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Study of Degenerate Four-Wave Mixing Signal in Atomic Vapor STEPHANY SANTOS, LARISSA GONALVES, NATALIA MELO, Universidade Federal Rural de Pernambuco UFRPE — Currently, a vast number of non-linear optical processes are known, for example, the generation of new frequencies through harmonic generation processes, frequencies addition and difference, wave mixing and several other processes. The nonlinear phenomenon studied in this work is the process of four waves mixing, which is a third order process, involving three fields of excitation and one field generated by the atomic media of study. In this work, we review the literature and present a theoretical description of the signal generated by the four waves mixing using the density matrix formalism. We focus on studying the signal generated by the transition of a photon in a system of four atomic levels in a degenerate four wave mixing (DFWM) configuration and perform computer simulations that describe the generated signal. Understanding mixture of four waves, we can set up analytical solutions to problems of DFWM in a vapor atomic media, as well as set up simulations and experiments in the area. Finally, we intend to study the propagation of speckle patterns in an adjustable nonlinear medium using the generated FWM signal. Starting from a standard photon space with normal distribution, call the speckle field, we will study the evolution from subthermal to super-thermal radiation once it was demonstrated that the distributions and the control of this evolution of radiation occur through a single parameter.

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