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Towards a portable optical clock based on a two-photon transition SHREYAS POTNIS, SHIRA JACKSON, AMAR VUTHA, Department of Physics, University of Toronto — Optical clocks based on narrow linewidth atomic transitions have achieved an unprecedented level of precision. These clocks rely on tight confinement of atoms by light, to mitigate Doppler shifts and atomic recoil, with the trapping light appropriately tuned to a "magic" wavelength to eliminate light shifts. An alternative approach is construct optical clocks using inherently Doppler-free two-photon transitions, which can lead to a substantially simplified architecture. The short cycle time and large atom numbers available with such a scheme enable rapid, high signal-to-noise measurements, paving the way for portable and autonomous clocks. We report on experimental progress towards constructing an optical clock based on the $4s^2\,{}^1S_0 \rightarrow 4s3d\,{}^1D_2$ two-photon transition in laser cooled ^{40}Ca atoms.

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