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Sub-Heisenberg limited phase measurement with two-mode squeezed vacuum GRETCHEN M. RATERMAN, PETR M. ANISIMOV, ARAVIND CHIRUVELLI, WILLIAM N. PLICK, SEAN D. HUVER, HWANG LEE, JONATHAN P. DOWLING, Louisiana State University — In this contribution, we present our studies of the sensitivity and resolution of phase measurement in a Mach-Zehnder interferometer with a two-mode squeezed vacuum (TMSV) input. TMSV provides a high-flux entangled state with average photon number of $\bar{n}$. Parity detection is suggested as a possible detection scheme, which can be carried out, for example, by using the NIST photon number resolving detectors. We show that super-resolution and "sub-Heisenberg" sensitivity is obtained with TMSV and parity detection. In particular, in our setup, the signal as a function of the phase evolves $\bar{n}$ times faster than in traditional schemes, and the uncertainty in the phase estimation is better than $1/\bar{n}$.

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