Abstract Submitted
for the DAMOP15 Meeting of
The American Physical Society

Fundamental Interactions for Atom Interferometry with Ultracold Quantum Gases in a Microgravity Environment JOSE P. D'INCAO, JILA, Department of Physics, University of Colorado, JASON R. WILLIANS, Jet Propulsion Laboratory, California Institute of Technology, CA — Precision atom interferometers (AI) in space are a key element for several applications of interest to NASA. Our proposal for participating in the Cold Atom Laboratory (CAL) onboard the International Space Station is dedicated to mitigating the leading-order systematics expected to corrupt future high-precision AI-based measurements of fundamental physics in microgravity. One important focus of our proposal is to enhance initial state preparation for dual-species AIs. Our proposed filtering scheme uses Feshbach molecular states to create highly correlated mixtures of heteronuclear atomic gases in both their position and momentum distributions. We will detail our filtering scheme along with the main factors that determine its efficiency. We also show that the atomic and molecular heating and loss rates can be mitigated at the unique temperature and density regimes accessible on CAL. This research is supported by the National Aeronautics and Space Administration.

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Date submitted: 30 Jan 2015 Electronic form version 1.4