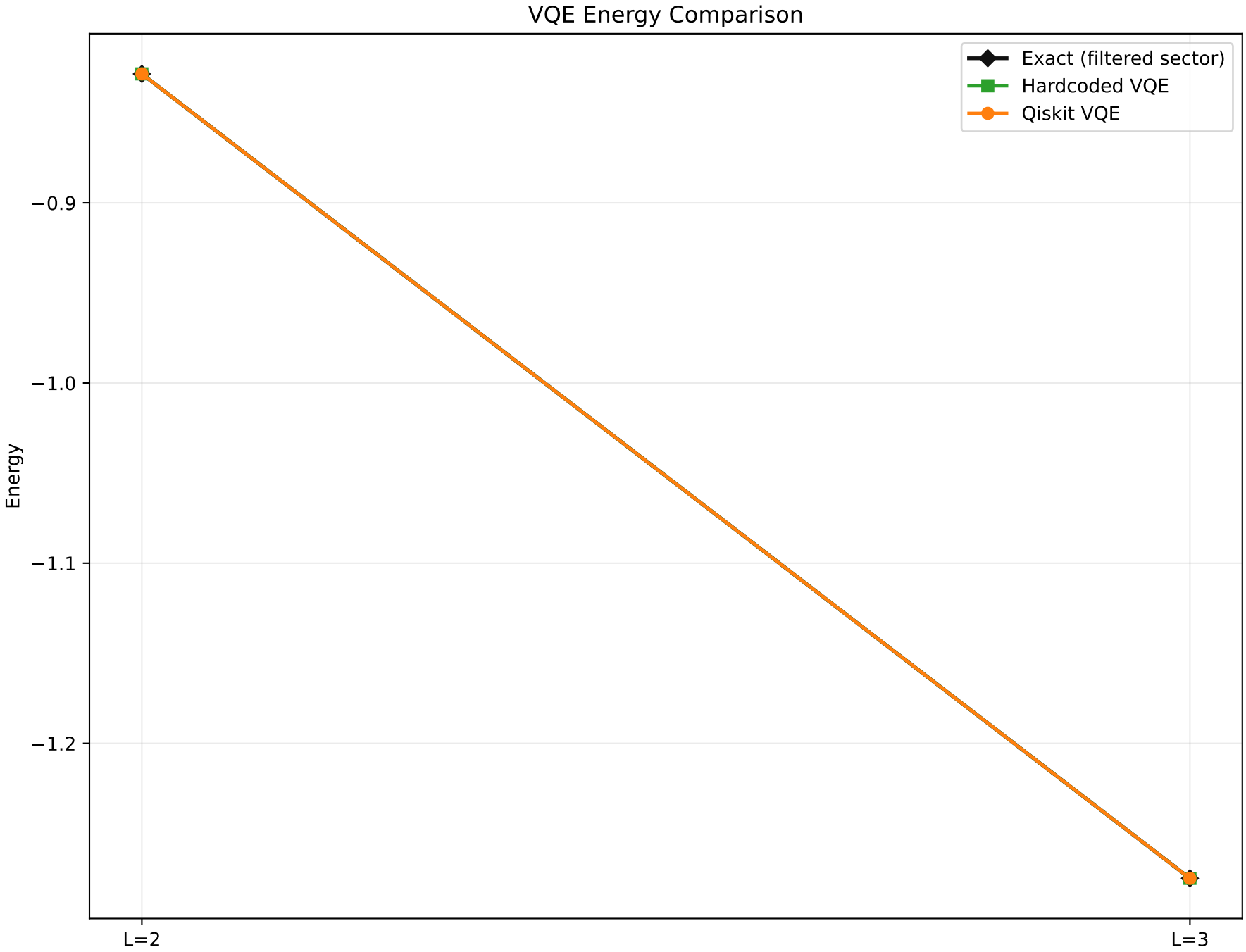
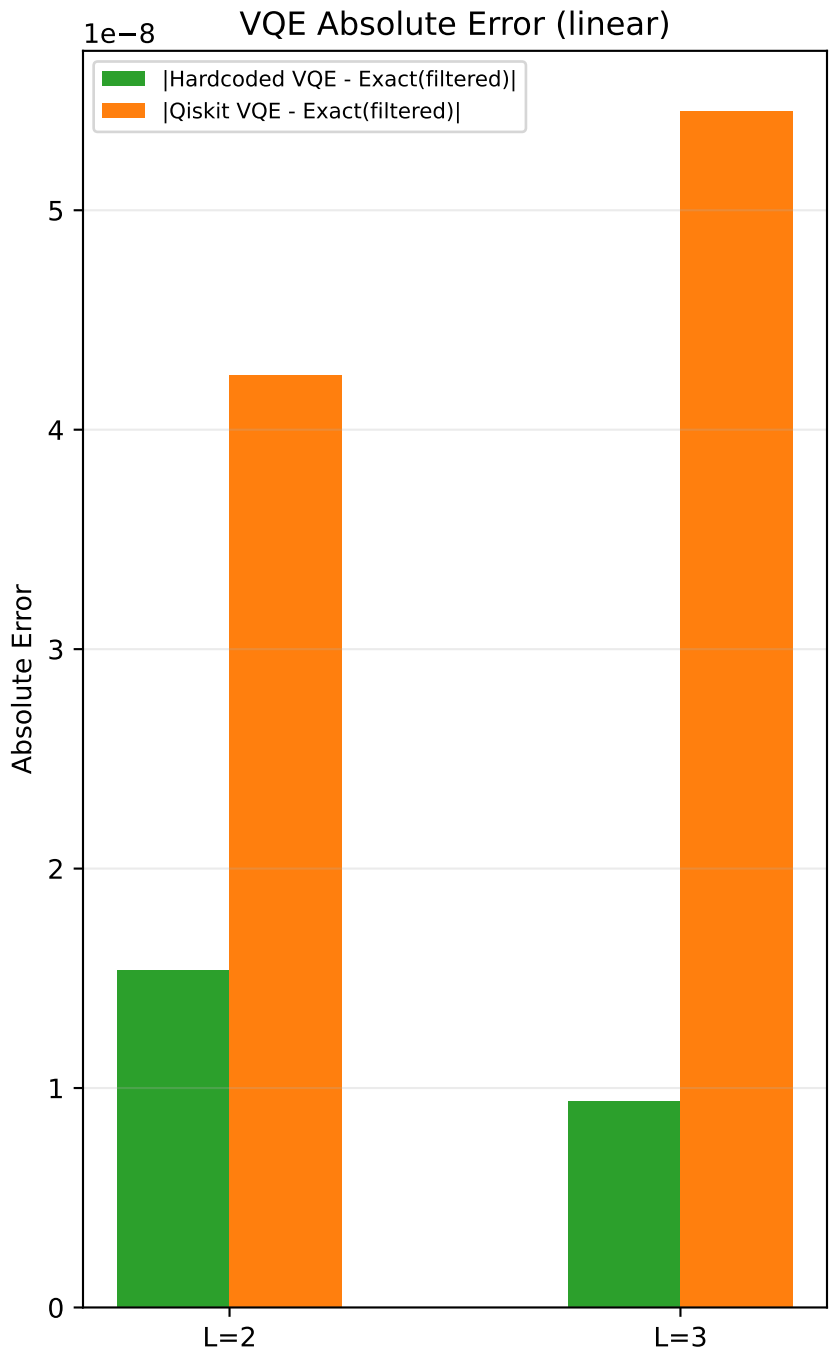
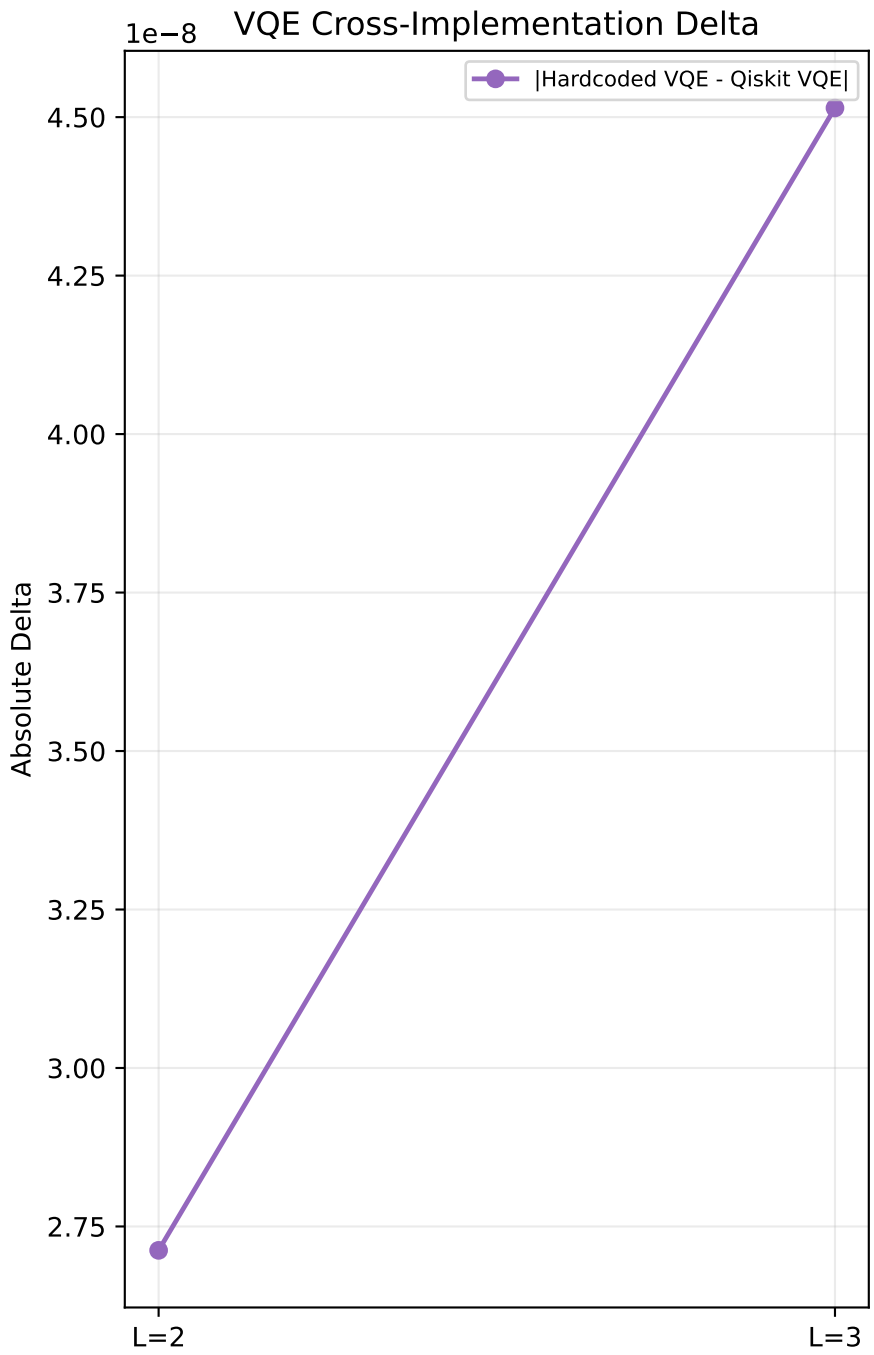
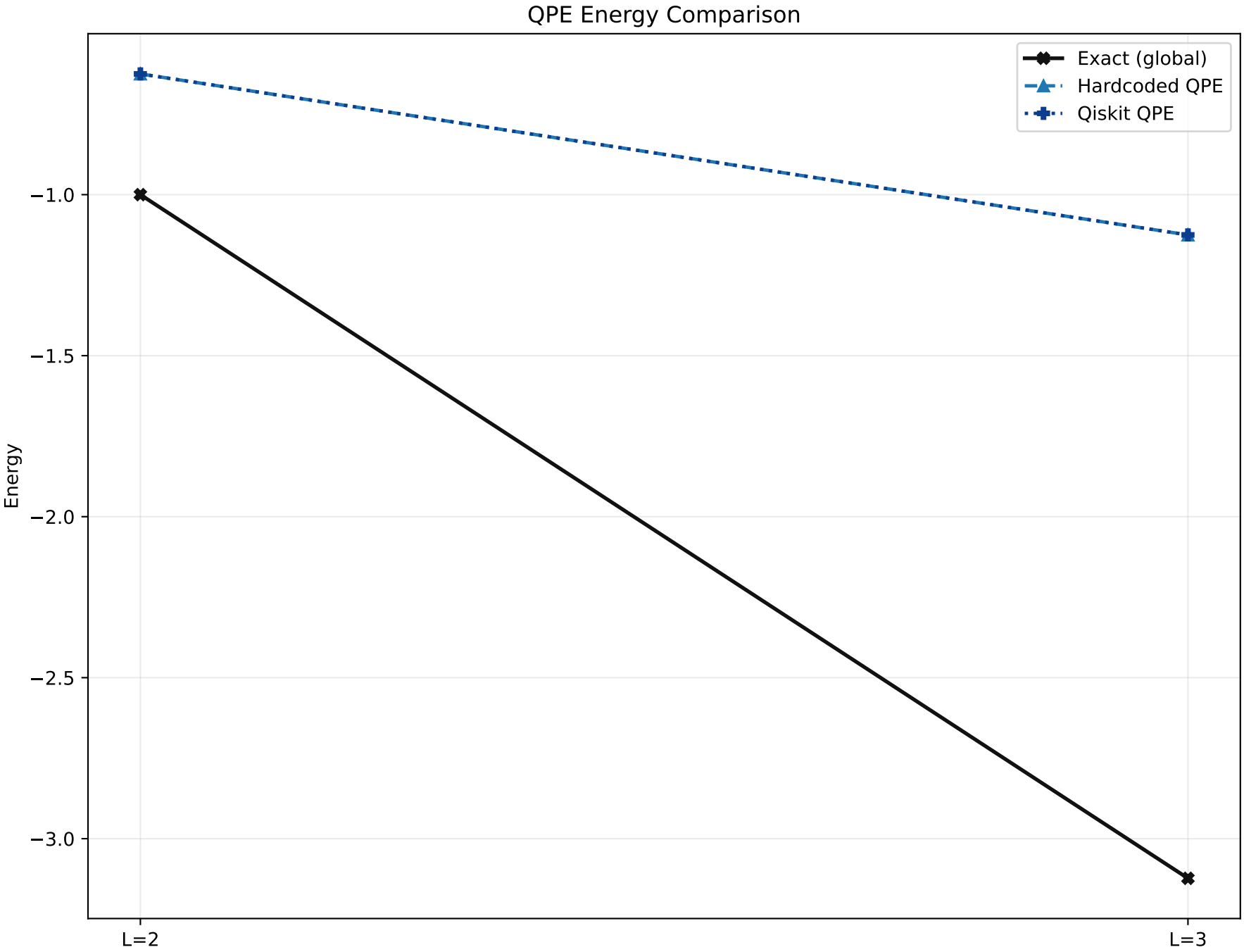
```
Hardcoded vs Qiskit Pipeline Comparison Summary

generated_utc: 2026-02-14T01:42:00.925635+00:00
all_pass: False
l_values: [2, 3]
trajectory_comparison_basis: trotter trajectories start from
  each pipeline's selected initial_state_source (default: vqe)

thresholds:
{'doublon_trotter_max_abs_delta': 0.001,
 'energy_trotter_max_abs_delta': 0.001,
 'fidelity_max_abs_delta': 0.0001,
 'ground_state_energy_abs_delta': 1e-08,
 'n_dn_site0_trotter_max_abs_delta': 0.005,
 'n_up_site0_trotter_max_abs_delta': 0.005}

hardcoded_qiskit_import_isolation:
{'offending_imports': [],
 'pass': True,
 'qiskit_imports': [{'line': 307, 'module': 'qiskit'},
                    {'line': 308, 'module': 'qiskit.circuit.library'},
                    {'line': 309, 'module': 'qiskit.primitives'},
                    {'line': 310, 'module': 'qiskit.quantum_info'},
                    {'line': 311, 'module': 'qiskit.synthesis'},
                    {'line': 312, 'module': 'qiskit_algorithms'},
                    {'line': 313, 'module': 'qiskit_algorithms.minimum_eigensolvers'}],
 'qpe_adapter_range': {'end_line': 409, 'start_line': 292}}

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)|
```

