Abstract Submitted
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Towards a Steady-state Atom Laser[1] CHUNCHIA CHEN, SHAYNE BENNETTS, RODRIGO GONZLEZ ESCUDERO, BENJAMIN PASQUIOU, FLORIAN SCHRECK, Institute of Physics, University of Amsterdam, HTTP://WWW.STRONTIUMBEC.COM/ TEAM — So far BECs and atom lasers have only been demonstrated as the product of a time sequential, pulsed cooling sequence. For applications such as next generation atomic clocks, superradiant lasers or atom interferometers for gravitational wave detection, a steady-state source of degenerate atoms offers great advantages. We present an apparatus that produces a steady-state strontium sample with a phase-space density approaching degeneracy, thus taking a critical step towards demonstrating steady-state atom lasers. Our machine achieves this by simultaneously cooling atoms in spatially separated regions on both the 30-MHz and 7.4-kHz linewidth Sr transitions [1]. We then continuously load a dipole trap where a Stark shift protected dimple collects the coldest atoms. We also demonstrate operation on the ^{87}Sr isotope which is of particular interest for atomic clocks. Finally, we demonstrate a new deceleration method [2] that might bridge the gap between the unity phase-space density now demonstrated and an eventual steady-state BEC [1] S. Bennetts et al., Phys. Rev. Lett. 119, 223202(2017). [2] C.-C. Chen et al., arXiv:1810.07157 (2018).

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