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Production of highly uniform magnetic field for the n2EDM experiment at the Paul Sherrer Institute.

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This work presents a preliminary design of the coils system developed for the neutron electric dipole moment experiment (n2EDM) at the Paul Sherrer Institute (PSI). The goal of this experiment is to find new sources of CP violation through the measurement of the neutron electric dipole. The current best limit of the nEDM measurement, 2.9×10^{-26} e.cm (90% C.L.) was reached by the RAL-Sussex-ILL collaboration in 2006. The n2EDM experiment aims at improving by one order of magnitude the statistical sensitivity while keeping under control the systematics effects. The gain in sensitivity, as well as the control of the systematics, require to produce a very uniform field.

First, the requirements on the field uniformity will be reminded. Then, the design of the main coil B_0 will be presented. The performances of this coil, simulated by the COMSOL software, will be shown, as well as the robustness of the COMSOL predictions. A field uniformity below 10^{-4} is achieved inside the precession chamber. Requirements on the field gradients are fulfilled. A possible technical design is presented. The influence of the mechanical imperfections are studied.

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