The Optical Rubidium Atomic Frequency Standard: Toward a Rugged Optical Atomic Clock 

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Ruggedized atomic clocks are necessary for a wide array of applications (e.g., satellite-based navigation and communication). Building upon existing vapor-cell and laser technologies, we describe an optical atomic clock, designed around a simple and manufacturable architecture, that utilizes the 778 nm two-photon transition in rubidium and yields fractional-frequency instabilities of $4 \times 10^{-13}/\sqrt{\tau}$ for $\tau$ from 1 to 10,000 s. We present a stability budget and demonstrate a system design for achieving a fractional-frequency instability of $1 \times 10^{-15}$ that can be maintained on long time scales.

1the Optical Rubidium Clock Association