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The Inverse Eigenvalue Problem for Entanglement Witnesses

In quantum information theory, a linear operator that can detect entanglement in a quantum system is called an entanglement witnesses. We consider the inverse eigenvalue problem for entanglement witnesses, which asks for a characterization of their possible spectra. Equivalently, we consider the problem of classifying the spectra that can result from applying a positive linear map to a single tensor factor of a positive semidefinite matrix. We completely solve this problem in some low dimensions and we derive a large family of new necessary conditions on the spectra in arbitrary dimensions.