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Physical Model of Modulation Dependent Effects in CPT Clocks

MICHAEL CRESCIMANNO, Youngstown State University, Dept. of Physics, IRINA NOVIKOVA, DAVID PHILLIPS, RON WALSWORTH, Harvard-Smithsonian Center for Astrophysics — We report on the semi-analytic evaluation of the three level atom in multiple light fields subject to a slow phase modulation. Combining these results with a model of the corresponding phase sensitive detection leads to a demodulated line shape that quantitatively accounts for the shifts and dependencies that have been observed in systematic studies of Coherent Population Trapping (CPT) resonances. Understanding these effects in detail is likely to be of utility in the optimization of miniature atomic time standards based on optical coherences.

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