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Entanglement witnesses for many qubit systems JUSTYNA ZWOLAK, Oregon State University, DARIUSZ CHRUŚCIŃSKI, Nicolaus Copernicus University — Entanglement is one of the essential features of quantum physics and is fundamental to future quantum technologies. The characterization of entanglement has been shown to be equivalent to the characterization of positive, but not completely positive, maps (PnCP) over matrix algebras. In the cases of 2×2 and 2×3 dimensional spaces does there exist complete characterization of the separability problem (due to the celebrated Peres-Horodecki criterion). However, for increasingly higher dimensions this task becomes more and more difficult. There has been a considerable effort devoted to constructing PnCP, but a general procedure is still not known. Recently we were able to generalize the Robertson map in a way that naturally meshes with $2N$ qubit systems, i.e., its structure respects the 2^{2N} growth of the state space. We proved that this map is positive, but not completely positive, indecomposable and optimal, and as such can be used to detect (bipartite) entanglement. We also determined the relation our maps to entanglement breaking channels. We will discuss these new classes of entanglement witnesses.

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