Executed Command
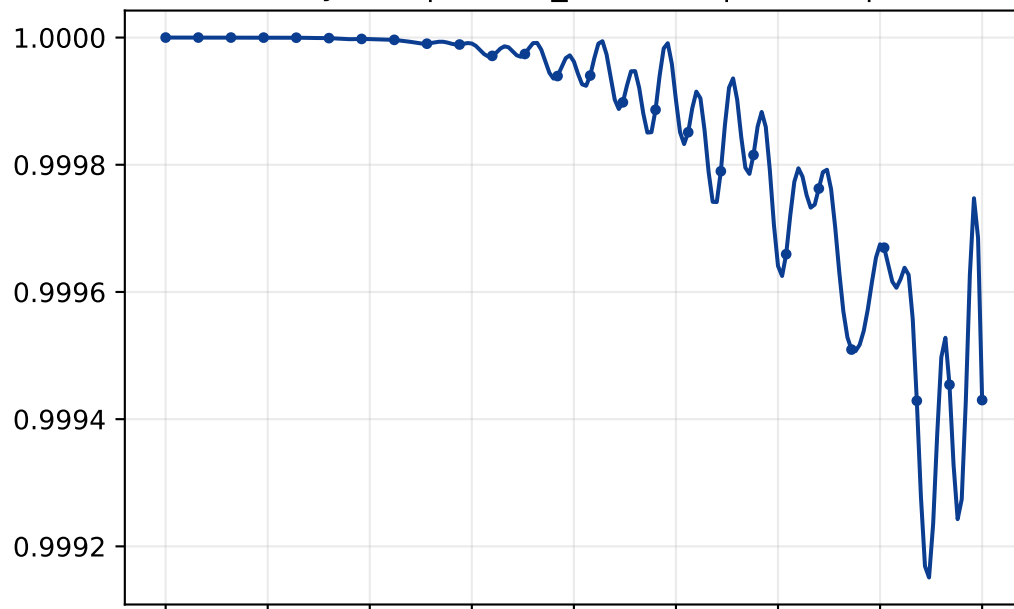
Reference: pipelines/PIPELINE_RUN_GUIDE.md
Script: pipelines/hardcoded_hubbard_pipeline.py
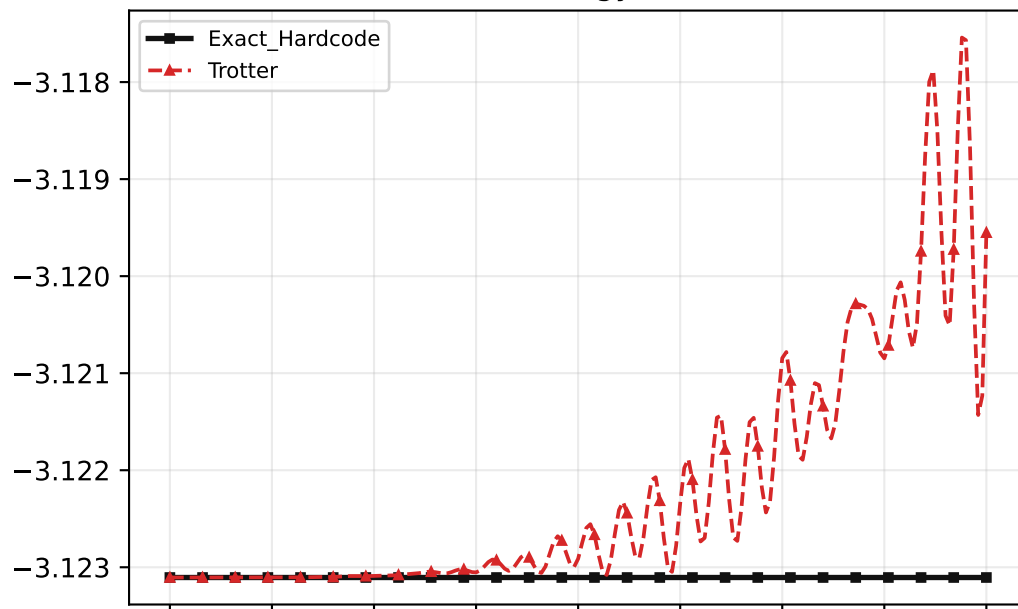
/Library/Frameworks/Python.framework/Versions/3.12/bin/python3 Fermi-Hamil-JW-VQE-TROTTER-
   PIPELINE/pipelines/hardcoded_hubbard_pipeline.py --L 3 --initial-state-source exact --t 1.0 --u 4.0 --dv 0.0
