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Connecting the Raman and EIT physics for a 88Sr high-accuracy optical clock

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Atomic systems based on a three-level Λ configuration offer interesting spectroscopic properties associated to the production of a coherence between the two lower states. Under laser excitation by two lasers, dressed and probe, the Raman peak and the electromagnetically induced transparency dip appear when the difference between the laser frequencies matches the energy separation between the lower states of the Λ system. That difference stabilized to an atomic splitting can be used as an optical clock. An application to ^{88}Sr atoms in an optical lattice was proposed in (1). The coherent coupling between the $5s^2$ $^1S_0$ ground state and the first excited state, 5s5p $^3P_0$ is mediated by the broad second excited 5s5p $^1P_1$ state, exploiting the electromagnetically induced transparency. The effective linewidth of the clock transition can be chosen at will by adjusting the intensity of the dressed laser. (1) R. Santra, E. Arimondo,T. Ido, C. H. Greene, and Jun Ye, arXiv:physics/0411197 (2004).