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Photon diode: performing nonunitary operations on quantum light GOR NIKOGHOSYAN[1], MICHAEL FLEISCHHAUER, Fachberreich Physik, University of Kaiserslautern, Germany — We discuss the interaction of two quantized modes of light with a spectrally broadened atomic ensemble. We show that the system is analogous to a two level system interacting with a bosonic reservoir, where the photonic modes correspond to the atomic states and the atomic ensemble corresponds to the modes of the reservoir. In contrast to the photonic reservoirs, the atomic ensembles can be easily controlled which can be used to simulate the dynamics of an open two level system in a reservoir with tunable spectrum. Due to the coupling with the atoms the analog of spontaneous decay for photons is obtained. This process leads to an irreversible transfer of photons from one mode to the other. The effect can be used for large variety of applications; e.g. the creation of new quantum states, the transfer of photons of optical frequency to microwave domain and vice versa, or the construction of a diode for photons, i.e. a device where single photon pulses injected in any of the two input ports will be directed to the same output port.

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