Improvements of the Hg cohabiting magnetometer for the nEDM experiment

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The Standard Model (SM) prediction for a static electric dipole moment for the neutron, breaking time reversal and parity symmetry is several orders of magnitude below the current best experimental limit $d_n < 2.9 \cdot 10^{-26}$ ecm (90 % CL). An experiment at the new ultra-cold neutron (UCN) source at the Paul Scherrer Institute, Switzerland, aims at a factor five improved sensitivity. Ramsey's method of separated oscillatory fields is used to detect a Larmor frequency shift for the UCN in a parallel and an anti-parallel configuration of magnetic and electric fields. To determine the applied magnetic field (~1μT) we measure the spin precession frequency of a spin polarized ensemble of ^{199}Hg atoms in the same volume as the UCN via the amplitude modulation of a light beam traversing the volume. The light beam is produced in an Hg discharge lamp. I will present how the replacement of these discharge lamps by a laser light source can improve the performance of the magnetometer and gives access to study its systematic effects.