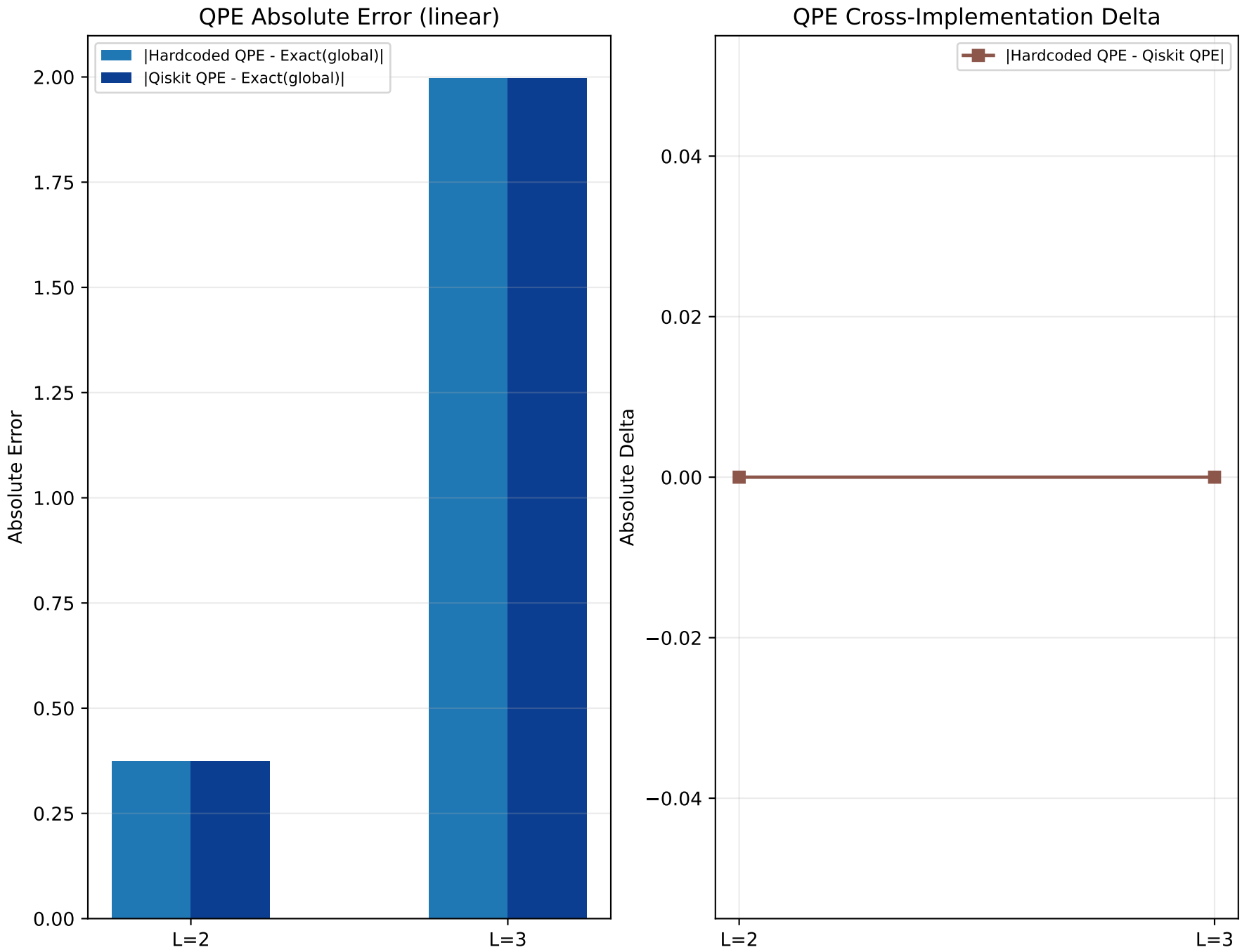
```
F_pipeline(t) is the pipeline's stored trajectory fidelity value (as computed internally vs that pipeline's exact
    evolution).

Per-L pass flags:
L=2 pass=True metrics_json=artifacts/hardcoded_vs_qiskit_pipeline_L2_metrics.json
L=3 pass=False metrics_json=artifacts/hardcoded_vs_qiskit_pipeline_L3_metrics.json
```


