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Unconventional multi-photon blockade in hybrid quantum systems

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Many applications in quantum technologies, such as quantum cryptography or optical quantum information processing, require light sources with a precise number of photons. Photon (phonon) blockade is the quantum phenomenon that occurs in a driven nonlinear system, in which a system cannot emit more than one photon each time. These effects are described by the sub-Poissonian excitation-number statistics. In this talk, we describe unconventional photon blockade in a hybrid system which is comprised of photonic and phononic mode such that a combined photon-phonon mode exhibits sub-Poissonian statistics while each mode, if analyzed separately, exhibits super-Poissonian statistics. Moreover, I will show that it is possible to achieve photon blockade in the driven cavity without an atom or any other kind of nonlinearity, but instead coupled to a nonlinear (i.e., squeezed) reservoir [1].

[1] A. Kowalewska-Kud□laszyk, S. I. Abo, G. Chimczak, J. Pe˘rina, F. Nori, and A. Miranowicz, Two-photon blockade and photon-induced tunneling generated by squeezing, Physical Review A 100 (2019), 10.1103/physreva.100.053857.

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