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Quantum analysis of a Nonlinear Beam splitter: third-order nonlinearity. HARI PRAKASH, Physics Department, University of Allahabad, Allahabad-211002, India, DEVENDRA KUMAR MISHRA[1], Physics Department, University of Allahabad, Allahabad-211002, India and V. S. Mehta College of Science, Bharwari, Kaushambi-212201, India — A linear beam splitter mixes two input modes having annihilation operators, say $\hat{a}$ and $\hat{b}$, to generate two output modes having annihilation operators, say, $\hat{c}$ and $\hat{d}$. It is common to write $\hat{c} = t\hat{a} + ir\hat{b}$, $\hat{d} = t\hat{b} + ir\hat{a}$, where the real constants t and r denote coefficients of transmission and reflection, respectively, and $t^2 + r^2 = 1$. We generalize the linear beam splitter input-output relations to include third-order nonlinearity and show that the nonlinear terms can give non-classical outputs with classical inputs. We study generation of squeezing and sub-Poissonian statistics for coherent light inputs.

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