

L=2 Run Settings & Metrics Summary

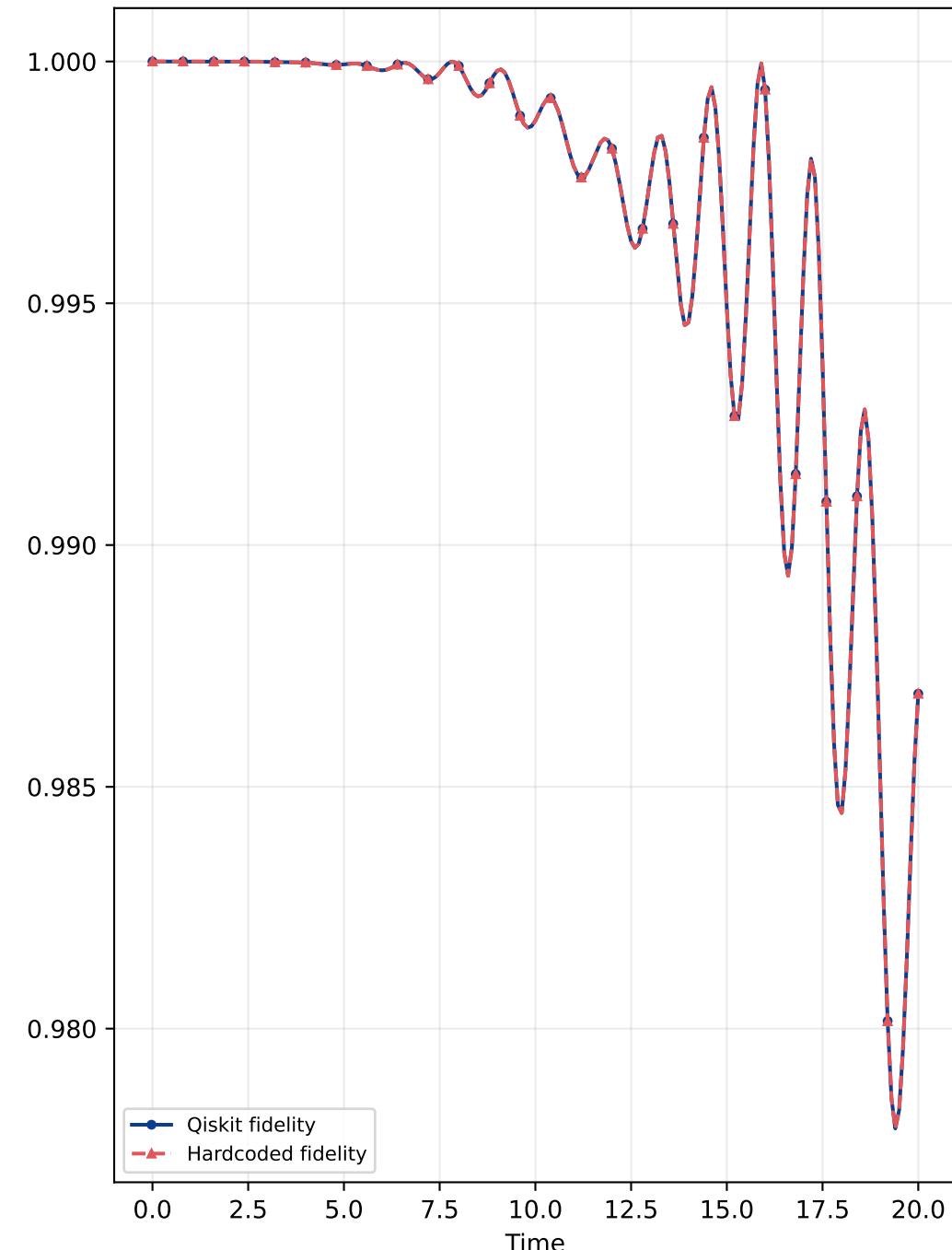
```
L=2  t=1.0  u=4.0  dv=0.0  boundary=periodic  ordering=blocked  initial_state_source=vqe  t_final=20.0  num_times=201  suz

thresholds:
doublon_trotter_max_abs_delta: 1.00e-03
energy_trotter_max_abs_delta: 1.00e-03
fidelity_max_abs_delta: 1.00e-04
