Abstract Submitted
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New techniques for a measurement of the electron electric dipole moment[1] CHRIS HO, JACK DEVLIN, ISABEL RABEY, PAULINE YZOMBARD, JONGSEOK LIM, SIDNEY WRIGHT, NOAH FITCH, ED HINDS, MIKE TARBUTT, BEN SAUER, Imperial College London — The search for the electric dipole moment of the electron (eEDM) is one of the most stringent tests for CP-violating physics beyond the Standard Model. The most sensitive searches for the eEDM use heavy polar molecules. We report on a series of new techniques that have improved the statistical sensitivity of the YbF eEDM experiment. We have increased the number of molecules participating in the experiment by an order of magnitude using a carefully designed optical pumping scheme. We have also increased the detection efficiency of these molecules by another order of magnitude using an optical cycling scheme. In addition, we show how to destabilise dark states and reduce backgrounds that otherwise limit the efficiency of these techniques. Together, these improvements allow us to demonstrate a statistical sensitivity of 1.8×10^{-28} e cm after one day of measurement, which is 1.2 times the shot-noise limit. This will allow us to measure the eEDM at the 10^{-29} e cm level with 100 days of data. These techniques are also applicable to other precision measurements using molecules.

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