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Input-Output Theory for Two Qubits in a 1D Waveguide: Photon Correlations X. ZHANG, HAROLD BARANGER, Duke Univ — We study the input power dependence of the photon-photon correlations, $g_2(t)$, in waveguide QED. Input-output theory is used (in the Markovian approximation) in order to go beyond wavefunction methods that are typically limited to a few photons. The system consists of two qubits (2LS) strongly coupled to propagating photons in a one-dimensional waveguide. The input is a coherent state of light with no correlations. After interacting with two qubits, transmitted and reflected photons show bunching and antibunching. We quantify the power by the mean number of photons per spontaneous decay time, $\bar{n}$. As a function of $\bar{n}$, $g_2(t = 0)$ starts at 1, peaks for $\bar{n} < 1$, and then returns to 1 at large power. Oscillations in $g_2(t)$ grow as $\bar{n}$ increases, as the input drives Rabi oscillations from which input photons then scatter. Surprisingly, when the two qubits are colocated, the reflected photons are always antibunched, even under classical driving.

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