Poster session 4 – Friday 8 July

P4.045 **Monitoring the KATRIN source properties within the beamline**

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The *KArlsruhe TRItium Neutrino* (KATRIN) experiment will measure the mass of the electron antineutrino with a sensitivity of 0:2 eV (90% CL). This will be done by observing the β-electron spectrum from the decay of tritium in the Windowless Gaseous Tritium Source (WGTS). The tritium source properties are required to be stable and known to a high precision, and will therefore undergo continuous monitoring from several systems.

The Forward Beam Monitor (FBM) is one such monitoring system. This system comprises of a complex mechanical setup capable of inserting a detector board into the KATRIN beamline at the end of the source and transport section. The detector board contains a hall sensor, a temperature gauge, and two PIN diodes which can detect β-electrons from the source with a precision of 0:1% in less than a minute with an electron flux density of $10^6\,s^{-1}mm^{-2}$.

The β-electrons that are produced from the decay of tritium are emitted isotropically in the WGTS and guided magnetically through the beamline to the spectrometers. These electrons are scattered and change their kinetic energy and angle relative to the magnetic field. Monte Carlo simulations have been performed to understand these influences and to produce simulated spectra. Another crucial task of this beam transport is the efficient retention of tritium ions which would otherwise constitute an irreducible background. During commissioning of the source and transport section the detector board may be replaced by a Faraday cup to study the ion retention.

As well as measuring the magnetic field, temperature, and ion ux inside the KATRIN beamline, the FBM will measure real-time count rates and differential β-electron spectra. Analysis of such spectra results in the required continuous monitoring of the tritium source with high energy resolution and precision.