

Abstract Submitted  
for the DAMOP16 Meeting of  
The American Physical Society

**Sensitivity improvements to the YbF electron electric dipole moment** ISABEL RABEY, JACK DEVLIN, BEN SAUER, Imperial College London, JONY HUDSON, None, MIKE TARBUTT, ED HINDS, Imperial College London — The electron is predicted to have a small electric dipole moment (EDM). The Standard Model (SM) predicts the EDM to be too small to ever detect at  $d_e < 10^{-38}$  e.cm. However, many extensions of the SM that suggest additional processes, predict the electrons EDM to be within a measurable regime of both current and proposed experiments. This poster presents some of the technical improvements made to the YbF electron EDM experiment 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. Including other improvements, the statistical uncertainty of our measurement is expected to be reduced by a factor of 90, allowing us to search for physics beyond the SM and below the recent upper limit of  $d_e < 8.9 \times 10^{-29}$  e.cm.

Isabel Rabey  
Imperial College London

Date submitted: 01 Apr 2016

Electronic form version 1.4