   --boundary periodic --ordering blocked --t-final 20.0 --num-times 201 --trotter-steps 128 --enable-drive
   --drive-pattern staggered --drive-A 0.0 --drive-omega 2.0 --drive-tbar 3.0 --drive-phi 0.0 --drive-time-
   sampling midpoint --skip-qpe --vqe-restarts 1 --vqe-maxiter 120 --output-json artifacts/compare_A0_L3.json
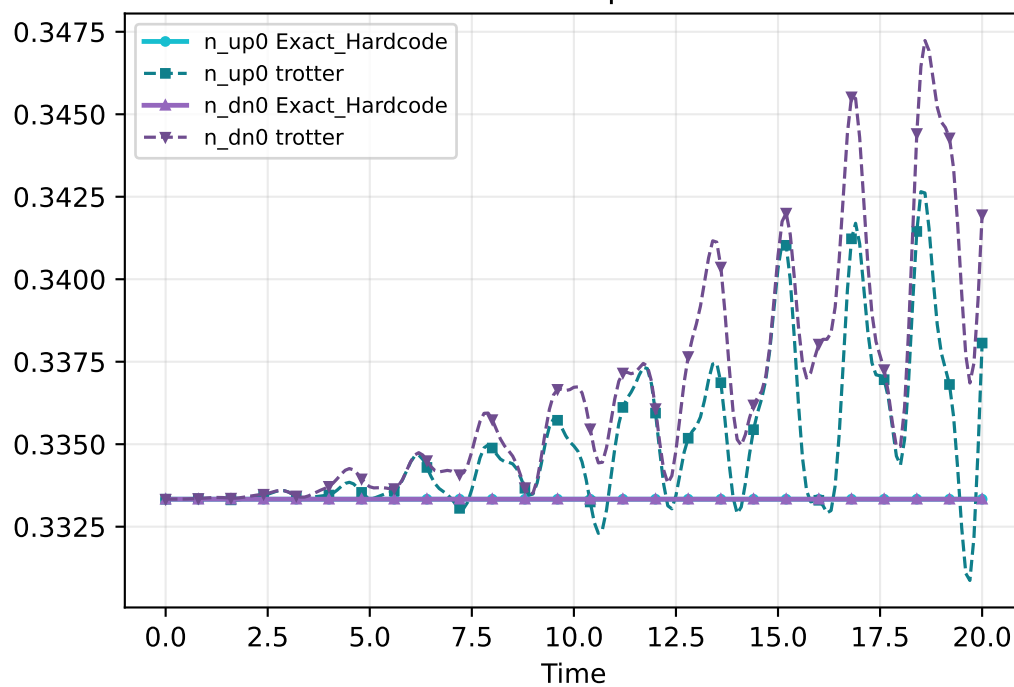   --output-pdf artifacts/compare_A0_L3.pdf