ground_state_energy_abs_delta: 1.00e-08
n_dn_site0_trotter_max_abs_delta: 5.00e-03
n_up_site0_trotter_max_abs_delta: 5.00e-03

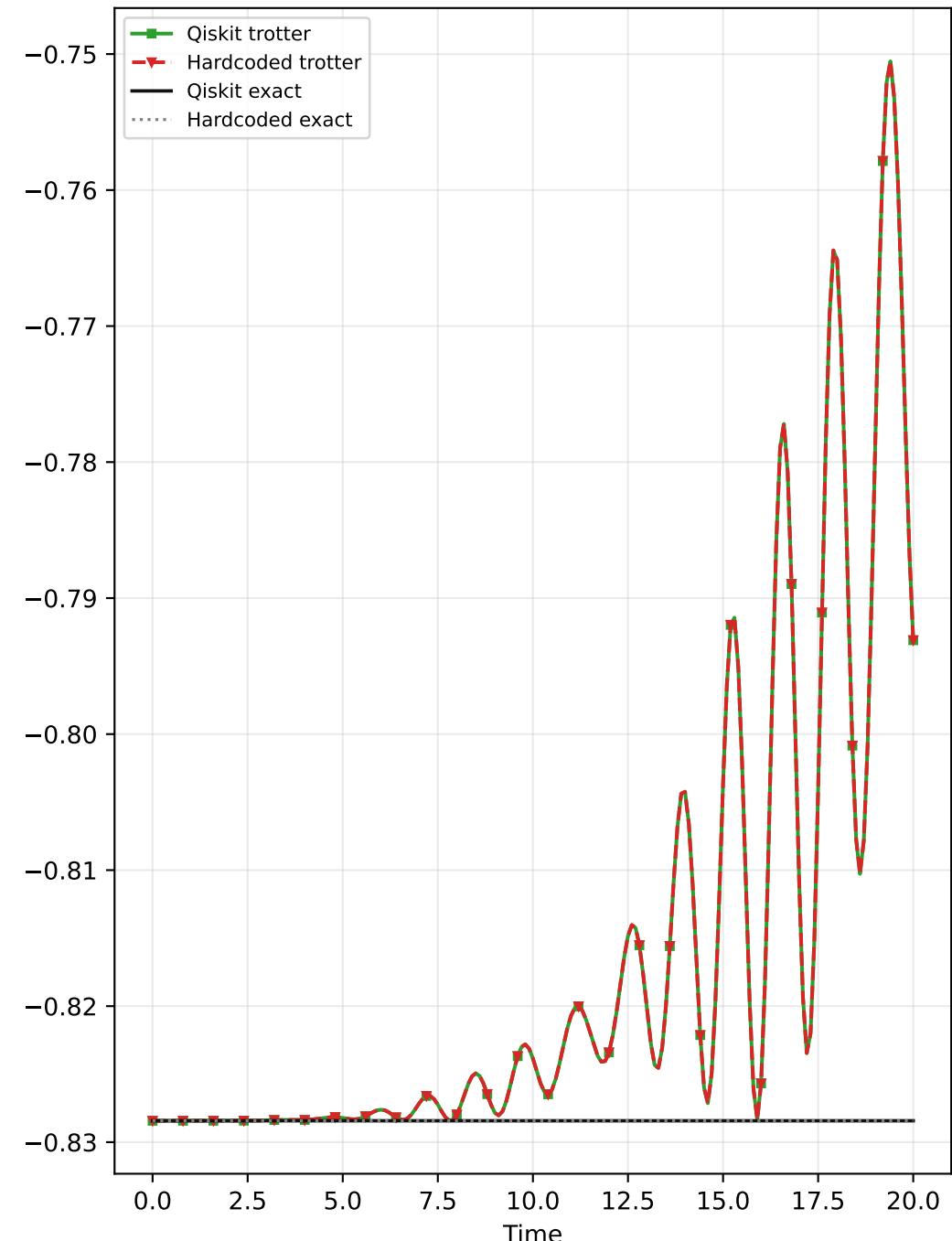
max |Δ|:
gs_energy: 0.00e+00
doublon_trotter: 2.79e-06
energy_trotter: 2.35e-05
fidelity: 8.59e-06
n_dn_site0_trotter: 2.79e-05
n_up_site0_trotter: 2.78e-05
result: PASS
```

