Abstract Submitted
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Time-dependent analysis of pulsed EIT processes in atomic clocks THOMAS ZANON, ANDREW LUDLOW, MARTIN M. BOYD, TANYA ZELEVINSKY, SEBASTIAN BLATT, TETSUYA IDO, JUN YE, JILA, National Institute of Standards and Technology — Narrow resonances established via Electromagnetically Induced Transparency under continuous excitations have been proposed as new optical frequency standards using either single trapped ions [1] or neutral atoms trapped in an optical lattice [2, 3]. In a similar approach to ultra high resolution spectroscopy, time separated Dark Resonance pulses in a three level Λ system have been proposed [4] as an alternative clock interrogation tool for probing a narrow transition between two long-lived states [5, 6]. Pulse sequences are designed that mix steady states or transient regimes with a free evolution time of the metstable ground state coherence, with the goal to optimally recover the clock information prepared by EIT. Raman-Ramsey nutations are then demonstrated using a set of effective damped two-level Optical Bloch equations. To evaluate potential accuracy of an EIT based clock, AC Stark shifts are carefully considered. These light shifts can be expressed as phase shifts in the cosine function describing the Raman-Ramsey oscillations resulting in a frequency shift of the central fringe minima. [1]I. Siemers et al, EuroPhys. Lett.**18**, 139 (1992).[2]R. Santra et al, Phys. Rev. Lett.**94**, 173002 (2005).[3]T. Hong et al, Phys. Rev. Lett.**94**, 050801 (2005).[4]T. Zanon et al, Phys. Rev. Lett.**94**, 193002 (2005).[5]J.E. Thomas et al, Phys. Rev. Lett.**48**, 867 (1982).[6]P. Knight, Nature.**297**, 16 (1982).

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