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A Simple Criterion for Quantum States of Light to Be Applicable for the Heisenberg-Limited Interferometry HWANG LEE, YANG GAO, Louisiana State University — Based on quantum information theory we present a criterion for quantum states of light to determine whether a certain input state can be used to achieve the Heisenberg limit. It provides a necessary condition for the Heisenberg-limited optical interferometry. This criterion can be expressed by the distance, between the input and output states, should depend linearly on the change of the phase difference in the limit of vanishing phase difference. On the other hand, since it does not rely on, nor specify what detection scheme to be adopted, the detection scheme needs be constructed independently. We also show that it is consistent with the previously known result suggested by Ou, based on a quantum nondemolition measurement scheme.

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