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Interference between competing pathways in the interaction of three-level atoms and radiation TONY ABI-SALLOUM, LORENZO NARDUCCI, Drexel University — When light interacts with atoms, it can induce transitions by way of distinct but indistinguishable pathways and yield unexpected results. In this talk we discuss the physical origin of the transparency induced in two different Cascade configurations by the simultaneous interplay of the coupling and probe fields. The two studied configurations differ by the different strengths of the applied fields. Probe and coupling fields are switched between configurations. We show, in the inhomogeneous limit, the existence of quantum interference in one configuration which is associated with Electromagnetically Induced Transparency. We also show the absence of interference in the other configuration which is related to the Autler-Townes effect. We use techniques borrowed from quantum scattering theory[1]. The transition amplitude between selected initial and final states offers what we believe is convincing evidence for the appearance, or for the absence, of quantum interference effects. [1] C. Cohen-Tannoudji, J. Dupont-Roc, and G. Grynberg. Atom-Photon Interactions: Basic Processes and Applications. Wiley (1992).

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