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Investigating CP-violating exotic interactions using a neutron bottle

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Low energetic neutrons are stored inside the apparatus searching for a permanent electric dipole moment of the neutron at the Paul Scherrer Institute. Precisely comparing the Larmor precession frequency of the neutrons spins to that of cohabiting 199Hg atoms spins, allows to investigate possible exotic short range spin-dependent interactions. Such an interaction could be mediated by axions or axion-like particles and its strength is proportional to the CP-violating product of scalar and pseudoscalar coupling constants gSgP.
Our measurement result confirms limits on gSgP from complementary experiments with spin-polarized nuclei
in a model-independent way. Limits from other neutron experiments are improved by up to two orders of magnitude in the interaction range of 10^-6 m < lambda < 10^-4 m.

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