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## Status of the neutron lifetime experiment $\tau$ SPECT

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The  $\tau$ SPECT experiment aims to measure the neutron lifetime  $\tau_n$  using a 3D magnetic storage technique. Due to the neutron's magnetic moment, very low-energetic neutrons (ultracold neutrons, UCN) with a maximum energy of  $\approx 50$  neV can be stored in the magnetic trap with a volume of  $\approx 8$  litres.  $\tau$ SPECT is designed to determine  $\tau_n$  using two independent measurement methods. In phase I, surviving UCN in the storage volume after varying storage times are counted. Phase II involves the in-situ detection of decay protons. A proof-of-principle measurement using the magnetic field of the former  $a$ SPECT spectrometer (double hump structure) for longitudinal confinement and a fused silica tube for radial storage has been performed in July 2015 [1]. Since then, besides the successful upgrade of the UCN D source at the pulsed research reactor Mainz [2], the 3D magnetic trap using a magnetic octupole for the radial confinement has been installed and commissioned. Other relevant components are a movable neutron guide system with an adiabatic fast passage (AFP) spin flipper as well as a custom-designed UCN detector (boron-coated ZnS:Ag scintillator). We will present the current status of the experiment and the progress of the initial commissioning runs.

### References

- [1] J. Karch, PhD thesis, Johannes Gutenberg University Mainz, 2017
- [2] J. Kahlenberg et al., Eur. Phys. J. A **53**, 226 (2017)

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