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Current Work to Improve Precision in Measurements of Helium Fine Structure[1] NIMA HASSAN REZAEIAN, DAVID 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 α, 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 α 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 α with uncertainty of 1.6 ppb. The electron g-factor measurement of α, 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.

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