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Improvements to the YbF electron electric dipole moment experiment B. E. SAUER, I. M. RABEY, J. A. DEVLIN, M. R. TARBUTT, C. J. HO, E. A. HINDS, Imperial College London — The standard model of particle physics predicts that the permanent electric dipole moment (EDM) of the electron is very nearly zero. Many extensions to the standard model predict an electron EDM just below current experimental limits. We are currently working to improve the sensitivity of the Imperial College YbF experiment.[1] We have implemented combined laser-radiofrequency pumping techniques which both increase the number of molecules which participate in the EDM experiment and also increase the probability of detection. Combined, these techniques give nearly two orders of magnitude increase in the experimental sensitivity. At this enhanced sensitivity magnetic effects which were negligible become important. We have developed a new way to construct the electrodes for electric field plates which minimizes the effect of magnetic Johnson noise.[2] The new YbF experiment is expected to comparable in sensitivity to the most sensitive measurements of the electron EDM to date. We will also discuss laser cooling techniques which promise an even larger increase in sensitivity.

[1]J. J. Hudson et al., Nature, **473**(7348), 493-U232 (2011).
[2]I. M. Rabey, J. A. Devlin, E. A. Hinds, B. E. Sauer, Rev. Sci. Inst. **87** 115110 (2016).

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