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Certifying Separability in Mixed States, and Superradiance ELIE WOLFE, University of Connecticut, S.F. YELIN, ITAMP at Harvard, University of Connecticut — Separability criteria are typically of the necessary-but-not-sufficient variety, in that satisfying some separability criterion, such as demanding positivity of all eigenvalues under partial transpose, does not strictly imply separability. Certifying separability amounts to giving an existence proof for a decomposition of target mixed state into some convex combination of separable states, however even determining the existence of such a decomposition is "hard." We show that it is effective to instead ask if the target mixed state "fits" some preconstructed separable form, in that one can generate a sufficient separability criterion relevant to all target states in some family by ensuring enough degrees of freedom in the preconstructed separable form. We demonstrate this technique by inducing a sufficient criterion for "diagonally symmetric" states of N qubits. A sufficient separability criterion opens the door to study precisely how entanglement is (not) formed; we use ours to prove that, counter-intuitively, entanglement is not generated in idealized Dicke superradiance despite the many-body effects of that model. We introduce a quantification of the extent to which a given preconstructed parametrization comprises the set of all separable states; for "diagonally symmetric."

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