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**Title: Differential formalism for the evolution of Gaussian states: Invariant states**

**Abstract:**

By the use of the invariant operators of quadratic Hamiltonians, it is possible to define a set of differential equations for the density matrix parameters and the covariance matrix of an arbitrary Gaussian state. This set of differential equations can be then used to describe the unitary evolution of a Gaussian system and the non-unitary evolution of its subsystems. On the other hand, by equaling the set of differential equations to zero, this formalism allows us to define invariant or quasi-invariant Gaussian states for different quadratic Hamiltonians. As examples we present invariant states for the frequency converter and quasi-invariant states for the parametric amplifier.