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Direct Neutrino Mass Measurements

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Neutrino oscillation experiments give clear evidences that neutrinos mix and have non-zero masses. The value of the neutrino mass scale is very important for cosmology and the evolution of the universe as well as for nuclear and particle physics. The determination of the neutrino masses is being addressed by the analysis of cosmological data, by the search for neutrinoless double beta decay and by the direct neutrino mass search. The latter method does not require further assumptions on neutrino properties: Usually the endpoint region of a beta decay or an electron capture is investigated with high precision.

The KArlsruhe TRItium Neutrino experiment KATRIN is investigating the
endpoint region of the tritium beta decay to search directly for the absolute neutrino mass. Its main components are a windowless gaseous molecular tritium source, an electron transport and tritium elimination section and a huge spectrometer of MAC-E-Filter type followed by an electron detector. KATRIN's sensitivity on the neutrino mass is 200 meV. Currently the main spectrometer and the detector is being installed and commissioned at the Karlsruhe Institute of Technology KIT.

After an introduction in this talk the different components of KATRIN as well as various test experiments and the status of the commissioning of KATRIN will be presented. An outlook on future approaches, e.g. using cryogenic bolometers to investigate the electron capture of Ho-163 or the beta decay of Rh-187 will be given.

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