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Confinement of an alkaline-earth element in a grating magneto-optical trap PETER ELGEE, ANANYA SITARAM, DANIEL BARKER, GRETCHEN CAMPBELL, Joint Quantum Institute, NIKOLAI KLIMOV, STEPHEN ECKEL, Sensor Science Division, National Institute of Standards and Technology — Cold alkaline-earth atoms are a promising platform for a variety of quantum technologies, in particular for atomic clocks. Such experiments often use a magneto-optical trap (MOT) for initial cooling and trapping, which usually requires a large setup and fine tuned alignment, limiting their potential applications. Here we demonstrate the first grating MOT of strontium, a compact alternative to the typical six-beam MOT. In this MOT, atoms are loaded from a small dispenser source and trapped with the diffraction off of a nanofabricated grating. Thus, such a MOT only uses a single input beam, which cuts down on space and alignment requirements. Our ^{88}Sr MOT has approximately 4×10^6 atoms with a temperature of around 5 mK, and a vacuum limited lifetime of over 1 s. These results indicate that compact grating MOT systems could be used for clocks or other quantum devices with alkaline-earth atoms.

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