

Abstract Submitted
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The Cold Atom Laboratory: a facility for ultracold atom experiments aboard the International Space Station DAVID AVELINE, Jet Propulsion Laboratory, CAL TEAM — Spread across the globe there are many different experiments in cold quantum gases, enabling the creation and study of novel states of matter, as well as some of the most accurate inertial sensors currently known. The Cold Atom Laboratory (CAL), being built at NASA's Jet Propulsion Laboratory (JPL), will be a multi-user facility that will allow the first study of ultracold quantum gases in the microgravity conditions of the International Space Station (ISS). The microgravity environment offers a wealth of advantages for studies of cold atoms, including expansion into extremely weak traps and achieving unearthy cold temperatures. It will also enable very long interaction times with released samples, thereby enhancing the sensitivity of cold atom interferometry. We will describe the CAL mission objectives and the flight hardware architecture. We will also report our ongoing technology development for the CAL mission, including the first microwave evaporation to Bose-Einstein condensation (BEC) on a miniaturized atom chip system, demonstrated in JPL's CAL Ground Testbed. We will present the design, setup, and operation of two experiments that reliably generate and probe BECs and dual-species mixtures of Rb-87 and K-39 (or K-41). CAL is scheduled to launch to the ISS in 2017. The CAL mission is supported by NASA's SLPS and ISS-PO. This research was carried out at the Jet Propulsion Laboratory, California Institute of Technology, under contract with the National Aeronautics and Space Administration.

Sheng-wet Chiow
Jet Propulsion Laboratory

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