

Abstract Submitted  
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**Pulse Propagation in Four-Level Atomic Systems Studied in light of Three-Level Doublets** TONY ABI-SALLOUM, Widener University, SETH MEISELMAN, Drexel University, J.P. DAVIS, FRANK A. NARDUCCI, Naval Air Systems Command — Based on our understanding of coherent effects such as Electromagnetically Induced Transparency (EIT) and Autler-Townes (AT) in three-level systems (Lambda, Cascade, Vee) we study the propagation of a probe pulse in a variety of four-level systems. Specifically, we study two “N” schemes: one in which the probe field couples the “outer” levels and one in which the probe couples two of the “inner” levels. Surprising, although these systems appear different, they exhibit very similar steady state behavior. The Physics becomes clear in a semi-dressed states picture where each four-level system reduces to two three-level systems. The semi-dressed states picture analysis is complemented with a numerical work that follows from the discretization in time and space of the fields and density matrix elements equations. The systems under study exhibit slow and fast light behaviors with a dramatic transition between two positive and negative group velocity regimes that are explained in the adopted picture.

Frank A. Narducci  
Naval Air Systems Command

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