VQE Energy Comparison
Exact (filtered sector)
Hardcoded VQE
Qiskit VQE
Energy
−0.9
−1.0
−1.1
−1.2
L=2
L=3

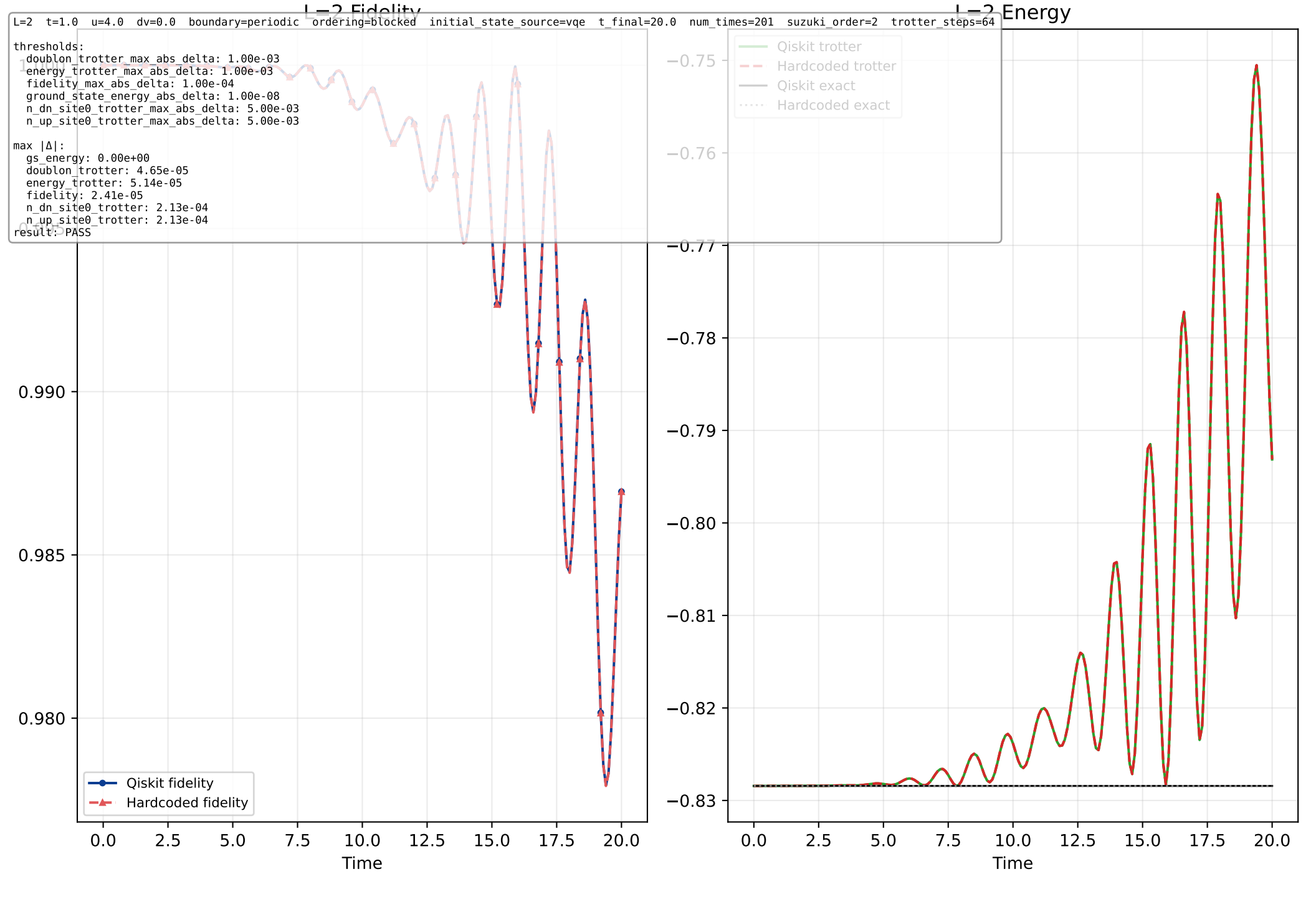

VQE Absolute Error (linear)
1e−8
|Hardcoded VQE - Exact(filtered)|
|Qiskit VQE - Exact(filtered)|
Absolute Error
0
1
2
3
4
5
L=2
L=3


VQE Cross-Implementation Delta
1e−8
|Hardcoded VQE - Qiskit VQE|
Absolute Delta
2.75
3.00
3.25
3.50
3.75
4.00
4.25
4.50
L=2
L=3

