

INTERFEROMETRIC MEASUREMENT OF THE QUADRATURE COHERENCE SCALE USING TWO REPLICAS OF A QUANTUM OPTICAL STATE

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Assessing Whether a quantum state ρ is nonclassical (*i.e.* incompatible with a mixture of coherent states) is a ubiquitous question in quantum optics, yet a nontrivial experimental task because many nonclassicality witnesses are nonlinear in ρ . In particular, if we want to witness or measure the nonclassicality of a state by evaluating its quadrature coherence scale, this a priori requires full state tomography. Here, we provide an experimental procedure for directly accessing this quantity with a simple linear interferometer involving two replicas (independent and identical copies) of the state $\hat{\rho}$ supplemented with photon-number-resolving measurements. This finding, which we interpret as an extension of the Hong-Ou-Mandel effect, illustrates the wide applicability of the multicopy interferometric technique in order to circumvent state tomography in quantum optics.