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An apparatus for a Steady-State Atom Laser SHAYNE BENNETTS, CHUNCHIA CHEN, RODRIGO GONZLEZ ESCUDERO, BENJAMIN PASQUIOU, FLORIAN SCHRECK, Institute of Physics, University of Amsterdam
— Strontium represents an ideal platform for developing a steady-state atom laser with potential applications in areas from interferometry to superradiant clock lasers. Traditional quantum gas machines have been limited to pulsed operation by the incompatibility of evaporation and laser cooling, which are routinely required to reach degeneracy. We will present details of the apparatus we have developed for producing a steady-state Bose Einstein condensate and our approach to construct a steady-state atom laser. Our machine tackles this goal by simultaneously cooling atoms in spatially separated regions on both the broad 30-MHz and narrow 7.4-kHz linewidth Sr transitions [1]. In this way we are able to continuously load a dipole trap at high phase space density in which a Stark shift protected [2] dimple trap collects and concentrates the coldest atoms. We describe recent progress in which we have produced steady-state atomic clouds with phase-space densities above unity and our ongoing efforts to produce a steady state-BEC and atom laser. [1] S. Bennetts et al., Phys. Rev. Lett. 119, 223202(2017). [2] S. Stellmer et al., Phys. Rev. Lett. 110, 263003(2013).

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