

Quantum state discrimination as a tool

Wilson Rabelo

Universidade Federal do Pará

One of the most important contributions of discrimination of quantum states is the correlation between the foundations of quantum mechanics and quantum information. This correlation has been the starting point for the motivation to work with fundamental problems in two areas. As an example we quote, minimum-error state discrimination applied for the preparation of quantum states and quantum communication, quantum filtering and quantum cryptography. In this scenario, we focus on the strategies of unambiguous discrimination. The literature has an extensive content on the subject, is dealing with the discrimination of pure or mixed quantum states, is applied or purely academic approach. Most studies do not explicitly show how it will implement its generalized measures and put them in the circuit model of quantum computing. Therefore, in this work we propose a protocol that explicitly demonstrates not only how to perform the construct the positive-operator-valued general measurement (POVM) as well as the quantum circuit that implements it. We will apply our protocols on problems of cryptography, quantum filtering and quantum min-entropy. [1] Bae, J., Kwok, L., J. Phys. A: Math. Theor. 48, (2015) 083001. [2] M. Takeoka, M. Ban, M. Sasaki, Phys. Rev A 68, (2003) 012307. [3] Y. C. Eldar, IEEE Trans. Inform. Theory 49, (2003) 446.