Hardcoded Hubbard Pipeline: L=3

Fidelity(t) = |<Exact_Hardcode|Trotter>|^2

Energy

- Exact_Hardcode
- Trotter

Site-0 Occupations

- n_up0 Exact_Hardcode
- n_up0 trotter
- n_dn0 Exact_Hardcode
- n_dn0 trotter

Total Doublon

- doublon Exact_Hardcode
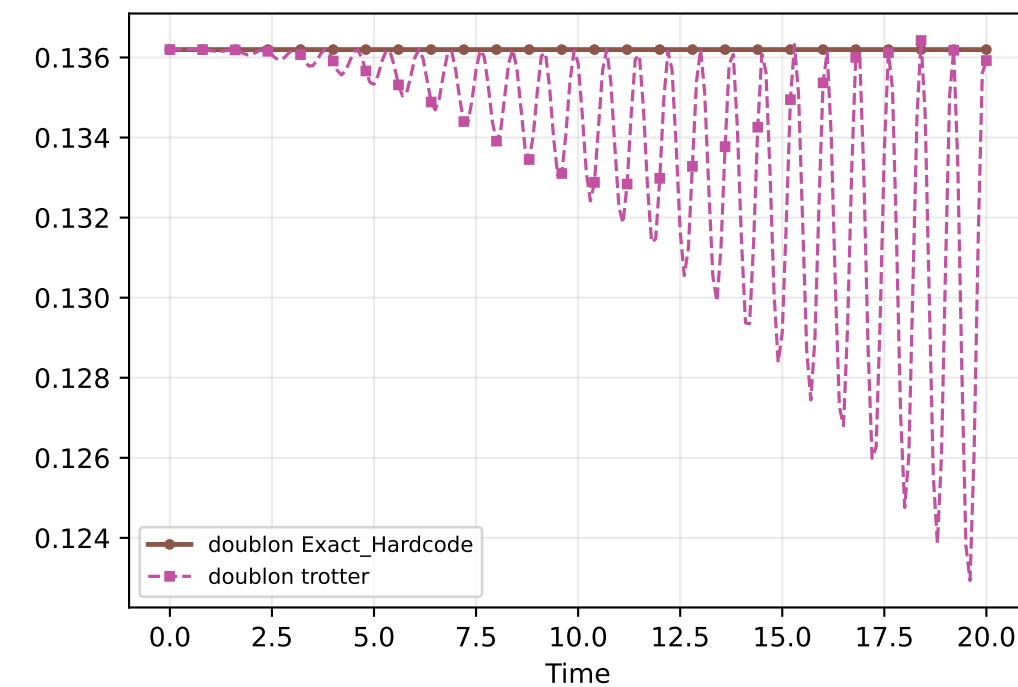- doublon trotter
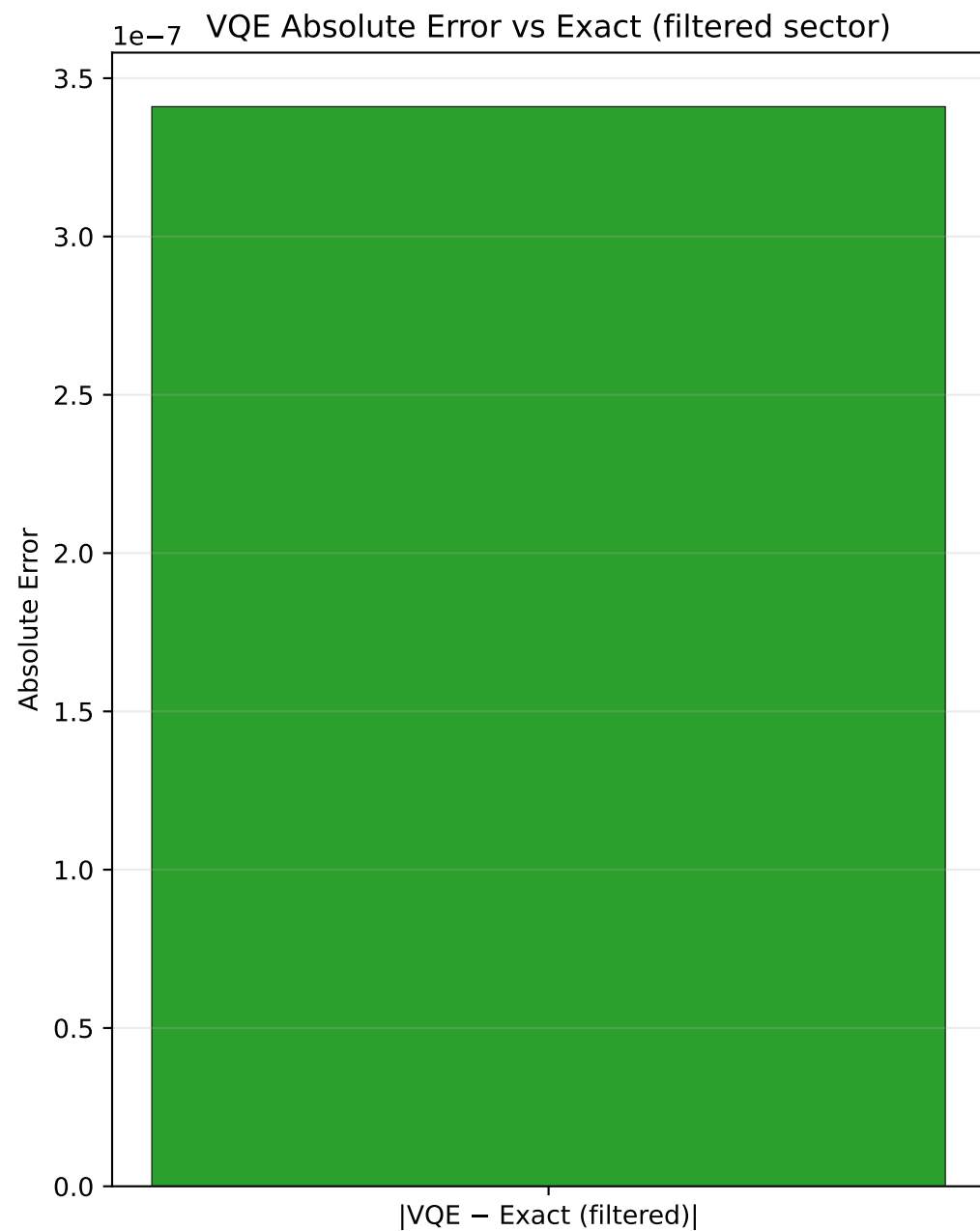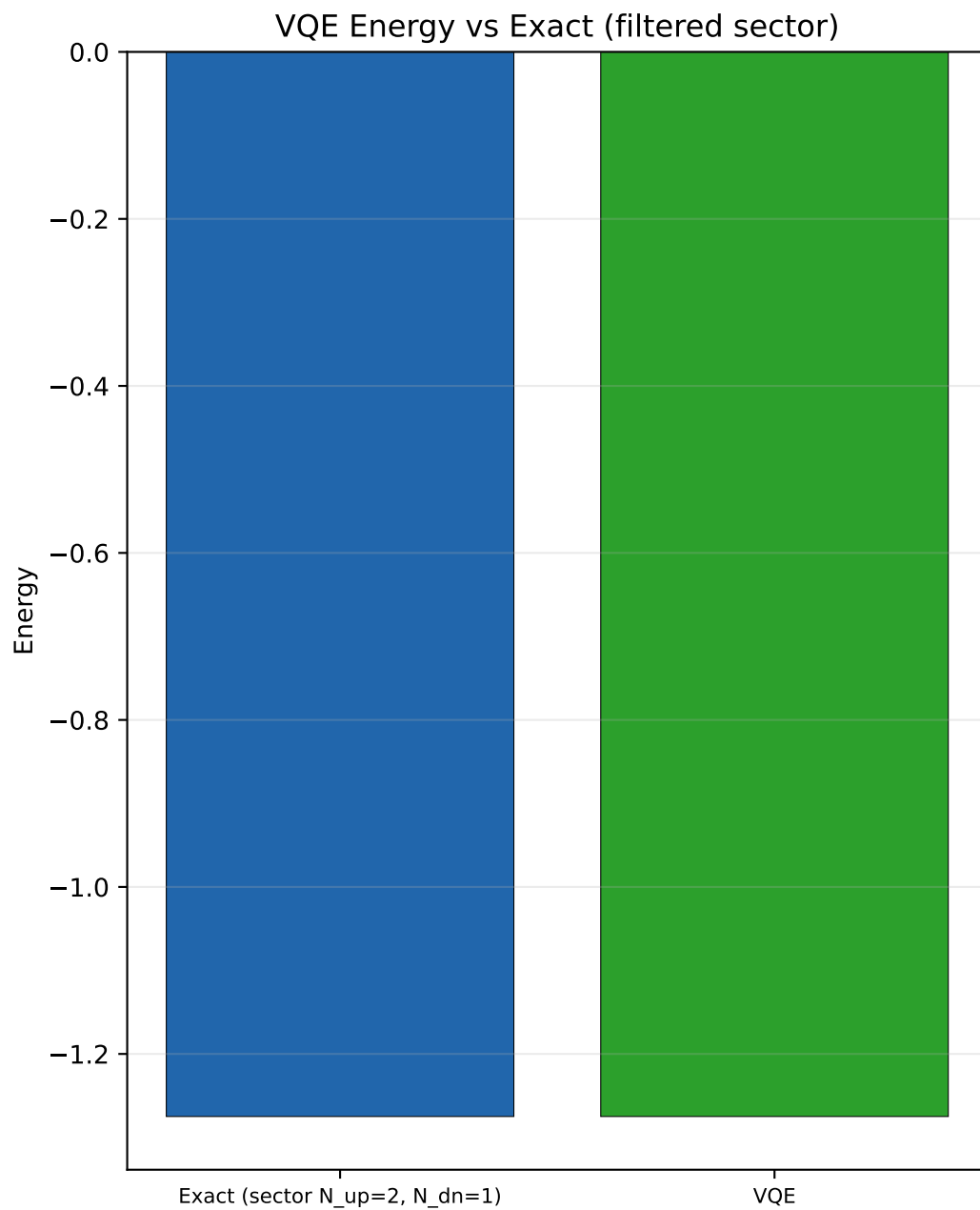
Time

VQE optimises within the half-filled sector; exact (filtered) is the true sector ground state.
Full-Hilbert exact energy is in the JSON text summary only.

VQE Energy vs Exact (filtered sector)

VQE Absolute Error vs Exact (filtered sector)

Hardcoded Hubbard pipeline summary

settings: {"L": 3, "t": 1.0, "u": 4.0, "dv": 0.0, "boundary": "periodic", "ordering": "blocked", "t_final": 20.0, "num_times":
exact_trajectory_label: Exact_Hardcode
exact_trajectory_method: python_matrix_eigendecomposition
ground_state_exact_energy (full Hilbert): -3.123105625618
ground_state_exact_energy_filtered: -1.2749172176353751
filtered_sector: {'n_up': 2, 'n_dn': 1}
vqe_energy: -1.274916876603393
qpe_energy_estimate: None
initial_state_source: exact
hamiltonian_terms: 22
reference_sanity: {'checked': False, 'reason': 'no matching bundled reference for these settings'}