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Photon blockade meets electromagnetically induced transparency HAYTHAM CHIBANI, Max-Planck-Institute of Quantum Optics, Hans-Kopfermann-Str. 1, 85748 Garching, Germany, JAMES ALVES DE SOUZA, Universidade Federal de Sao Carlos, Departamento de Fisica, 13565-905 - Sao Carlos, SP - Brasil, EDEN FIGUEROA, Max-Planck-Institute of Quantum Optics, Hans-Kopfermann-Str. 1, 85748 Garching, Germany, CELSO JORGE VILLAS BOAS, Universidade Federal de Sao Carlos, Departamento de Fisica, 13565-905 - Sao Carlos, SP - Brasil, GERHARD REMPE, Max-Planck-Institute of Quantum Optics, Hans-Kopfermann-Str. 1, 85748 Garching, Germany — One of the outstanding goals of quantum optics is the realization of controllable nonlinearities at the level of single quanta of matter and light. Here, we theoretically study the optical control of the quantum dynamics of a system which merges single-atom cavity quantum electrodynamics with electromagnetically induced transparency, namely a three-level atom strongly coupled to a high-finesse cavity. We explore the photon statistics of the light emitted from the cavity by calculating the equal-time second-order intensity correlation function $g^2(0)$. We find a rich structure in the behavior of $g^2(0)$ which exhibits photon statistics varying from sub-Poissonian ($g^2(0) \approx 0$) to super-Poissonian ($g^2(0) \approx 100$), and which can be optically tuned via the control field intensity. We also show that when the system is strongly driven, $g^2(0)$ shows two sub-Poissonian regions at different control field intensities, resulting from a single-photon and a two-photon blockade, respectively. The observed quantum control paves the way towards the implementation of a novel quantum device which allows the switching and/or the attenuation of the amplitude noise of a laser beam.

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