Pipeline Comparison L=2: Hardcoded vs Qiskit (Fidelity & Energy)

Fidelity

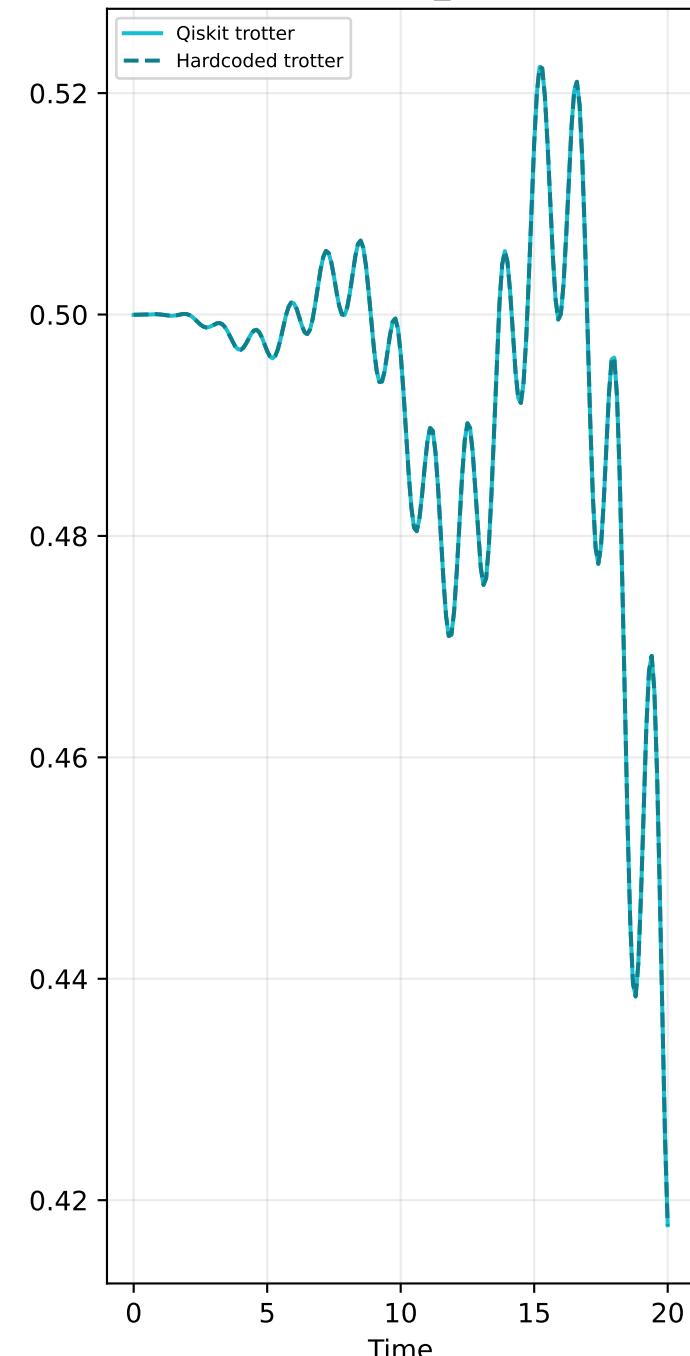


Energy

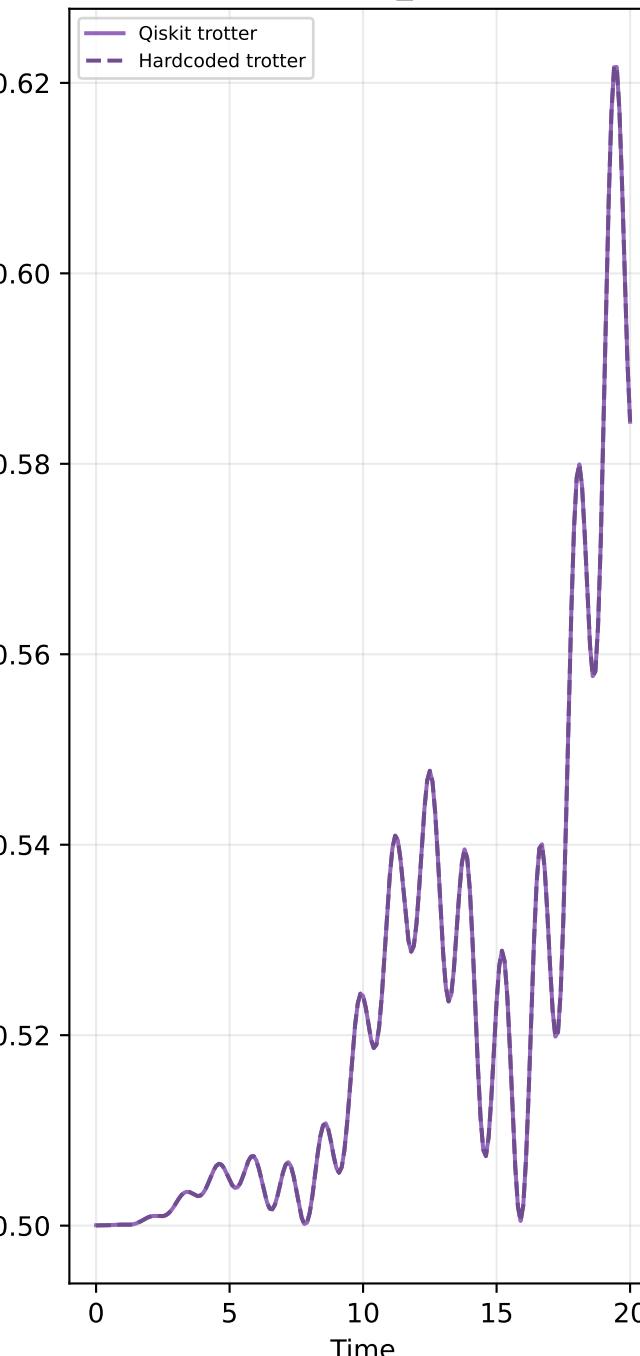


Pipeline Comparison L=2: Occupations & Doublon (auto-zoomed)

