

Abstract Submitted
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Spectroscopy of a solid-state optical clock transition MOHIT VERMA, HIROMITSU SAWAOKA, AMAR VUTHA, University of Toronto — Rare earth ions doped into solid-state host crystals exhibit optical transitions with long coherence times, making them useful for applications such as quantum memories. However, optical transitions in these systems are typically inhomogeneously broadened into \sim GHz-broad bands, which limits their utility as absolute frequency references for atomic clocks. We have identified the highly forbidden ${}^7F_0 \rightarrow {}^5D_0$ transition in Sm:SrF₂ as a possible exception to this general rule, with very weak coupling to the crystal environment. We report the first direct laser excitation of this highly forbidden transition, and the observation of an excited state lifetime exceeding 10 ms. This system could lead the way to solid-state optical atomic clocks that do not require laser cooling and trapping.

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