

Atomic Molecular and Optical Physics Seminar

November 16, 2007 at 10:30 noon

Physics 1305

“Progress Towards a Measurement of the Electron Electric Dipole Moment Using PbO*”

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A non-zero measurement of the electric dipole moment (EDM) of the electron \mathbf{d}_e within the next few orders of magnitude of the current limit of $|\mathbf{d}_e| < 1.6 \times 10^{-27}$ e-cm [1] would be clear evidence for physics beyond the standard model. An experiment to look for \mathbf{d}_e is underway using the metastable $a(1)$ state of the PbO molecule. This state can be used as a co-magnetometer to reject many sources of magnetic noise and systematics. A stable apparatus has been constructed including a heated vapor cell. With this apparatus, a proof of principle for the experiment has been completed. Progress is underway to make a measurement with an expected sensitivity of $|\mathbf{d}_e| \sim 10^{-25}$ e cm/(day)^{1/2}. A straightforward modification to this apparatus allowing for a reexcitation detection scheme will improve this sensitivity by reducing backgrounds. Additionally, two future generation experiments are being developed that are expected to increase the sensitivity by as much as 3-4 orders of magnitude.

- [1] B.C. Regan, Eugene D. Commins, Christian J. Schmidt, and David DeMille, *Phys. Rev. Lett.* **88** (7), 071805 (2002).