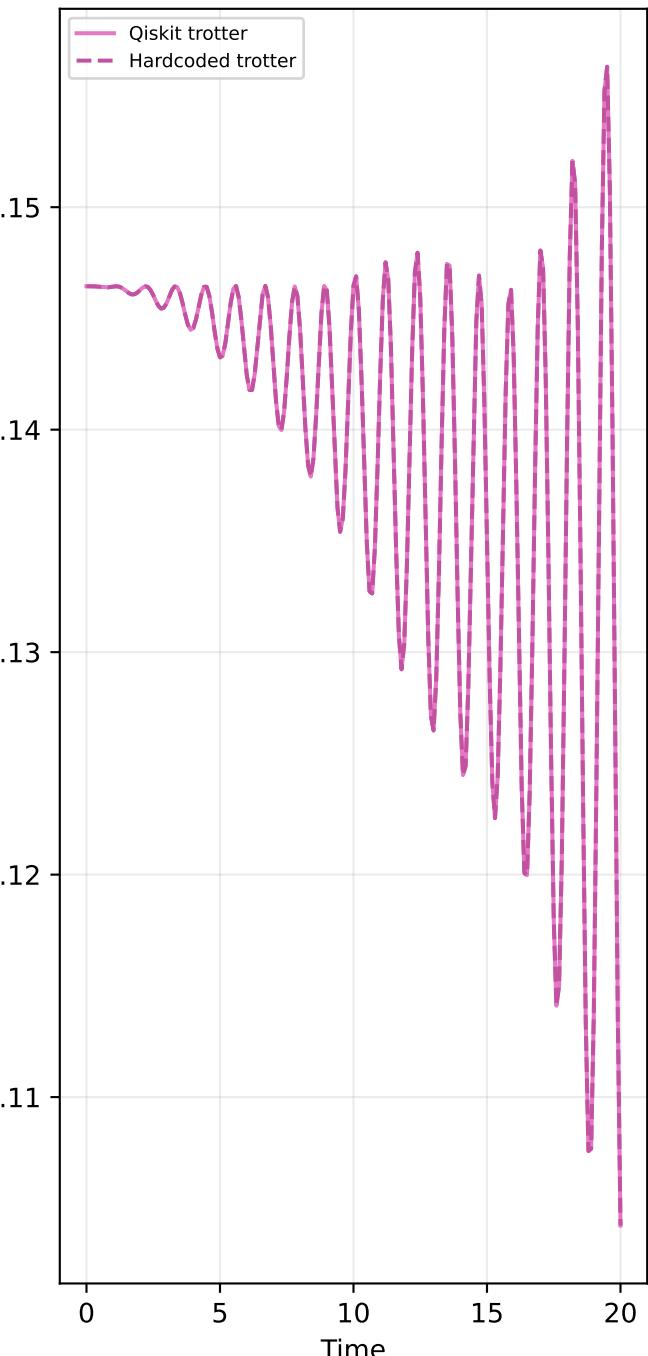
Site-0 n_up



