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Progress towards a Na+Er mixture experiment AVINASH KUMAR, MONICA GUTIERREZ GALAN, NEIL ANDERSON, SWARNAV BANIK, HECTOR SOSA-MARTINEZ, Joint Quantum Institute, University of Maryland, STEPHEN ECKEL, NIST, Joint Quantum Institute, University of Maryland, TED JACOBSON, University of Maryland, IAN SPIELMAN, GRETCHEN CAMPBELL, NIST, Joint Quantum Institute, University of Maryland — Recent advances in the production of arbitrary trapping potentials for ultracold atoms have enabled the creation and study of analog physical systems using degenerate gases. Here we present an exploration of cosmic inflation realized using a supersonically expanding, toroidally trapped, ^{23}Na BEC. We observe features of cosmic inflation such as the red-shifting of phonons, particle production, and spontaneous winding number generation. Our group is currently constructing a second-generation experimental apparatus for a Na+Er mixture. This novel setup features a dual species 2D MOT, an improved imaging system, a new locking system for the 583 nm narrow line transition of Er, and high magnetic field capabilities. These new capabilities open the possibility of studying lanthanide-alkali collisions and Feshbach spectra, as well as the realization of other quantum many body systems.

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