LEPP JOURNAL CLUB

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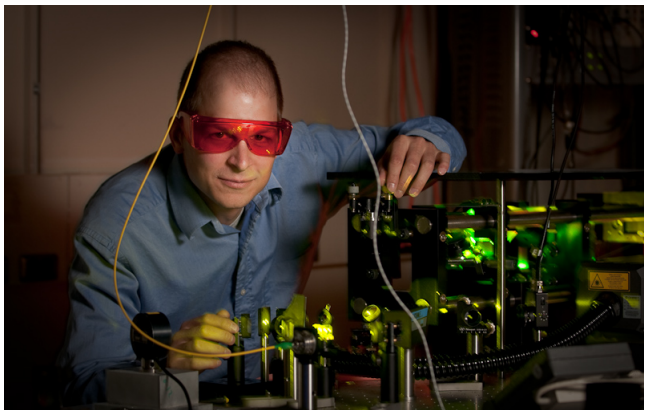
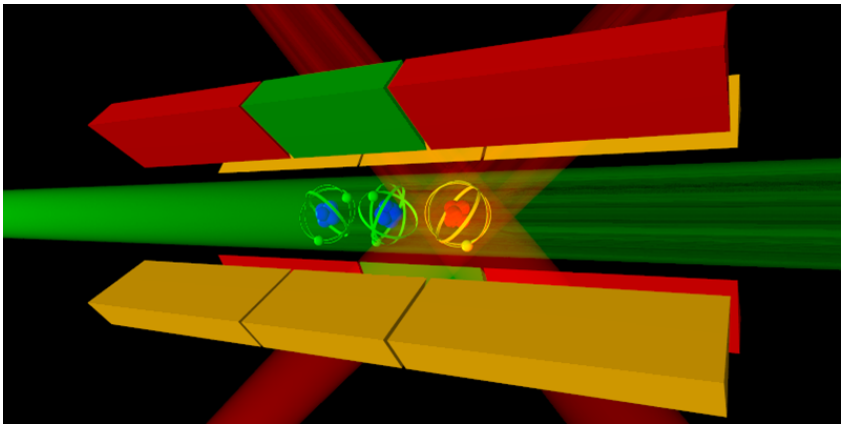


Optical Atomic Clocks

Optical atomic clocks are the most accurate measurement tools ever constructed, with an absolute accuracy that exceeds 10^{-17}. Of these, clocks based on quantum-logic readout of Al^+ ions have the highest accuracy [1]. Such a clock has been compared the NIST's mercury ion clock to derive the most stringent constraint on the present-day variation of the fine-structure constant α [2]. One possible technical application is the measurement of gravitational red-shifts on the earth's surface, and future clocks may enable centimeter-level height measurements for geodesy and geophysics [3]. Recent experiments show a record Q-factor of 6×10^{15}, which exceeds even the Q-factors in Mössbauer spectroscopy [4]. If time permits (no pun intended), I will discuss the how quantum information is best extracted from the clock atoms [5].



Friday
April 5, 4:00pm
301 Physical Sciences Building
(Refreshments, 3:45pm)

[1] C. W. Chou, D. B. Hume, J. C. J. Koelemeij, D. J. Wineland, and T. Rosenband. PRL 104:070802, (2010)
[2] T. Rosenband *et al.*, Science 319:1808 (2008)
[3] C. W. Chou, D. B. Hume, T. Rosenband, and D. J. Wineland. Science 329:1630 (2010)
[4] C. W. Chou, D. B. Hume, M. J. Thorpe, D. J. Wineland, and T. Rosenband. PRL 106:160801 (2011)
[5] T. Rosenband and D. R. Leibrandt, arXiv:1303.6357 [quant-ph]

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