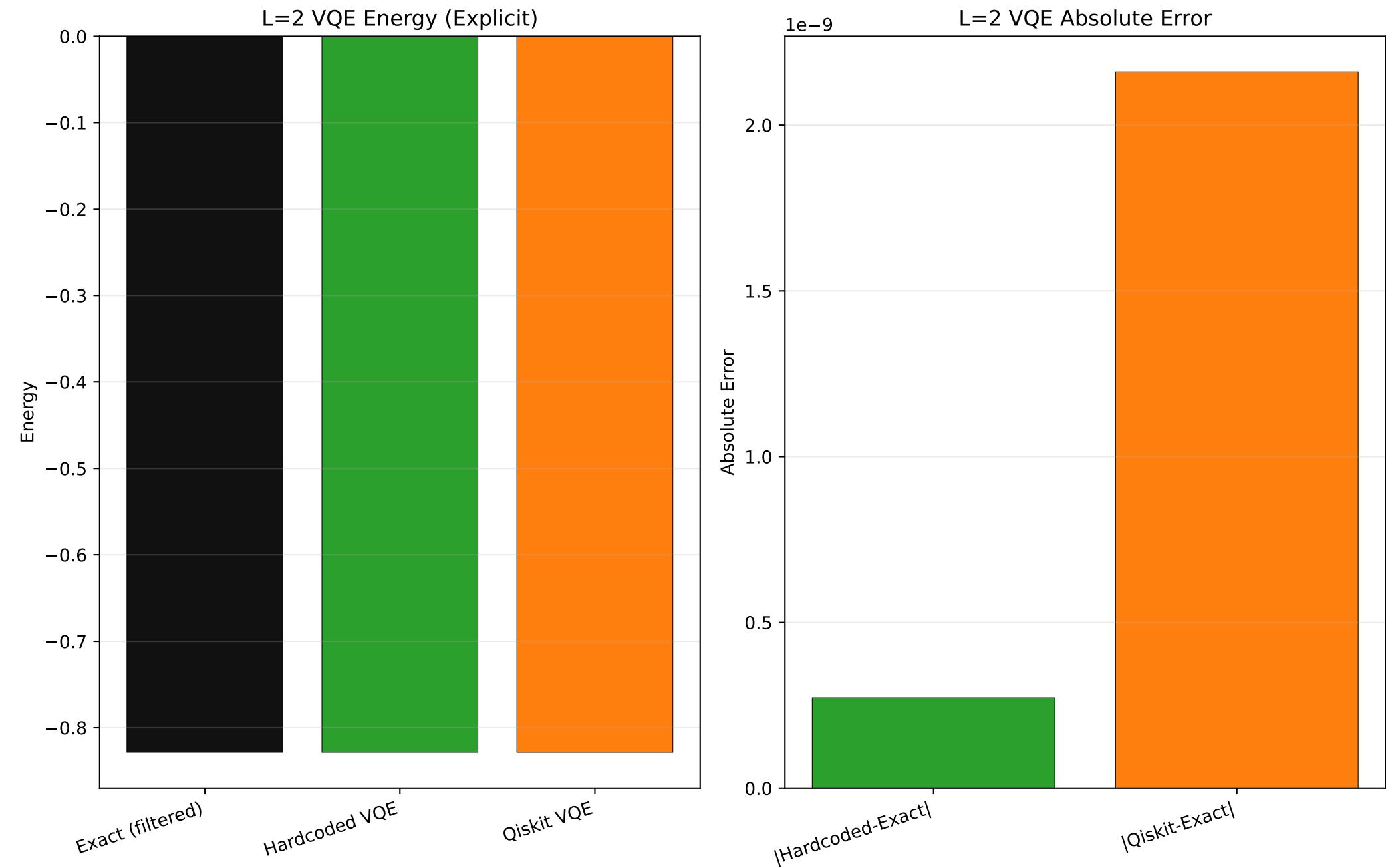
Site-0 n_dn



Doublon

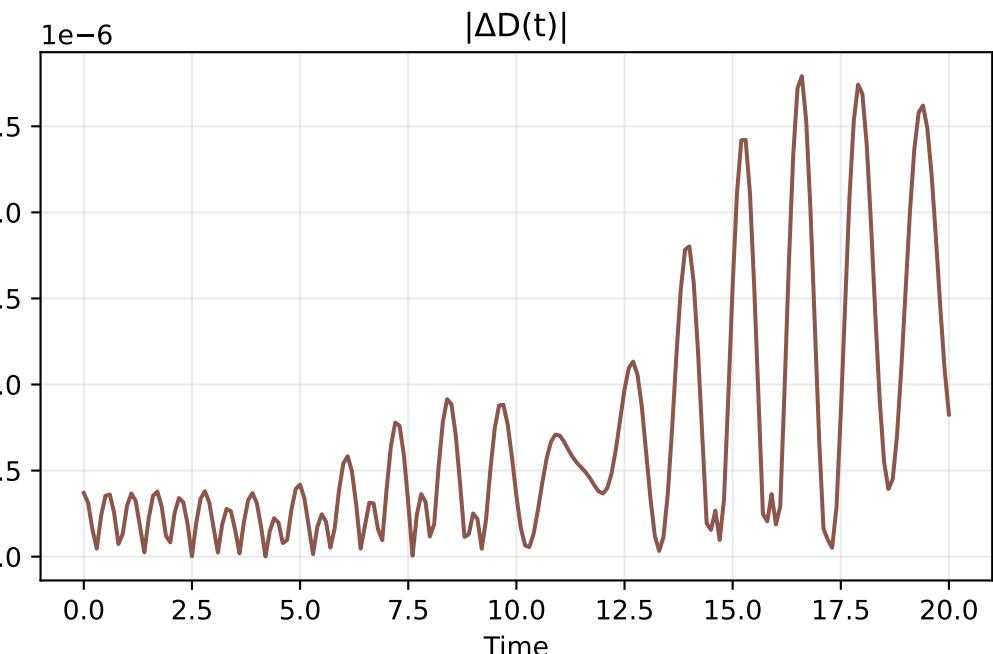
