Abstract Submitted
for the DAMOP16 Meeting of
The American Physical Society

**Fourier Spectroscopy of a Spin-Orbit Coupled Bose Gas** ANA VALDES-CURIEL, DIMITRIS TRYPOGEORGOS, ERIN MARSHALL, IAN SPIELMAN, Univ of Maryland-College Park — We generate spin-orbit coupling in a spin-1 Bose-Einstein condensate using Raman transitions. We are able to measure the system's spin and momentum dependent energy spectrum by looking at the time evolution of the three spin states. We drive transitions at different detunings from Raman resonance and extract the Fourier components of the time dependent evolution to reconstruct the spectrum. We also add a periodic modulation to one Raman field which allows us to have a fully tunable spin-orbit coupling dispersion that we can directly measure using our spectroscopy technique.

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Date submitted: 29 Jan 2016 Electronic form version 1.4