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Wavefunction Vortex Attachment via Matrix Products: Application to Atomic Fermi Gases in Flat Spin-Orbit Bands[1] VITO SCAROLA, Virginia Tech — Ultracold atomic gases in the presence of strong spin-orbit coupling present challenging many-body problems. For very strong spin orbit coupling, interaction effects dominate. The resulting many-body problem is non-perturbative but progress can be made with validated wavefunctions that properly account for the location of wavefunction vortices. I will discuss a new method to construct and validate Jastrow-correlated wavefunctions in arbitrary bases. The method implements vortex insertion in terms of matrix products. The approach was tested on a model of a dilute gas of Rashba spin-orbit coupled fermions in the presence of slow rotation. Validated wavefunctions show that vortices in slowly rotating atomic fermi gases with strong spin-orbit coupling cluster near the system center and should therefore be directly visible in time-of-flight imaging.

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