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# Quantification and unification of quantum macroscopicity, coherence, and nonclassicality.

*Thursday 12 July 2018 15:30 (30 minutes)*

This talk will present our recent efforts towards quantifications and unification of quantum macroscopicity, coherence, and nonclassicality. It will first cover our size measure for macroscopic quantum superpositions based on the phase-space structure [1] and another measure based on the degree of disturbance by coarse-grained measurements [2]. We will then present a more recent result that unifies two well-known yet independently developed concepts, i.e., the quantum coherence and the nonclassicality of light [3]. The concept of quantum coherence was recently developed based on the framework of quantum resource theories [4], while the notion of nonclassicality of light that has been established since the 1960s based on the quantum theory of light [5]. Our orthogonalization process enables one to quantify the coherence of an arbitrary continuous-variable state in the coherent-state basis, which leads to the conclusion that the coherence and the nonclassicality are identical resources [3]. Finally (if time is allowed), the talk will briefly discuss experimental implementations of macroscopic quantum states in optical systems [6,7].

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