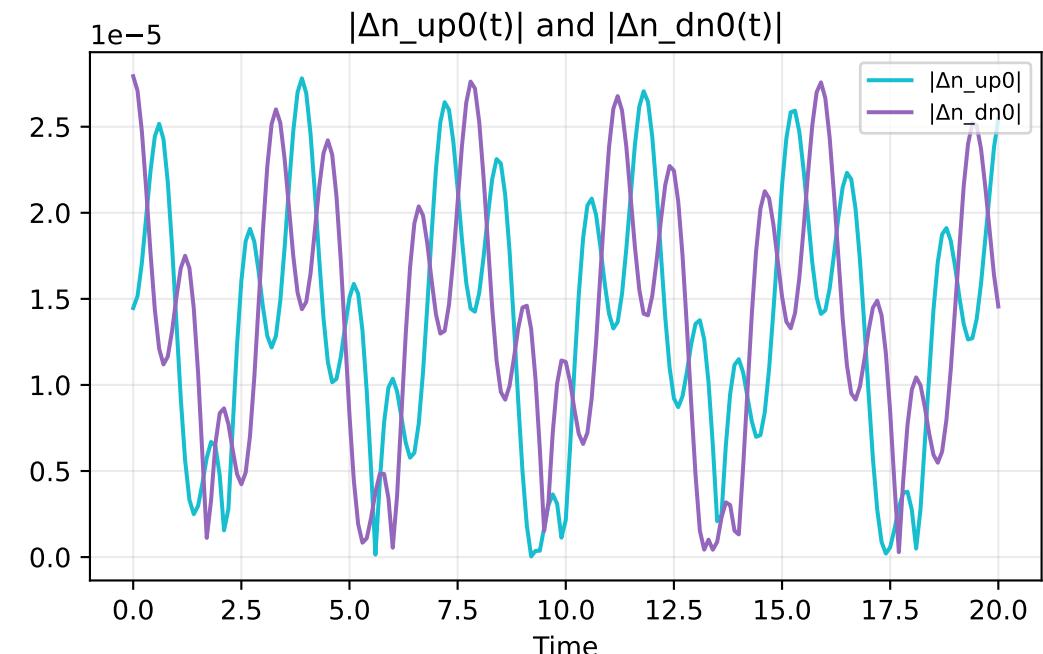