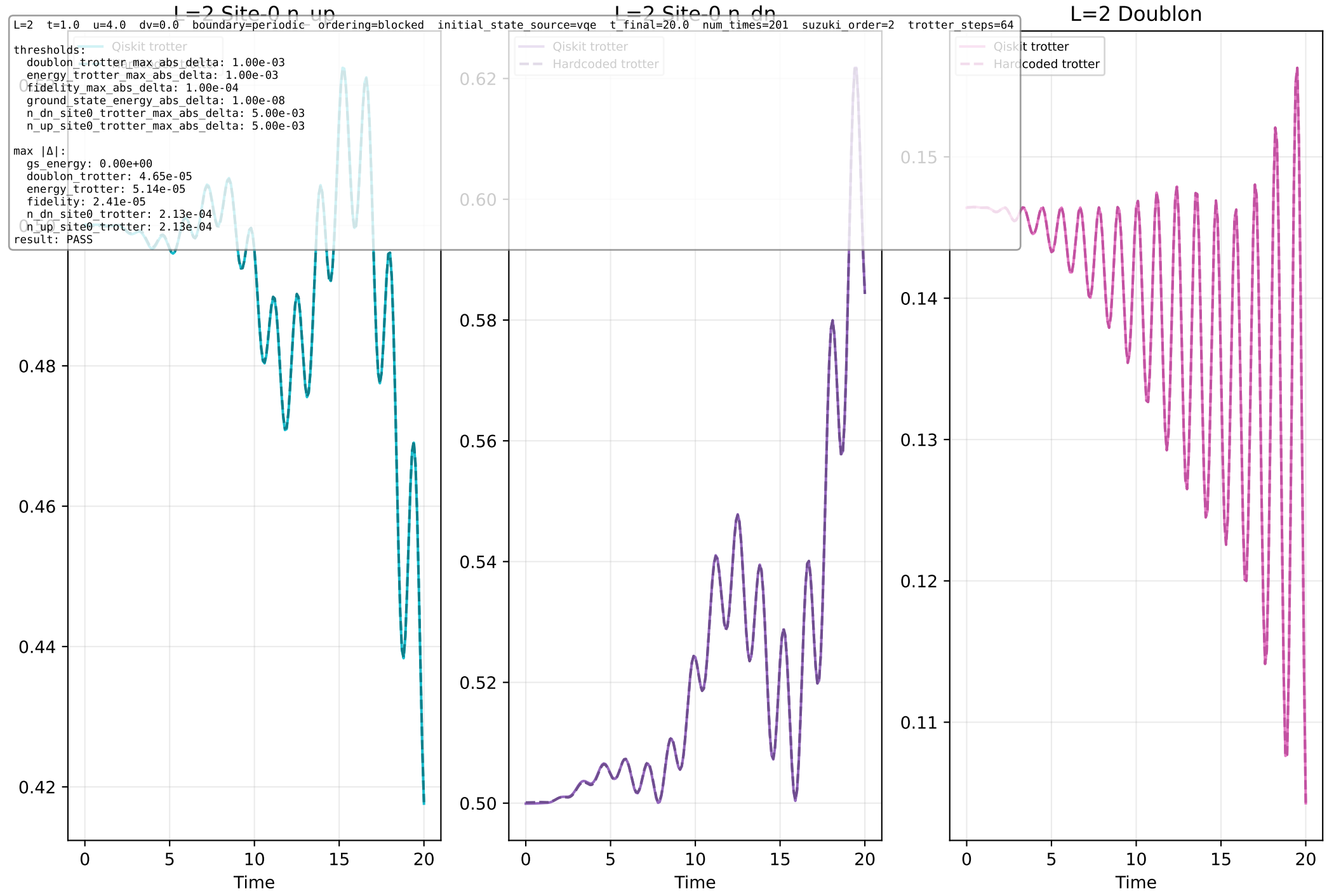

QPE Energy Comparison
Exact (global)
Hardcoded QPE
Qiskit QPE
Energy
−1.0
−1.5
−2.0
−2.5
−3.0
L=2
L=3


QPE Absolute Error (linear)
|Hardcoded QPE - Exact(global)|
|Qiskit QPE - Exact(global)|
Absolute Error
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
L=2
L=3
QPE Cross-Implementation Delta
|Hardcoded QPE - Qiskit QPE|
Absolute Delta
0.04
0.02
0.00
−0.02
−0.04
L=2
L=3

