Protecting the Kitaev honeycomb model from external fields\textsuperscript{1}

HAITAN XU, JACOB TAYLOR, Joint Quantum Institute, University of Maryland, College Park, MD 20742, and National Institute of Standards and Technology, Gaithersburg, MD 20899 — We propose an approach to generate many-body interactions from two-body interactions with stable cat states. Applied to the celebrated Kitaev honeycomb model, our approach opens a spectral gap in the gapless phase of the model without any external magnetic field. We confirm the non-Abelian topological properties of a generalized Kitaev model and demonstrate our approach’s robustness to sources of error. Our work provides a complete framework for experimentally realizing and manipulating non-Abelian anyons, with direct application in topological quantum computation.

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