Contribution ID: **90** Type: **Oral presentation**

Sensitive search for neutron to mirror-neutron oscillations at the PSI UCN source

Monday 8 September 2025 15:10 (20 minutes)

Parity-conjugated copies of standard model particles, so-called mirror particles, could provide answers for several standing issues in physics.
Since they would at first only interact with ordinary matter gravitationally, they can be viable candidates for dark matter. If mixing between standard model and mirror particles was possible, they could contribute to baryon number violation.
The mirror-neutron experiment at the Paul Scherrer Institute (PSI) was designed to search for anomalous disappearances of ultracold neutrons that could be hinting at neutron-to-mirror-neutron oscillations. Allowing for the presence of hypothetical mirror magnetic fields, the experiment was conducted in a controlled magnetic field, scanning from 5 μT to 109 μT. No evidence for anomalous neutron losses was found. Furthermore we are examining neutron losses for mass differences of up to $\Delta m = 0.02$ neV. We provide an overview of the experiment, its data analysis based on Monte Carlo simulations and precise magnetic field maps, and conclude with the presentation of new limits on the oscillation time.

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Session Classification: Session