Abstract Submitted
for the DAMOP15 Meeting of
The American Physical Society

Quantum Interference Effects in Saturated Absorption Spectroscopy of n=2 Triplet-Helium Fine Structure ERIC A. HESSELS, MARKO HORBATSCH, ALAIN MARSMAN, York University — The program of determining a more accurate value of the fine structure constant from He fine structure spacings requires the determination of linecenters to better than 1 kHz. Even though neighboring transitions are more than 1000 linewidths out of resonance, when measuring the linecenters to the required accuracy one cannot ignore the different available excitation and decay pathways, whose interference can lead to appreciable shifts. This effect was demonstrated to be significant in laser spectroscopy [1], and in saturated fluorescence spectroscopy [2]. Here, it is investigated for saturated absorption spectroscopy [3]. Our findings for the 2^3P_1 - 2^3P_2 interval indicate that the extrapolations to zero laser-field intensity and zero gas pressure from the ranges at which experiments were performed introduce kHz-level shifts. Correcting for these shifts moves the result into better agreement with other measurements of this interval.

[1] A. Marsman, M. Horbatsch, and E.A. Hessels, Phys. Rev. A 86, 040501(R) (2012)
[2] A. Marsman, E.A. Hessels, and M. Horbatsch, Phys. Rev. A 89, 043403 (2014)
[3] T. Zelevinsky, D. Farkas, and G. Gabrielse, Phys. Rev. Lett. 95, 203001 (2005)

Alain Marsman
York University

Date submitted: 30 Jan 2015 Electronic form version 1.4