Discriminating between optical coherent superposition states with imperfect detection

A Fatahizadeh and A Rabeie*

Physics Department, Faculty of Science, Razi University, Kermanshah, Iran

E-mail: rabeie@razi.ac.ir

Abstract

Quantum state discrimination between optical coherent superposition states is considered. The Helstrom bound for imperfect detection is evaluated. Under a physically realistic model of photodetection, we study several techniques for discriminating between optical coherent superposition states. We investigate quantum error probabilities for the Kennedy receiver, the Dolinar receiver and the unitary rotation scheme proposed by Sasaki and Hirota for sub-unity detector efficiency. Also, we study the feedback strategy employed by the Dolinar receiver to achieve the Helstrom bound for sub-unity detection efficiency.

Keywords: Schrödinger cat states, Helstrom bound, Kennedy receiver, Sasaki-Hirota receiver, Dolinar receiver.

For full article, refer to the Persian section