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Progress towards a portable two-photon optical clock

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We report on progress towards the construction of an optical atomic clock based on the $4s^2\,{}^1S_0 \rightarrow 4s3d\,{}^1D_2$ two-photon transition in ^{40}Ca atoms. Two-photon transitions are inherently Doppler and recoil free, which eliminates the need for tight confinement of the atoms during interrogation. This allows for a simplified design that can be made robust, compact and portable. A compact magneto-optical trap for calcium atoms is constructed with 423 nm external cavity diode lasers. Two portable ultra-stable lasers at 915 nm, with linewidths below 50 Hz, have been developed for interrogation of the two-photon clock transition.

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