Bundle Page: L=2 Fidelity & Energy

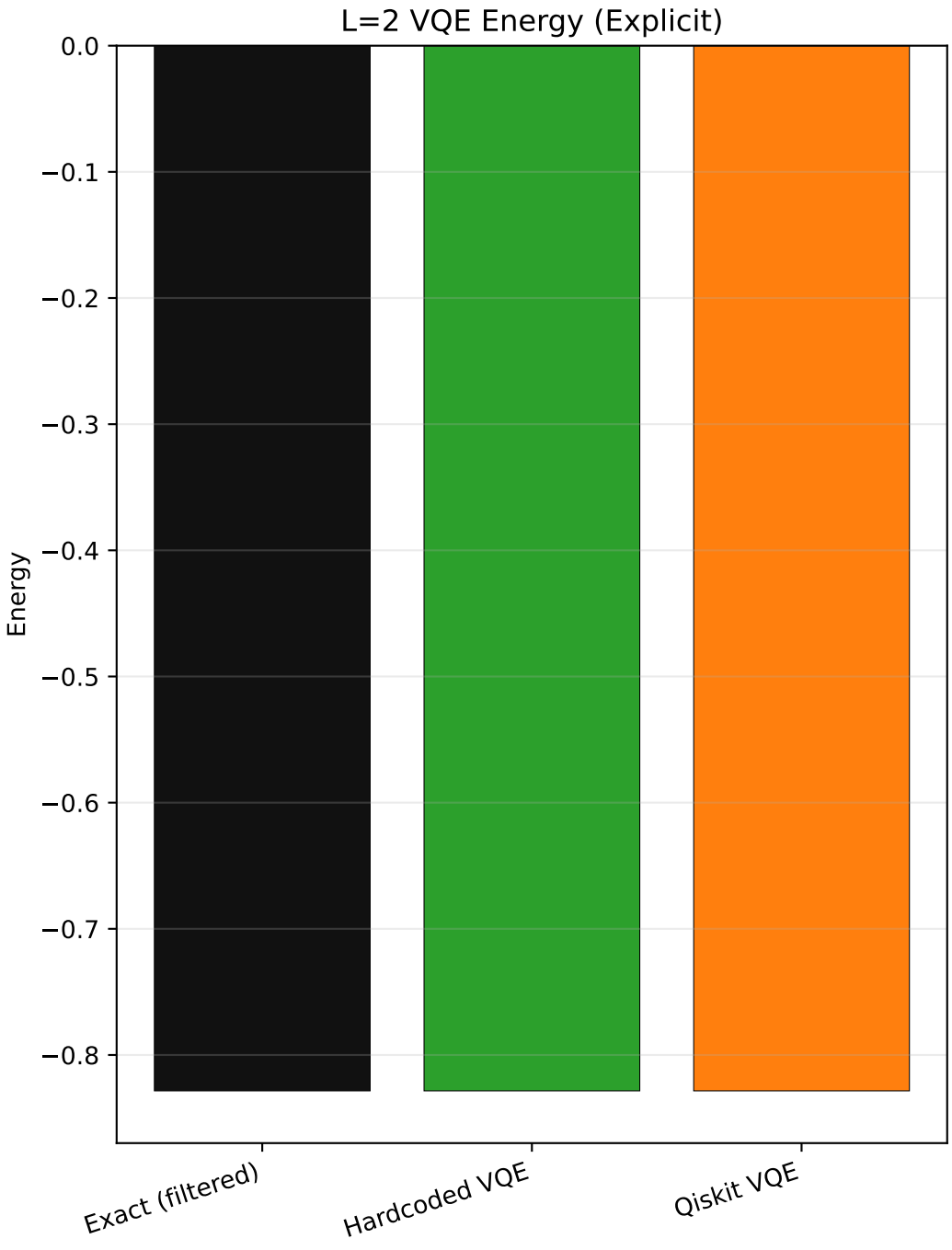


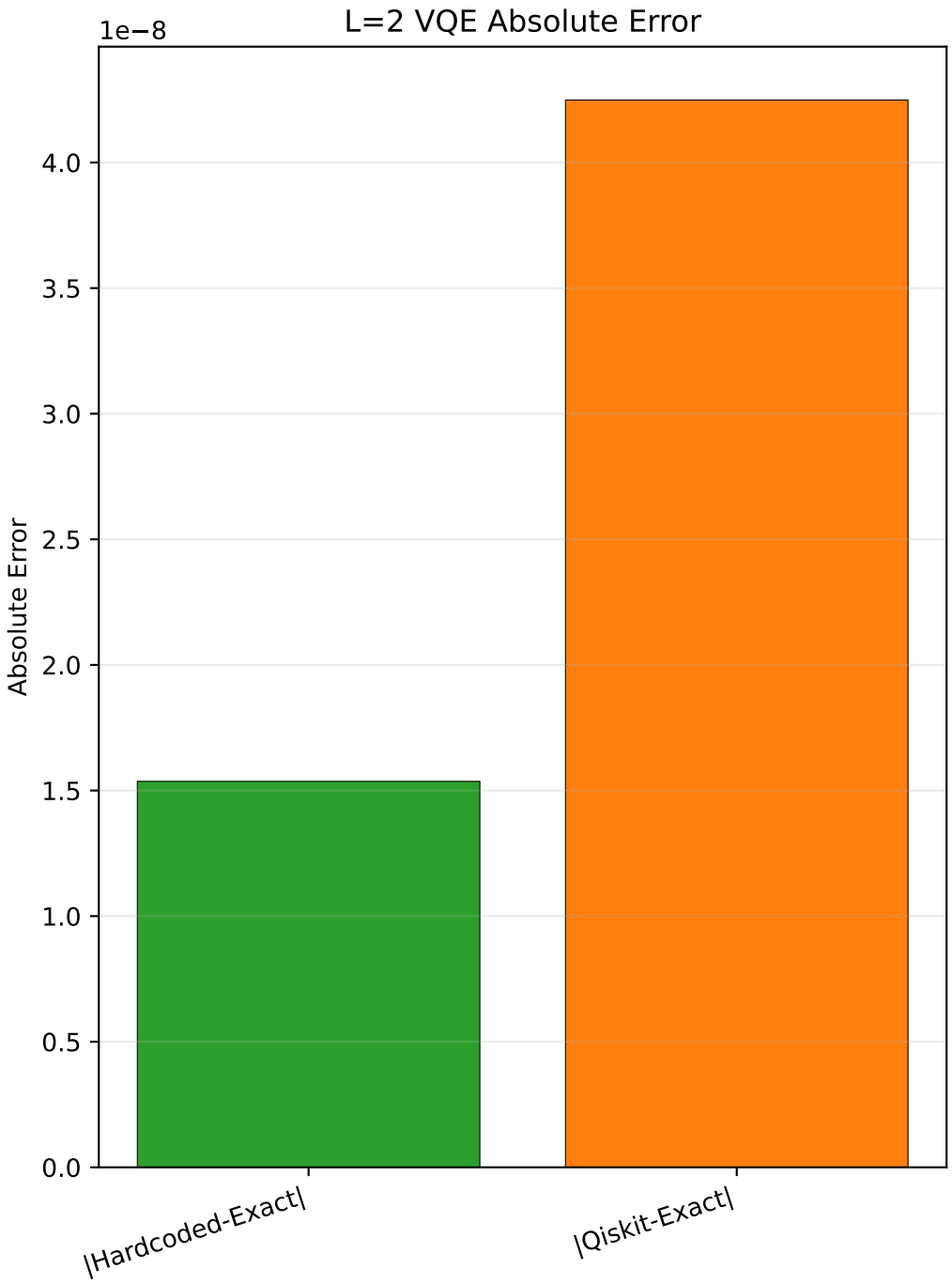
Bundle Page: L=2 Occupations & Doublon (auto-zoomed)




```
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  suzuki_order=2  trotter_steps=64

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: 4.65e-05
  energy_trotter: 5.14e-05
  fidelity: 2.41e-05
  n_dn_site0_trotter: 2.13e-04
  n_up_site0_trotter: 2.13e-04
result: PASS
```

VQE is a separate quantity from the Trotter t=0 value; do not infer VQE energy from trajectory plots.

