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Quantum Jumps and Photon Counting Statistics in Waveguide QED XIN ZHANG, HAROLD BARANGER, Duke Univ — Using a novel quantum jump approach, we explore counting statistics for photons in a waveguide scattering from strongly coupled qubits. The system consists of one or two qubits coupled to a one-dimensional waveguide with a coherent state as input. Bunching/antibunching of the photons after interacting with the qubits is typically characterized by the second-order correlation function, neglecting higher-order correlations. Here, we adapt the quantum jump approach to study the full counting statistics of the photons. Our approach takes into account the interference of input photons with photons emitted by the qubits, thereby allowing each jump to be identified as an individual photon (not qubit emission). We present the waiting time distribution of photon arrivals and joint distribution of adjacent waiting times for both systems, noting differences and power dependence. Compared to the second-order correlation function, the waiting time distribution gives a more accurate and clearer view of bunching/antibunching.

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