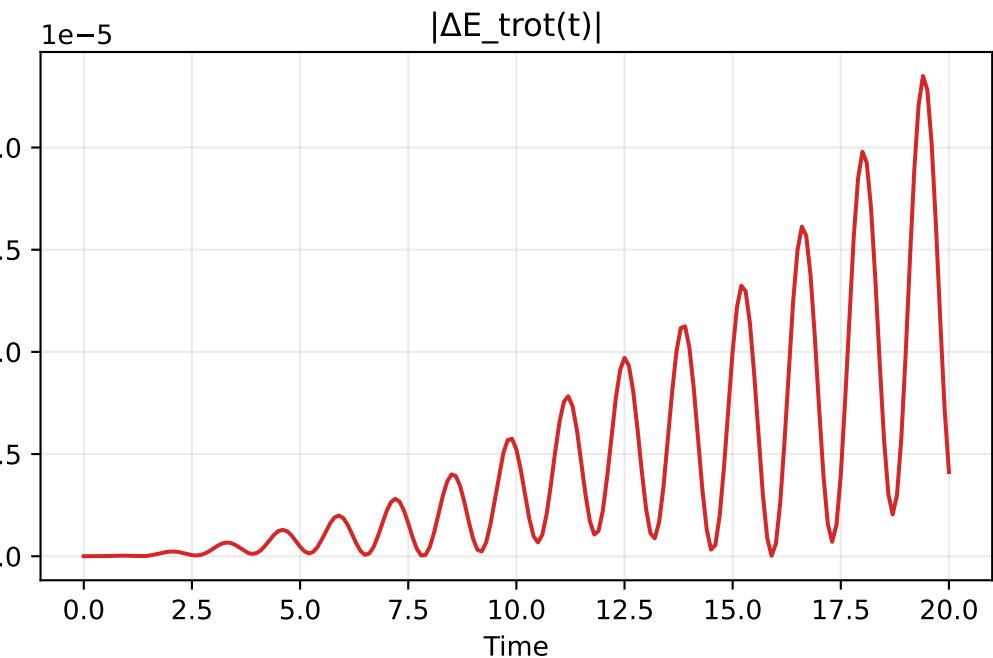
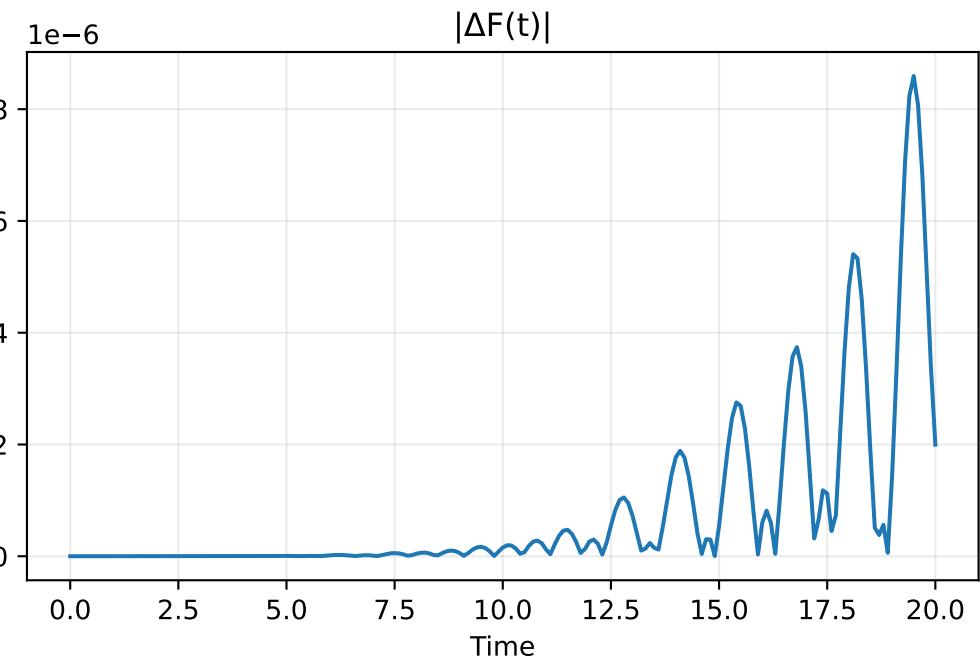


