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Quantum Physics

Photon Antibunching, Sub-Poisson Statistics and Cauchy-Bunyakovsky and Bell's Inequalities

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We discuss some mathematical aspects of photon antibunching and sub-Poisson photon statistics. It is known that Bell's inequalities for entangled states can be reduced to the Cauchy-Bunyakovsky inequalities. In this note some rigorous results on impossibility of classical hidden variables representations of certain quantum correlation functions are proved which are also based on the Cauchy-Bunyakovsky inequalities.

The difference K between the variance and the mean as a measure of non-classicality of a state is discussed. For the classical case K is nonnegative while for the n-particle state it is negative and moreover it equals -n. The non-classicality of quantum states discussed here for the sub-Poisson statistics is different from another non-classicality called entanglement though both can be traced to the violation of the Cauchy-Bunyakovsky inequality.

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