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## Status and Physics Potential of SATURNE

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The Sarov tritium neutrino experiment (SATURNE) is part of the scientific program of the National Center for Physics and Mathematics (NCPM) [1] that was founded in Sarov in 2021. The experiment is under preparation, with the first taking of data expected for 2025. Being motivated by fundamental problems in neutrino physics, SATURNE will primarily search for neutrino electromagnetic interactions [2,3] in elastic and ionizing neutrino-atom collisions. It will employ a high-intensity tritium neutrino source, with an initial activity of at least 10 MCi and possibly up to 40 MCi. The tritium source will be used in combination with the He-4, Si and SrI<sub>2</sub>(Eu) targets in order to study the elastic and ionization channels of neutrino-atom collisions at unprecedentedly low energies. The Si and SrI<sub>2</sub>(Eu) detectors with record low-energy thresholds for such detector types will measure the ionization channel of neutrino-atom collisions. With the 1-year data from either detector, one may expect to achieve a sensitivity on the order of  $\sim 10^{-12} \mu_B$  at 90% C.L. to the neutrino magnetic moment  $\mu_\nu$ , which is the most studied theoretically and actively searched experimentally among the neutrino electromagnetic properties. The measurements with the liquid He-4 detector in a superfluid state are expected to provide the first observation of coherent elastic neutrino-atom scattering (CEvAS) [4,5]. This will bring the experimental studies of coherent elastic neutrino-nucleus scattering (CEvNS) [6] to a qualitatively new level, namely when one will be able to explore the neutrino elastic scattering not only on a nucleus as a whole, but also on an atom as a whole. With the 5-year data using the liquid He-4 detector, it is also expected to achieve a record-high  $\mu_\nu$ -sensitivity of  $\sim 10^{-13} \mu_B$  at 90% C.L.

### References

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