give an overview of the thermal behavior of the WGTS, planned commissioning measurements and outlook of an overall influence on the neutrino mass measurement.

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