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A Quantum Optical Diode: Nonlinear-Linear junction

Diodes are at the core of any circuit processing device. They act as generalized valves and have been designed for electronic, heat and optical asymmetric conduction. We introduce briefly these concepts and present a quantum optical diode for photonic transport. The diode is based on a nonlinear-linear resonator junction in which different frequencies can be rectified, that is unidirectionally transmitted, in different directions. We also show that for a specific resonant configuration the system is a single-photon-rectifying source. Finally, through a semiclassical approach we are able to give a straightforward explanation of the rectifying effect in terms of an excitation dependent detuning of the photon tunneling between the resonators.

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