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Observations of ultracold atoms in microgravity shell potentials¹ NATHAN LUNDBLAD, RYAN CAROLLO, Bates College, DAVID AVELINE, Jet Propulsion Laboratory, COURTNEY LANNERT, Smith College / University of Massachusetts, Amherst, KARMELA PADAVIC, BRENDAN RHYNO, SMITHA VISHVESHWARA, University of Illinois, Urbana-Champaign — NASA's Cold Atom Laboratory (CAL) provides investigators the unique capability of producing BECs in orbit, where the perpetual freefall environment enables experiments largely free of gravitational perturbation. We use this environment to study radiofrequency-dressed ultracold samples in an ellipsoidal shell potential, a geometry that is technically difficult to achieve on Earth. We discuss the results of the first-generation science run, focusing on shell thermometry, model characterization, and inflation adiabaticity. We also summarize our understanding of the apparatus-related limitations on shell size, shell coverage and uniformity, and review possibilities for the second-generation instrument now in orbit.

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