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An experimental search on the electron EDM based on solid-state techniques YOUNG JIN KIM[1], CHEN-YU LIU[2], Indiana University, Bloomington — A discovery of a permanent electric dipole moment of the electron (eEDM) would provide crucial information about the nature of T-violation and imply new sources of CP-violation beyond the Standard Model. We are pursuing research that would improve the present experimental limit of the eEDM using a new technique in solid-state systems at 4K. The experiment uses a Gadolinium Gallium Garnet sample with a large magnetic response, which can be measured using the Superconducting Quantum Interference Device as the magnetometer. In this talk, I will discuss the progress to control the systematic effects, including the design and implementation of a 24-bit DAQ system with ultra-low level of channel crosstalk, and the control of the high voltage drift from the supply. With significant progress, finally we push the experimental limit of eEDM on the order of 10-25e cm under four days integration time of data, which is most sensitive results ever achieved using the solid state technique. In addition, the experiment is free of sources that could produce spurious signal at this level. Further enhancement of the eEDM sensitivity would require operating the experiment at sub-Kelvin temperatures.

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