Antibunching and unconventional photon blockade with Gaussian squeezed states

MARC-ANTOINE LEMONDE, McGill University, NICOLAS DIDIER, McGill University, Université de Sherbrooke, AASHISH CLERK, McGill University — There is considerable interest in both the circuit QED\(^1\) and optomechanics,\(^2\) experiments in using the measured intensity fluctuations of a bosonic field as a direct signature of a nonclassical state. Although these nonclassical signatures, such as antibunching, are usually observed in strongly nonlinear systems, they also have been reported with Gaussian states in linear systems.\(^3\) To clarify the significance of the intensity correlations, we derive a sufficient condition for deducing if a field is non-Gaussian based on intensity correlations measurement.\(^4\) With these results in hands, we shed light on the so-called unconventional photon blockade effect predicted in a driven two-cavity setup with surprisingly weak Kerr nonlinearities, stressing that it is a particular realization of optimized Gaussian amplitude squeezing.