A many-body interpretation of Majorana bound states, and conditions for their localisation THOMAS O'BRIEN, Lorentz Institute, ANTHONY WRIGHT, University of Queensland — We derive a condition for the existence of completely or exponentially localised Majorana bound states (with the potential for non-Abelian statistics) in a generic many-body system. We discuss the relationship between the existence of these operators and the protection of the ground state degeneracy from local perturbations. We use our methods to study the exponential decay of the Majorana bound states in the non-interacting Kitaev chain, finding complete agreement between our many-body calculation and single-particle results. We then apply these results to various interacting systems which have previous evidence for Majorana bound states.

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