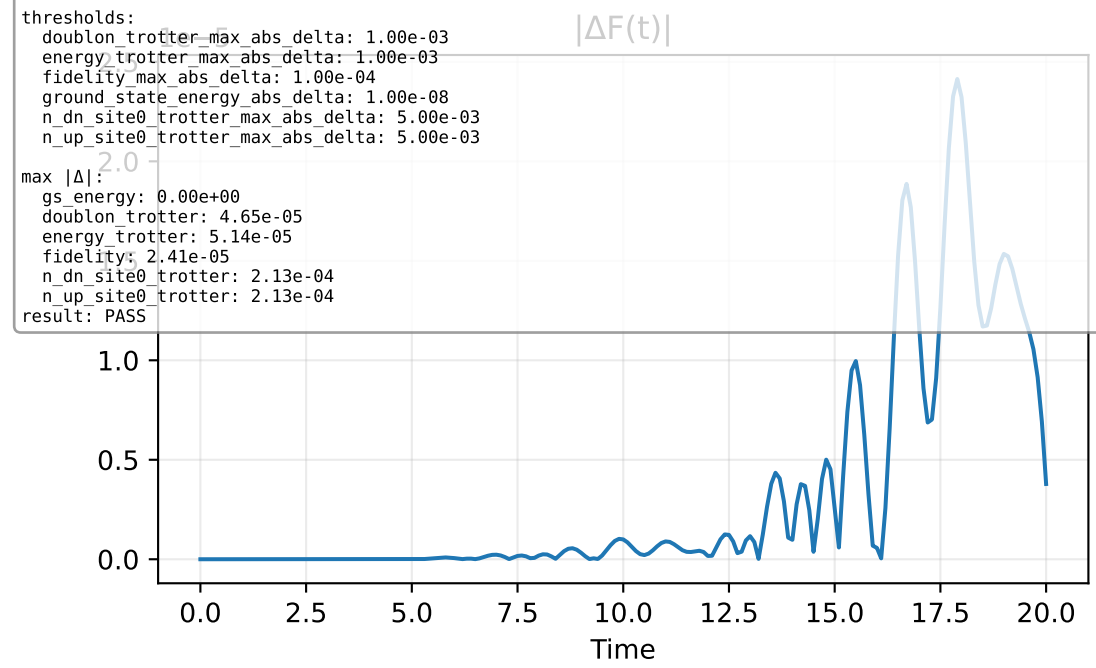


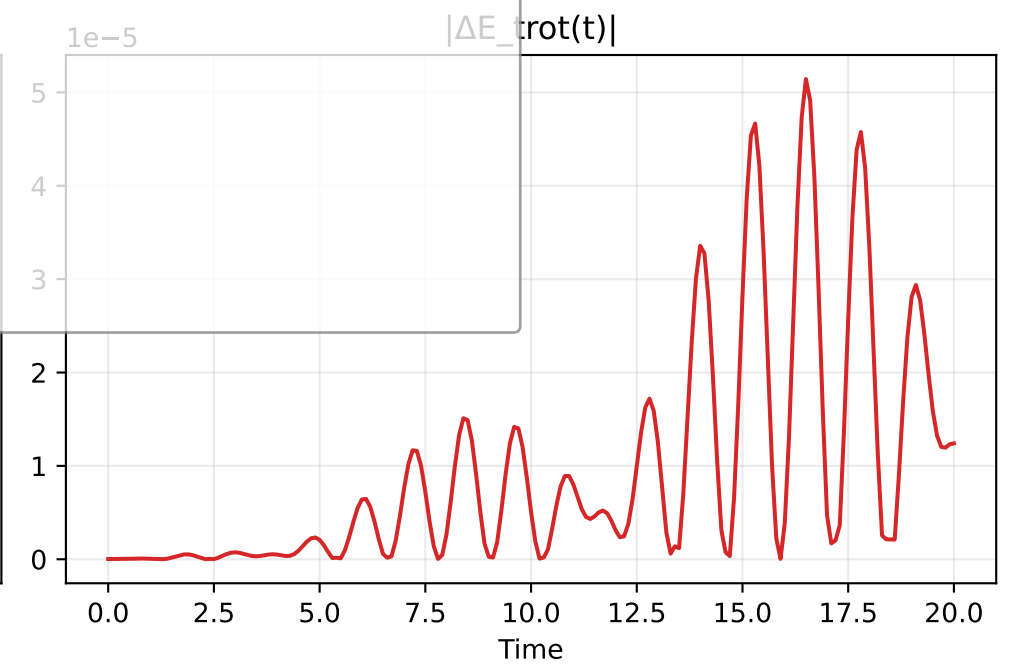


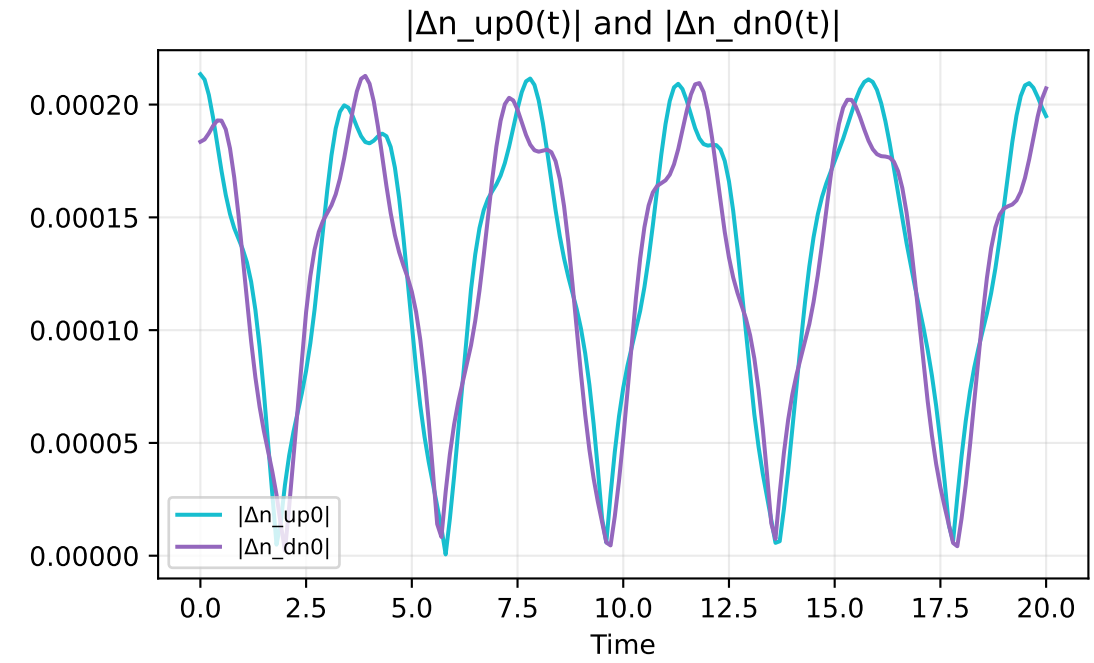
Bundle Delta Diagnostics L=2

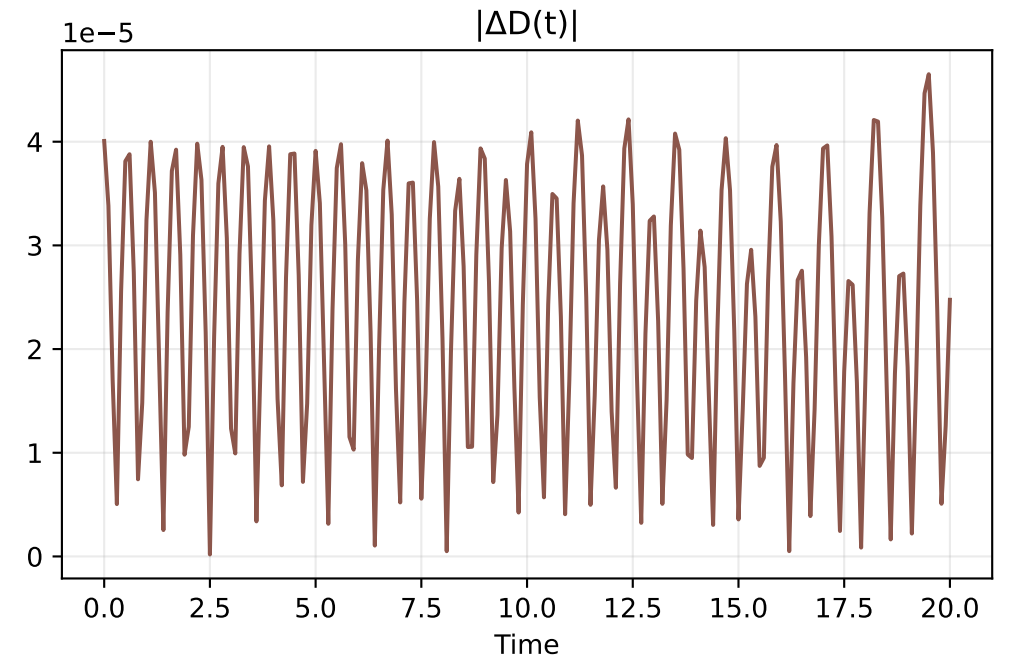
$\Delta X(t) = |X_{hc}(t) - X_{qk}(t)|$, where $X_{pipeline}(t)$ is that pipeline's stored trajectory value.

```
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  suzuki_order=2  trotter_steps=64

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: 4.65e-05
  energy_trotter: 5.14e-05
  fidelity: 2.41e-05
  n_dn_site0_trotter: 2.13e-04
  n_up_site0_trotter: 2.13e-04
result: PASS
```



