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The magnetometer system planned for the neutron electric dipole moment (nEDM) experiment at LANL[1] YI CHEN, CHEN-YU LIU, Indiana University, NEDM@LANL COLLABORATION — A non-zero electric dipole moment (EDM) of a fundamental particle violates the time-reversal symmetry, implying a violation of the combined charge conjugation and parity (CP) symmetry. The current experimental limit of nEDM provides stringent constraints on new sources of CP violation beyond the Standard Model of particle physics. The nEDM experiment at Los Alamos National Laboratory (LANL), with its upgraded ultracold neutron source, aims to improve this measurement to $3.0 \times 10^{-27} e \cdot cm$, which is an order of magnitude smaller than the current best limit. In controlling the magnetic field background to achieve this sensitivity, we plan to implement mercury (Hg)—both as the co-magnetometer and as an external magnetometer. The latter would be the first implementation of its kind for nEDM applications. I will describe the details about the magnetometers, and present methods utilizing the magnetometers to improve the uniformity of the magnetic field and to quantify the geometric phase systematic error.

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Yi Chen
Indiana University

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