Progress towards measuring the $2S_{1/2}$ to $2P_{1/2}$ interval in hydrogen

A.C. VUTHA, N. BEZGINOV, I. FERCHICHI, E.A. HESSELS, York University — There is a large discrepancy between the CODATA value for the proton charge radius, and its determinations from muonic hydrogen measurements. This discrepancy is referred to as the proton radius puzzle. Improved measurements on atomic hydrogen can elucidate the origins of this discrepancy. We have constructed an experiment to measure the Lamb shift ($n = 2, S_{1/2} \rightarrow P_{1/2}$) in a fast beam of atomic hydrogen. Using a novel separated-oscillatory-fields method and high signal-to-noise ratio detection, we can measure the center of this transition with a statistical uncertainty approaching $10^{-5}$ of its natural linewidth. We report on our studies of systematic effects, and on our progress towards a new measurement of the proton charge radius.

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