# Gaussian Channel Discrimination

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The optimal discrimination of two quantum states is a central problem in quantum information theory and, more generally, in quantum mechanics. A problem of equal importance, but more difficult to solve, is the optimal discrimination between two different quantum channels. In this talk we consider both these tasks in the setting of bosonic systems. First we show how we can estimate the error probability affecting the optimal discrimination of two arbitrary Gaussian states. In particular, we show how this can be done using a symplectic formulation of the quantum Chernoff bound. Then, we consider the problem of discriminating between two Gaussian channels. In this case we provide a general bound for the error probability which affects the "classical discrimination" of these channels, i.e., their discrimination assuming classical states as input. By exploiting this bound, we can show when a non-classical input state (e.g., an entangled state) is able to outperform any classical input state. This enhancement is explicitly shown in two paradigmic scenarios both involving the use of low energy: the sensing of a low-reflectivity target in a bright thermal-noise bath (quantum illumination), and the readout of classical memories with high reflectivities (quantum reading).