On the existence of mutually unbiased basis sets in complex vector spaces of finite dimension.

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Thursday, May 29, 2003
102 Bradley Hall, 4:00 pm
(Tea 3:30 pm Math Lounge)

Abstract

Basis sets A and B are said to be mutually unbiased if all inner products (between any element of A and any element of B) have the same magnitude. Wootters and Fields have shown that a complex vector space of dimension d supports d+1 mutually unbiased basis sets if d is a power of a prime. Electron spin provides the most familiar example in quantum physics, the case d=2, in which the eigenbases of the three Pauli matrices are mutually unbiased. We will discuss physical motivations (in particular, why do we care to have d+1 mutually unbiased basis sets in the first place?), examples where all d+1 exist, and musings about the case d=6.

This talk should be accessible to undergraduates.

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