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Separability from Spectrum for Qubit-Qudit States

The separability from spectrum problem asks for a characterization of the eigenvalues of the bipartite mixed states ρ with the property that $U^*\rho U$ is separable for all unitary matrices U . This problem has been solved when the local dimensions m and n satisfy $m = 2$ and $n \leq 3$. We solve all remaining qubit-qudit cases (i.e., when $m = 2$ and $n \geq 4$ is arbitrary). In all of these cases we show that a state is separable from spectrum if and only if $U^*\rho U$ has positive partial transpose for all unitary matrices U . This equivalence is in stark contrast with the usual separability problem, where a state having positive partial transpose is a strictly weaker property than it being separable.