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Generating and detecting bound entanglement in two-qutrits using a family of indecomposable positive maps

The problem of bound entanglement detection is a challenging aspect of quantum information theory for higher dimensional systems. Here, we propose an indecomposable positive map for two-qutrit systems, which is shown to detect a class of positive partial transposed (PPT) entangled states. A corresponding witness operator is constructed and shown to be weakly optimal and locally implementable. Further, we perform a structural physical approximation of the indecomposable map to make it a completely positive one, and find a new PPT entangled state which is not detectable by certain other well-known entanglement detection criteria.

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