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KATRIN: an experiment to determine the neutrino mass

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The KArlsruhe TRItium Neutrino (KATRIN) experiment is a next generation, model independent, large scale tritium-beta-decay experiment to determine the mass of the electron anti-neutrino by investigating the kinematics of tritium beta decay with a sensitivity of 0.2 eV/c². The measurement setup consists of a high luminosity windowless gaseous molecular tritium source (WGTS), a differential and cryogenic pumped electron transport and tritium retention section, a tandem spectrometer section (Pre-Spectrometer and Main Spectrometer) for energy analysis, followed by a detector system for counting transmitted beta decay electrons.

To achieve the desired sensitivity the WGTS, in which tritium decays with an activity of 10e11 Bq, needs to be stable on the 0.1% level in injection pressure and temperature at an absolute value of 27K. With the capability to create an axial magnetic field of 3.6T the WGTS is going to be one of the world's most complex superconducting magnet & cryostat systems.

The Main Spectrometer (length 24m, diameter 10m), which works as a retarding electrostatic spectrometer, will have an energy resolution of 0.93eV at 18.6keV. The retarding potential of -18.6kV needs to be stable at the 1ppm level. In order to reach the background level needed to achieve the sensitivity, it will be operated at a pressure of 10e-11mbar.

The talk will give an overview of the actual status of the project.

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