Mutually Unbiased Bases

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Abstract

Quantum physicists began studying the concept of *mutually unbiased bases (MUBs)* in the late 70's as a solution to optimal quantum state discrimination. Namely, a maximal set of mutually unbiased bases can be used to construct a minimal set of measurement operators that maximally characterize a quantum system. In the last 10 years, there has been a revised interest in mutually unbiased bases by mathematicians, due to their relationship to problems in finite geometry and combinatorics. While there has been incremental progress made in the study of MUBs, there still remains major open questions. This talk will introduce the topic from a historical approach, and discuss open problems, some incremental solutions, and possible directions forward.

Keywords: mutually unbiased basis (MUBs), quantum state, finite geomerty, combinatorics.