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KATRIN like MINI MAC-E Filter with a tritium source for the advanced physics lab course

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The KATRIN experiment at the Karlsruhe Institute of Technology (KIT) aims to determine the effective neutrino mass using the kinematics of electrons from the tritium β -decay. The integral energy spectrum of the electrons is measured by an electro-static high-pass filter, using the MAC-E filter principle (Magnetic Adiabatic Collimation and Energy filter). Only electrons with energies above the retarding potential of the filter are counted at the detector at the end of the MAC-E spectrometer. In order to give students the opportunity to learn more about the experimental principles behind KATRIN, a smaller version of the MAC-E filter setup, called MiniMACE, has been built, which will be used in the advanced physics lab course at KIT. With a scale of approximately 1:20 the MiniMACE experiment includes all the major components of KATRIN: a tritium source, the spectrometer with adjustable high voltage, a high resolution detector and the magnetic guiding field. Other than KATRIN, the source uses two implanted disks with tritium and ^{83}Kr that can be exchanged inside the ultra-high vacuum source chamber. This poster shows the design of the physics lab setup and reports on first results. This project has been supported by RIRO (Research Infrastructure in Research- Oriented teaching), which is part of the ExU project at KIT.

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