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Sensitivity improvements to the YbF electron electric dipole moment experiment ISABEL RABEY, JACK DEVLIN, BEN SAUER, JONY HUDSON, MIKE TARBUTT, ED HINDS, Imperial College London — The electron is predicted to have a small electric dipole moment (EDM). The size of this fundamental property is intimately connected to the breaking of time reversal symmetry (T) in nature. The Standard Model, which does include a small amount of T asymmetry, predicts the EDM to be too small to ever detect at $d_e<10^{-38}$ e.cm. However, many extensions of the Standard Model that suggest additional T-violation predict the electron's EDM to be within a measurable regime of both current and proposed experiments. This talk describes our YbF electron EDM experiment and introduces some of the technical improvements made to our machine since the last measurement. We have increased the statistical sensitivity of our interferometer by increasing the number of YbF molecules that participate in the experiment and by increasing their detection probability. We demonstrate several hardware developments that combine laser, microwave and rf fields which, when applied to YbF, can pump six times more population into the initial measurement state. In the detection region we have used techniques developed for molecular laser cooling, including resonant polarisation modulation, to dramatically increase the number of scattered photons by a factor of 10. Combining all improvements, the statistical uncertainty of our measurement is expected to be reduced by a factor of ninety, allowing us to search for physics beyond the Standard Model and below the recent upper limit of $d_e<8.9\text{x}10^{-29}$ e.cm.

Isabel Rabey
Imperial College London

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