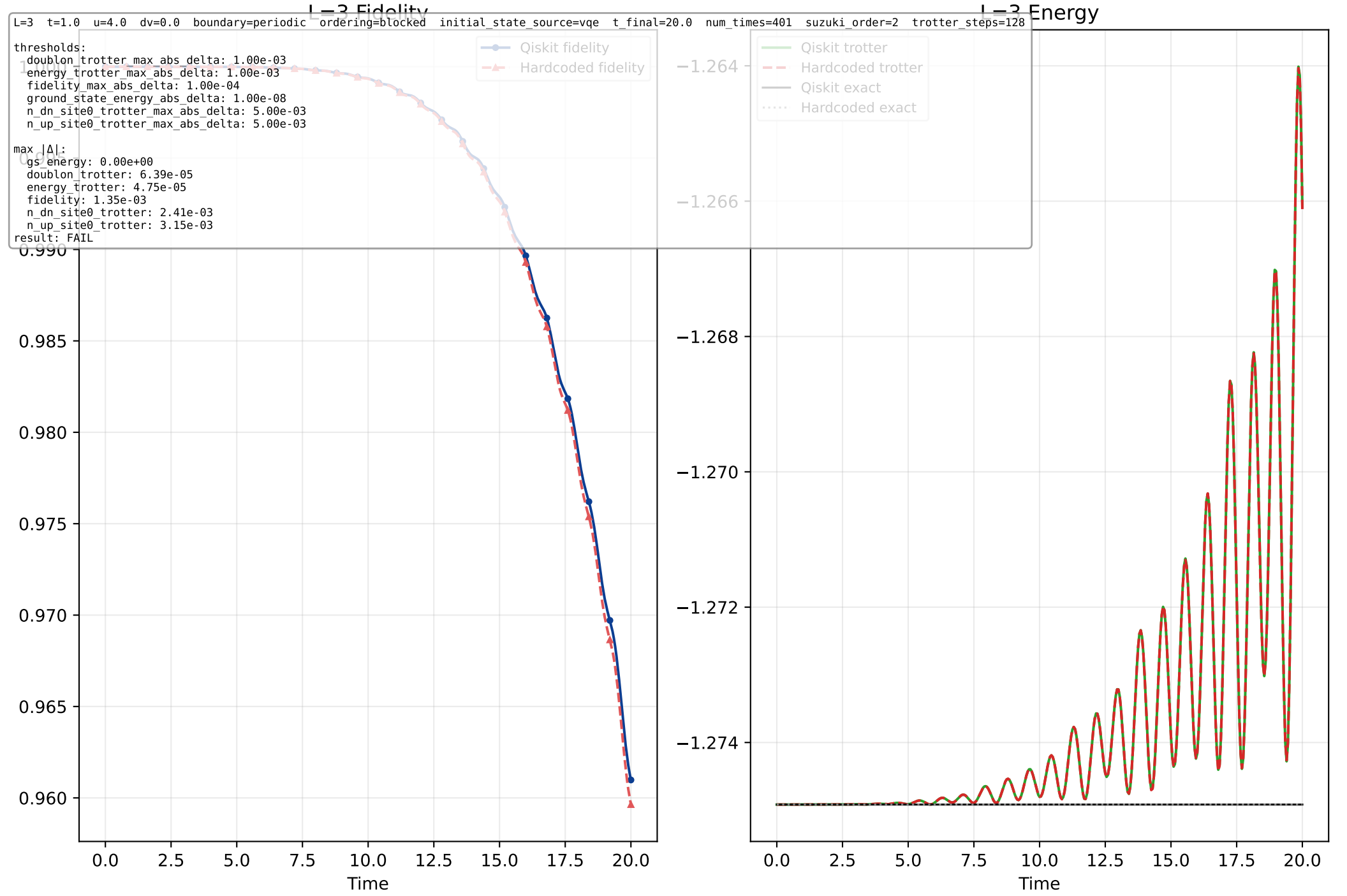






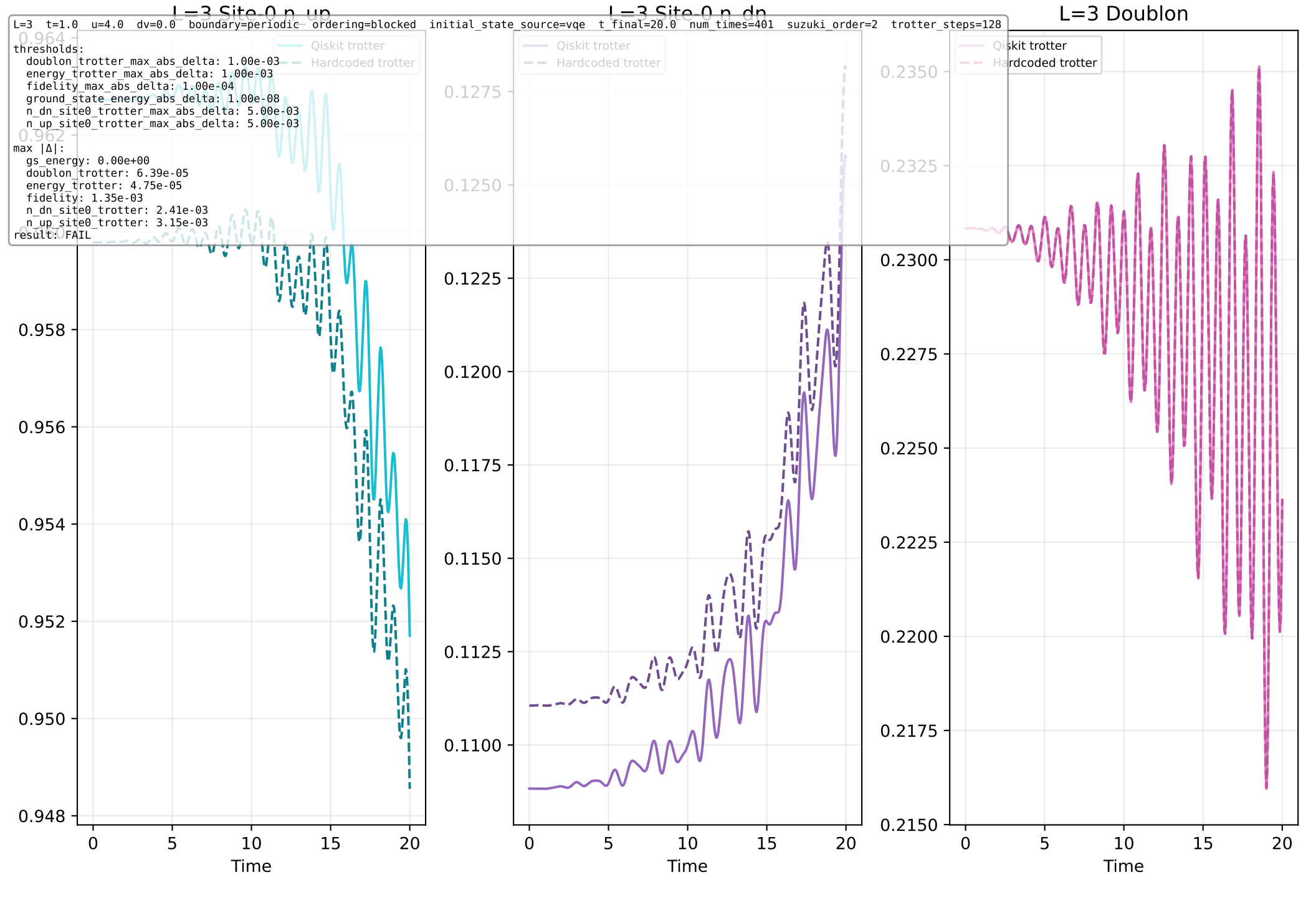
```
Bundle metrics page L=2

Trotterization comparison uses each path's configured initial state.
For VQE-init runs, both exact(t) and trotter(t) start from the VQE ansatz state.

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 = 2.4137975728866223e-05 / 3.2780993371204888e-06 / 3.783465616358228e-06
energy_trotter max/mean/final = 5.1436108605140696e-05 / 9.344796006301634e-06 / 1.2411196367745347e-05
n_up_site0_trotter max/mean/final = 0.00021346380603026738 / 0.000129601417068683 / 0.00019487823333519394
n_dn_site0_trotter max/mean/final = 0.0002127320858726911 / 0.00012600310926826942 / 0.00020719542794467305
doublon_trotter max/mean/final = 4.6510415792039295e-05 / 2.4404822266394123e-05 / 2.4752750301254567e-05

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
```

