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Quantum-noise limits in matter wave interferometry with anyons FRANK CORVINO, Stevens Institue of Technology, IVANA DJURIC, J.D. MANCINI, City University of New York, CHRISTOPHER SEARCH, Stevens Institute of Technology — Here we consider a generalized Mach-Zehnder interferometer for matter waves with fractional quantum statistics, so called anyons. First, the input-output relations are derived for a lossless beam splitter with two input arms and two output arms using anyon commutation relations. By studying the scattering of multi-particle states by the beam splitter we are able to elucidate the role of quantum statistics and compare the output statistics of bosons, fermions, anyons, and classical particles. In addition, we study the quantum noise in the output statistics for the full interferometer and compare the results with anyons to the standard quantum limit for the sensitivity of the interferometer. Finally, we suggest methods for achieving Heisenberg limited sensitivity in an anyonic matter wave interferometry.

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