



PHYSIKALISCHES KOLLOQUIUM

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Thema: **Direct Probes of Neutrino Mass**

Zeit und Ort: Dienstag, 30.10.2018, 16:40 Uhr
Recknagel-Bau, Hörsaal REC/C213, Haeckelstr. 3

Leiter: Prof. Dr. Michael Kobel

Kurzfassung: The mass scale of neutrinos remains one of the fundamental open questions in modern physics, with far-reaching implications from particle physics to cosmology. Precision measurements of the kinematics of weak interactions, in particular tritium beta decay and electron capture in ^{163}Ho , offer the only model-independent (direct) approach to address this question in a laboratory experiment. The currently most mature technique relies on the spectroscopy of tritium beta decay near its kinematic endpoint at 18.6 keV. The KARlsruhe TRitium Neutrino experiment (KATRIN) is targeted at improving the sensitivity of this method by an order of magnitude to $200 \text{ meV}/c^2$ (90% C.L.). To this end, KATRIN utilises an ultra-luminous windowless gaseous tritium source and a high-resolution electrostatic spectrometer. In its recent „First Tritium“ campaign, KATRIN has successfully inaugurated its full 70-m electron beam line in the summer of 2018 and is now carrying out final commissioning works leading up to the start of neutrino-mass measurements. At the same time, novel approaches studying the electron capture spectrum in ^{163}Ho with cryogenic microcalorimeters (notably, ECHO and HOLMES), or developing innovative techniques for tritium beta spectroscopy using radio-frequency detection of single electrons (Project 8), are gaining momentum. Experiments exploiting these new techniques are currently in the conceptual design and early measurement phases, with the aim of developing these complementary methods further towards a sub-eV sensitivity on the neutrino mass.

Biographie: Kathrin Valerius studied physics and astronomy at the University of Bonn and went on to pursue her doctorate in the field of neutrino physics, which she obtained at Münster University in 2009. Both her diploma and PhD thesis were devoted to neutrino mass search with the KATRIN experiment. Her postdoctoral research at the Erlangen Centre for Astroparticle Physics and at APC, Paris, was dedicated to the study of galactic gamma-ray sources - most notably, pulsar wind nebulae - with the H.E.S.S. telescopes. Since 2014 Kathrin Valerius is leading the Helmholtz Young Investigator group "Analysis of KATRIN data to measure the neutrino mass and search for new physics" at the Karlsruhe Institute of Technology.

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