
QUANTUM INFORMATION THEORY TALK AND TUTORIAL: YUMING ZHAO, University of Waterloo

Introduction to quantum self-testing

Suppose we have a physical system consisting of two separate labs, each capable of making a number of different measurements. If the two labs are entangled, then the measurement outcomes can be correlated in surprising ways. In quantum mechanics, we model physical systems like this with a state vector and measurement operators. However, we do not directly see the state vector and measurement operators, only the resulting measurement statistics (which are referred to as a *correlation*). There are typically many different models achieving a given correlation. Hence it is a remarkable fact that some correlations have a unique quantum model. A correlation with this property is called a self-test.

This tutorial will offer an introduction to self-testing and relevant mathematics. Particular focus will be given to the operator-algebraic perspective of understanding self-testing and the use of approximate representation theory in proving robustness.