Abstract Submitted
for the DAMOP20 Meeting of
The American Physical Society

Rotation Sensing with Trapped Ion Interferometry ADAM WEST, RANDALL PUTNAM, WES CAMPBELL, PAUL HAMILTON, University of California, Los Angeles — We report on work developing a precision rotation sensor through interferometry with a single trapped ion [1]. We demonstrate ultrafast manipulation of a Zeeman qubit in $^{138}Ba^{+}$ via Raman transitions with a picosecond pulsed laser. Qubit rotations with a single 20 ps pulse correspond to an instantaneous Rabi frequency above 30 GHz. We have used the same technique to perform ultrafast spin-motion entanglement. Work is ongoing to harness this spin-motion coupling to perform 1D interferometry. The long term goal of rotation sensing is expected to realize a precision which is competitive with commercial rotation sensors. A consideration of the associated systematic effects indicates that this goal is achievable with the current ion-trapping toolbox [2]. Implementation of SDKs in a Zeeman qubit may also provide a versatile technique of achieving large momentum transfer that could be broadly applicable to matter-wave interferometry.

References:
[1] W. C. Campbell and P. Hamilton, J. Phys. B **50**, 064002 (2017)
[2] A. West, Phys. Rev. A **100**, 063622 (2019)

Adam West
University of California, Los Angeles

Date submitted: 30 Jan 2020 Electronic form version 1.4