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Measurement- and comparison-based sizes of Schrödinger cat states of light TYLER VOLKOFF, Univ of California - Berkeley — We extend several measurement-based definitions of effective "cat-size" to coherent state superpositions with branches composed of either single coherent states or tensor products of coherent states. These effective cat-size measures depend on determining the maximal quantum distinguishability of certain states associated with the superposition state: e.g., in one measure, the maximal distinguishability of the branches of the superposition is considered as in quantum binary decision theory; in another measure, the maximal distinguishability of the initial superposition and its image after a one-parameter evolution generated by a local Hermitian operator is of interest. The cat-size scaling with the number of modes and mode intensity (i.e., photon number) is compared to the scaling derived directly from the Wigner function of the superposition and to that estimated experimentally from decoherence. We also apply earlier comparison-based methods for determining macroscopic superposition size that require a reference GHZ state. The case of a hierarchical Schrödinger cat state with branches composed of smaller superpositions is also analyzed from a measurement-based perspective.

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