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The windowless gaseous tritium source WGTS of the KATRIN experiment

The KATRIN experiment is currently being assembled at the Karlsruhe Institute of Technology to measure the absolute value of the electron antineutrino mass with a sensitivity of 200 meV/c2 (90% C.L.).
The energy of electrons from the tritium beta-decay is measured close to the endpoint of the spectrum with an integrating electrostatic spectrometer (MAC-E-filter). The neutrino mass is extracted by fitting simulated spectra to the measured data. For a neutrino mass sensitivity of 200 meV/ c2 both high statistics and small systematic uncertainties are mandatory. Both values depend not only on the spectrometer, but also on a well-designed and understood high statistics tritium source.
The windowless gaseous tritium source (WGTS) is a stainless steel tube with a length of 10m and a diameter of 90 mm. It is operated at 30 K with a high temperature stability of better than 3 mK/h. Tritium is injected through small orifices in the middle of the tube and pumped out by turbo molecular pumps at both ends, providing a permanent activity of 1011 Bq. The beta-electrons are guided adiabatically to the spectrometer by the magnetic fields of super-conducting solenoids.
This poster will present the mechanical design and key parameters of the WGTS as well as important systematic effects due to gas composition, gas dynamics, final state distributions and temperature stability.
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