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A nEDM measurement by using a spallation UCN source of He-II

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We are studying a new nEDM measurement in the region of < 10-27 e cm, which can be a clue to understand baryogenesis in the universe. For improving counting statistics, we are increasing UCN density by means of a superthermal method [1]. We have placed a He-II bottle at a temperature below 1 K in a spallation neutron source, where UCN production rate is optimized. The UCN transport is improved so that higher UCN density is obtained in an EDM cell. The systematic error, in the previous nEDM measurement, was dominated by a geometric phase effect (GPE) on atomic spin precession, which was used as a magnetometer. The GPE arises from particle motion in a magnetic field gradient. We are studying a 129Xe spin magnetometer. The mean free path for 129Xe interatomic collisions can be short. The motion of the 129Xe atom is suppressed so that the GPE becomes small [2]. In this workshop, we will discuss the present status of our experiment.

[1] Phys. Rev. Lett. 108, 134801(2012).
[2] Phys. Lett. A 376, 1347(2012).

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