When initial_state_source=vqe, Trotter $E(t=0) = \langle \psi_{\text{vqe}} | H | \psi_{\text{vqe}} \rangle$ = VQE energy.
VQE energy \neq exact ground state energy unless VQE fully converged.



Delta Diagnostics L=2

$\Delta X(t) = |X_{hc}(t) - X_{qk}(t)|$, where $X_{pipeline}(t)$ is that pipeline's stored trajectory value.



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L=2 metrics summary

Delta metric definitions:
ΔF(t)      = |F_hc(t) - F_qk(t)|
ΔE_trot(t) = |E_trot_hc(t) - E_trot_qk(t)|
Δn_up0(t)   = |n_up0_hc(t) - n_up0_qk(t)|
Δn_dn0(t)   = |n_dn0_hc(t) - n_dn0_qk(t)|
ΔD(t)       = |D_hc(t) - D_qk(t)|

F_pipeline(t) is the pipeline's stored trajectory fidelity value (as computed internally vs that pipeline's exact evolution).

ground_state_energy_abs_delta = 0.0
fidelity max/mean/final = 8.59377818263063e-06 / 8.005364268005184e-07 / 1.9968946775028584e-06
energy_trotter max/mean/final = 2.3499154368722408e-05 / 4.296069546226253e-06 / 4.121644446297701e-06
n_up_site0_trotter max/mean/final = 2.781282510533334e-05 / 1.3631273238300274e-05 / 2.545305309981094e-05
n_dn_site0_trotter max/mean/final = 2.7934482115687942e-05 / 1.3868963351504503e-05 / 1.4557018242267183e-05
doublon_trotter max/mean/final = 2.7910871213676636e-06 / 6.794619643993374e-07 / 8.256188262223407e-07

checks:
{'doublon_trotter_max_abs_delta': True,
 'energy_trotter_max_abs_delta': True,
 'fidelity_max_abs_delta': True,
 'ground_state_energy_abs_delta': True,
 'n_dn_site0_trotter_max_abs_delta': True,
 'n_up_site0_trotter_max_abs_delta': True}

PASS = True

```