Quasi-orthogonal Subalgebras of Matrix Algebras

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The idea of complementarity in quantum measurement theory and information theory has led to the investigation of the subject. Subalgebras of the $M_n \otimes M_n$ complex matrix algebra corresponding to either measurements or subsystems are considered. Quasi-orthogonality is a generalization of mutually unbiasedness, and it means orthogonality of the traceless subspaces. We seek direct-sum decompositions of the full matrix-algebra to pairwise quasi-orthogonal subalgebras. We provide several results on the $n = 2$ case, and some for general n. The related notion of conditional POVM is explained as well.

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