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The Tritium Laboratory of Helmholtz for Matter&Universe Research

The Tritium Laboratory Karlsruhe (TLK) of the Institute for Astroparticle Physics (IAP) located at KIT Campus North contributed in advancing the understanding of the radioactive hydrogen isotope tritium and its technical use for applications in nuclear fusion, astroparticle physics and beyond. Two of its outstanding features are its license to handle up to 40 grams of tritium, and its unique closed tritium cycle that allows reprocessing of tritiated gases. During its three decades of operation, the TLK has gained extensive knowledge in tritium handling. It is continuously maintained and upgraded, enabling it to provide a world-leading state-of-the-art research facility within the Helmholtz Association.

One of TLK's outstanding achievements is operating the tritium source of the KATRIN experiment, the world-leading endeavor for direct measurement of the neutrino mass based on tritium beta decay. At TLK the closed tritium loop for KATRIN was developed and is running smoothly since 2018. Its successful operation enabled the measurements leading to the currently best upper limit on the neutrino mass.

The IAP and TLK are committed to the future of tritium neutrino research and we are pursuing R&D towards generating and handling atomic tritium.

In this contribution, we present the TLK and its unique infrastructure contributing to ongoing and future neutrino experiments.

Authors: AKER, Max (KIT, IAP-TLK); BATZLER, Dominic (KIT, IAP-TLK); BEKRIS, Nicolas (KIT, IAP-TLK); BORN-SCHEIN, Beate (KIT, IAP-TLK); BORNSCHEIN, Lutz (KIT, IAP-TLK); CRISTESCU, Ion (KIT, IAP-TLK); DIAZ BARRERO, Deseada (KIT, IAP-TLK); GRÖSSLE, Robin (KIT, IAP-TLK); HASSELMANN, Leonard; HERMANN, Valentin (KIT, IAP-TLK); HILLESHEIMER, David (KIT, IAP-TLK); KOHPEISS, Joshua (KIT, IAP-TLK); KOVAC, Neven (KIT, IAP-TLK); LE, Thanh-Long (KIT, IAP-TLK); MELZER, Christin (KIT, IAP-TLK); NIEMES, Simon (KIT, IAP-TLK); PRIESTER, Florian (KIT, IAP-TLK); RODENBECK, Caroline (KIT, IAP-TLK); RÖLLIG, Marco (KIT, IAP-TLK); SCHÄFER, Peter (KIT, IAP-TLK); SCHLÖSSER, Magnus (KIT, IAP-TLK); SCHNURR, Ulrich (KIT, IAP-TLK); STURM, Michael (KIT, IAP-TLK); WELTE, Stefan (KIT, IAP-TLK); WENDEL, Jürgen (KIT, IAP-TLK); WYDRA, Johanna (KIT, IAP-TLK); ZELLER, Genrich (KIT, IAP-TLK)

Presenter: SCHLÖSSER, Magnus (KIT, IAP-TLK)

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