

Abstract Submitted  
for the DAMOP13 Meeting of  
The American Physical Society

**Current Work to Improve Precision in Measurements of Helium Fine Structure**<sup>1</sup> NIMA HASSAN REZAEIAN, DAVIS SHINER, University of North Texas — With the recent improvement on the  $2^3P$  Helium fine structure calculation by Pachucki and the quest for finding the most precise value for  $\alpha$ , spectroscopic measurement of the helium atom has a great advantage to find this primary constant. Distinctively, the 32 GHz atomic fine structure of  $2^3P$  J2 to J0 interval with uncertainty of 100Hz leads a factor of three better than the best current value of  $\alpha$  and an impulsion to the theory to evaluate the largest term of order  $m\alpha^8$  is our ambition. This measurement not only tests the quantum electrodynamics, but also establishes the fine structure constant  $\alpha$  with uncertainty of 1.6 ppb. The electron g-factor measurement of  $\alpha$ , even though, is by far more accurate at 0.37 ppb, our end result would be a examination to the best alternative atom recoil measurements with different approach. To reach on this level of accuracy, we implement our frequency selector with precision better than 1 to 100 along with laser cooling mechanism to enhance the signal to noise ratio by increasing the signal strength.

<sup>1</sup>This work is supported by NSF grant.

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Date submitted: 23 Jan 2013

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