

Abstract Submitted
for the DAMOP19 Meeting of
The American Physical Society

Towards 2S-8D spectroscopy in a cryogenic hydrogen beam¹

ADAM BRANDT, SAMUEL COOPER, CORY RAZOR, ZAKARY BURKLEY, DYLAN YOST, Colorado State University — Hydrogen spectroscopy has provided a route to determine fundamental constants and is a testing ground for bound state Quantum Electrodynamics theory. In particular, precisely measured optical transitions in hydrogen have become a core component in the determination of the Rydberg constant and the proton radius. For example, spectroscopy of 2S-nS/D transitions, in conjunction with the precisely measured 1S-2S transition, offers a straightforward route to extract the Rydberg constant and proton charge radius. However, this result is divergent from other determinations of the proton radius. Therefore, we aim to remeasure these transitions with an improved experimental setup. A 5 K atomic hydrogen beam is optically excited into the 2S state via two-photon absorption. The 2S-8D transition is then excited by two-photon absorption at 780 nm. This method is advantageous compared to previous measurements of the 2S-8D transition by the reduction of velocity effects and greater metastable flux, as well as improved frequency metrology via an optical frequency comb.

¹NIST Precision Measurement Grant

Adam Brandt
Colorado State University

Date submitted: 31 Jan 2019

Electronic form version 1.4