Abstract Submitted
for the DAMOP19 Meeting of
The American Physical Society

High-flux atomic sources for Very Long Baseline Atom Interferometry[1] D. TELL, H. ALBERS, E. WODEY, C. MEINERS, R.J. RENGELINK, C. SCHUBERT, D. SCHLIPPERT, W. ERTMER, E.M. RASEL, Institute of Quantum Optics, Leibniz University Hannover — In atom interferometry, the interaction of light and matter enables a high degree of control over atomic ensembles, allowing them to be used as ultrasensitive probes in precision measurements. Instruments based on this technique have for instance been successfully used to sense accelerations and test fundamental theories.
The 10 m Hannover Very Long Baseline Atom Interferometry facility (VLBAI) exploits the linear scaling of acceleration sensitivity with the free fall distance. In order to reach its full potential, error sources need to be tackled on a level beyond state-of-the-art experiments. Free fall times on the order of seconds necessitate very low spatial expansion, while for low shot noise and interleaved measurement scenarios, a high flux source of Bose-Einstein condensates is indispensable.
We present two atomic sources for rubidium and ytterbium which will be implemented for drop and launch operation in the VLBAI facility. Starting with a high atomic flux, our scheme comprises the use of increased cooling laser power, dynamically shaped optical trapping potentials and delta-kick collimation for a reduced expansion rate of the dilute atomic ensemble, showing promising perspectives for future interferometry operation.

[1]The VLBAI facility is a major research equipment funded by the DFG. We acknowledge support from the CRCs 1128 geo-Q and 1227 DQ-mat.

Dorothee Tell
Institute of Quantum Optics, Leibniz University Hannover

Date submitted: 01 Feb 2019 Electronic form version 1.4