Bundle Page: L=3 Fidelity & Energy

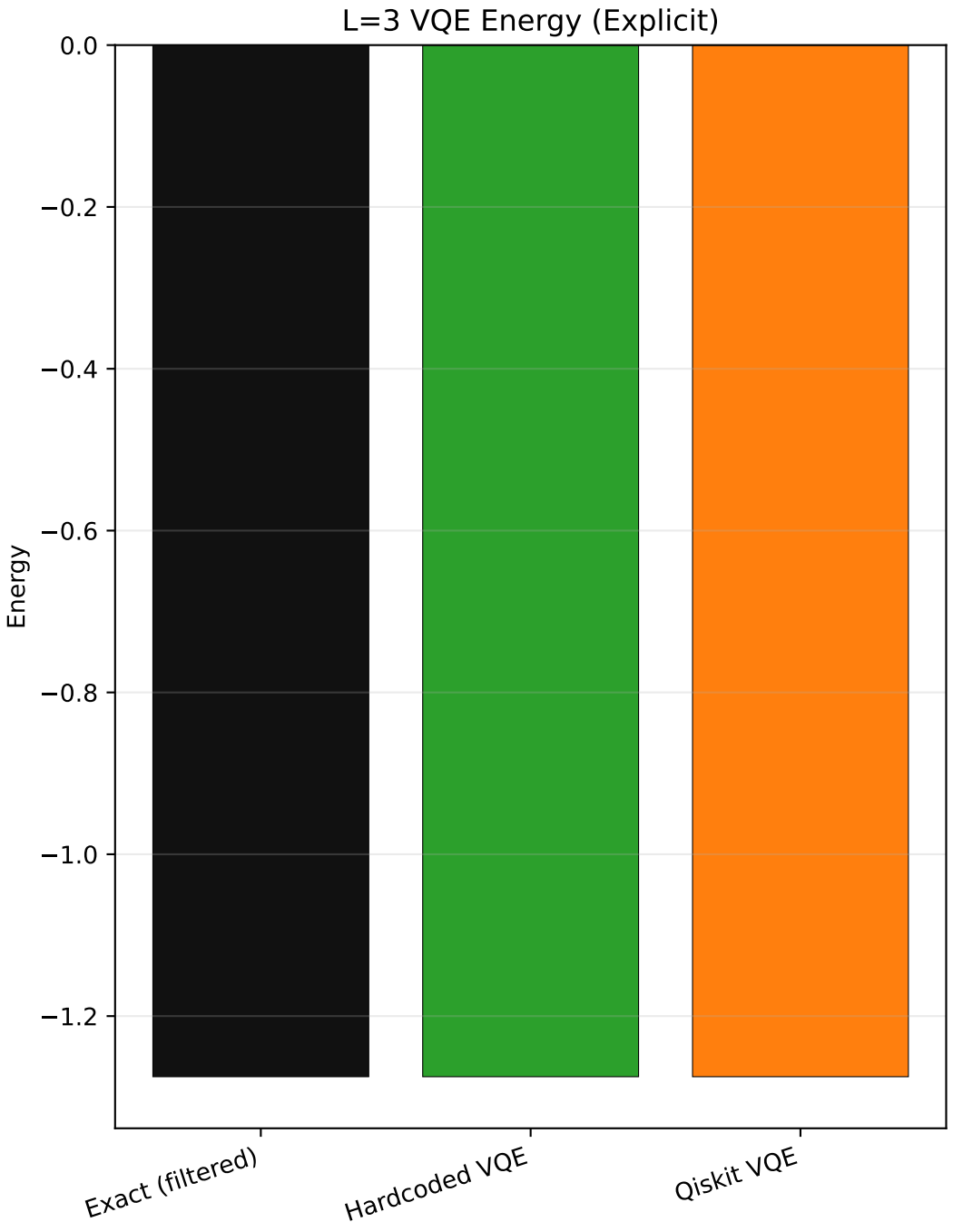


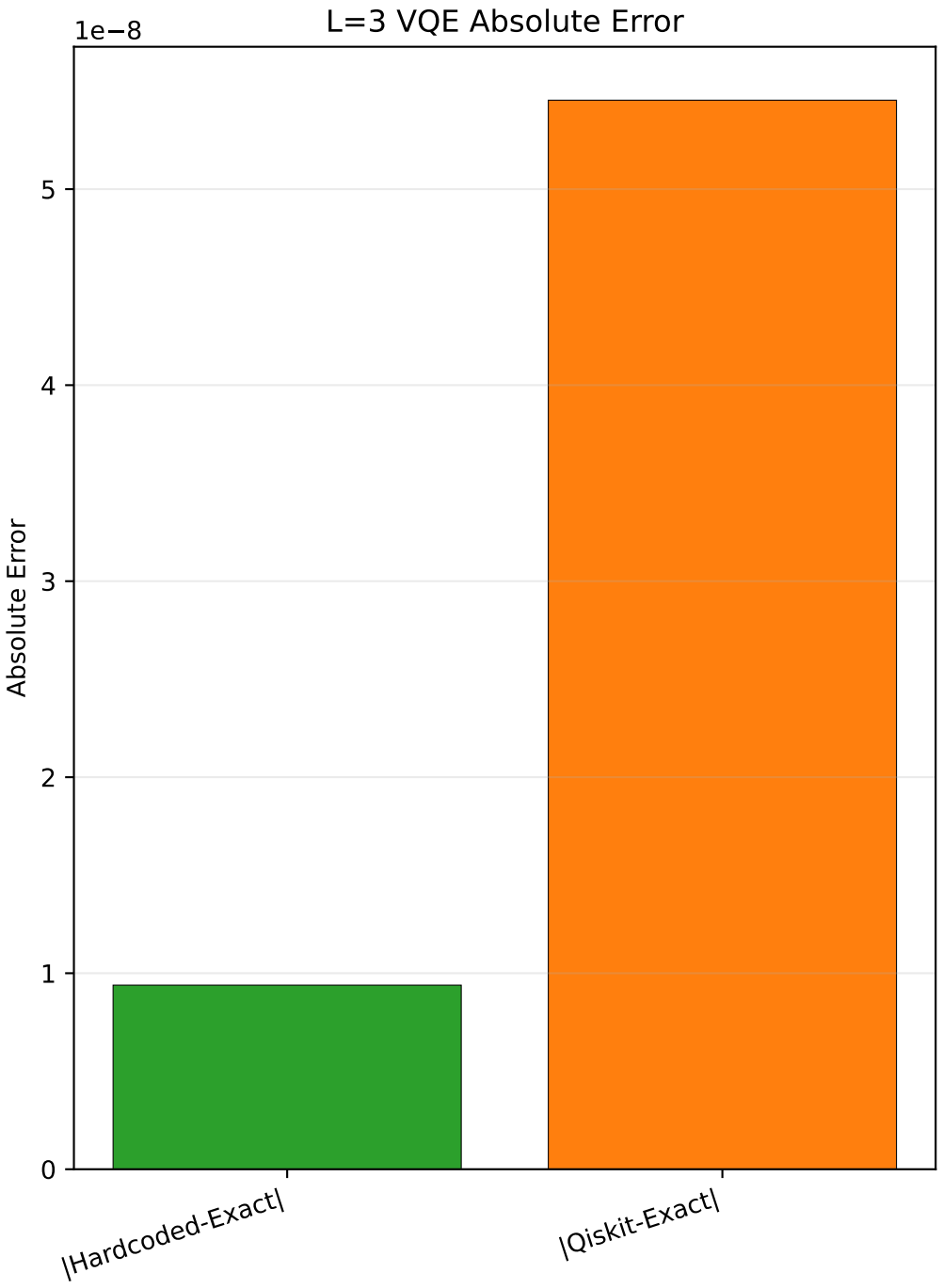

```
L=3  t=1.0  u=4.0  dv=0.0  boundary=periodic  ordering=blocked  initial_state_source=vqe  t_final=20.0  num_times=401  suzuki_order=2  trotter_steps=128

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: 6.39e-05
  energy_trotter: 4.75e-05
  fidelity: 1.35e-03
  n_dn_site0_trotter: 2.41e-03
  n_up_site0_trotter: 3.15e-03
result: FAIL
```

Bundle Page: L=3 Occupations & Doublon (auto-zoomed)



VQE is a separate quantity from the Trotter t=0 value; do not infer VQE energy from trajectory plots.

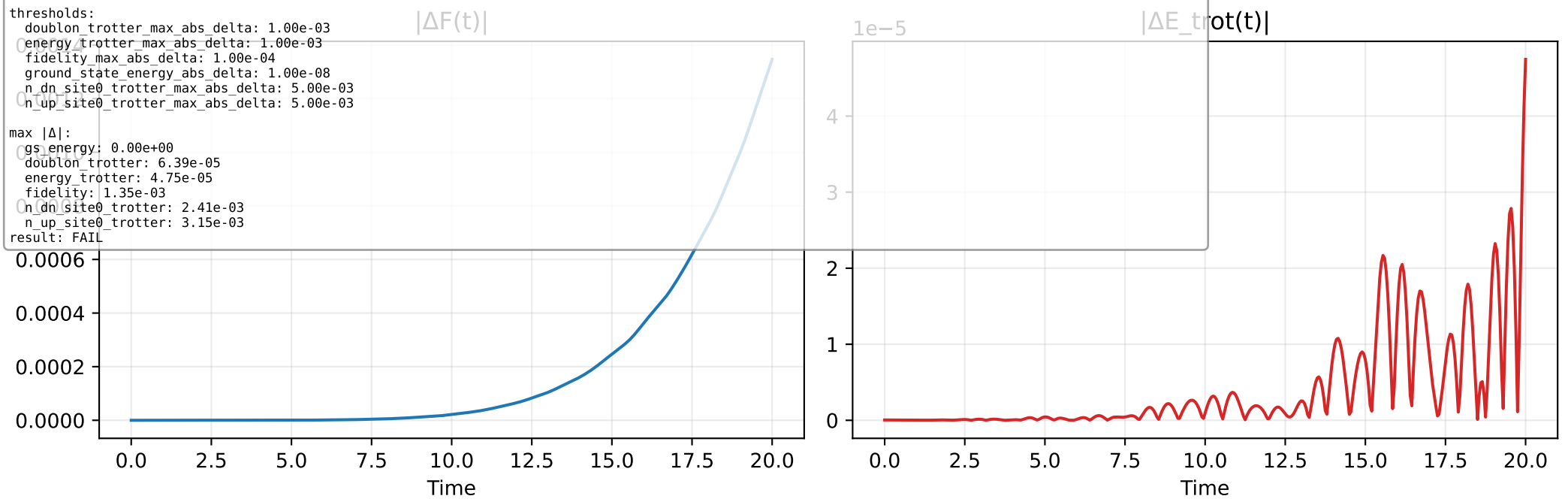


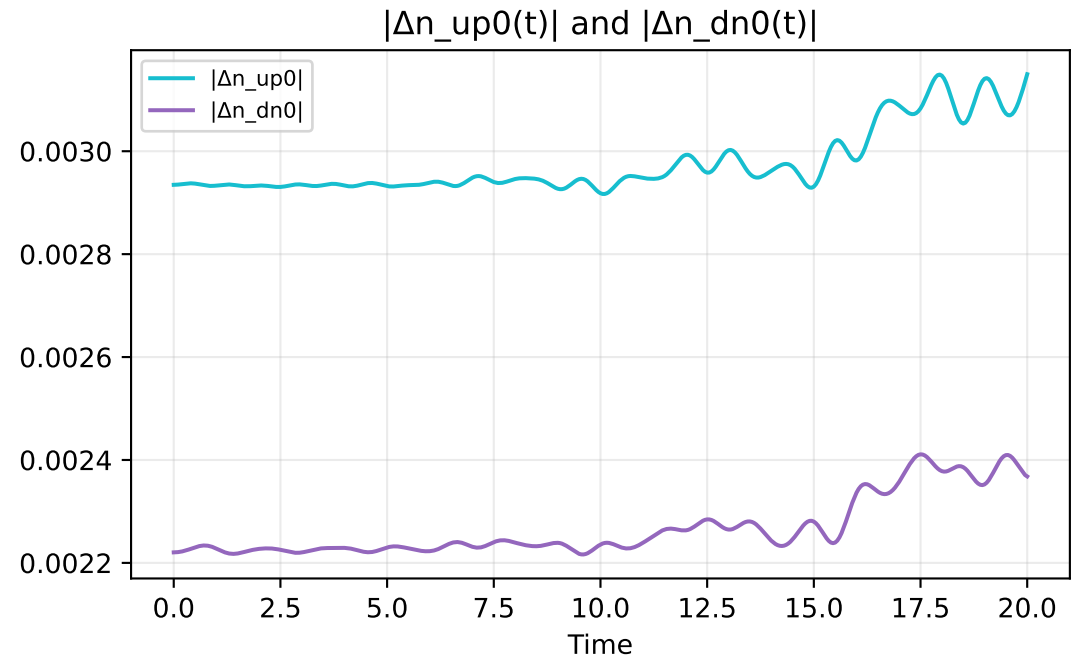


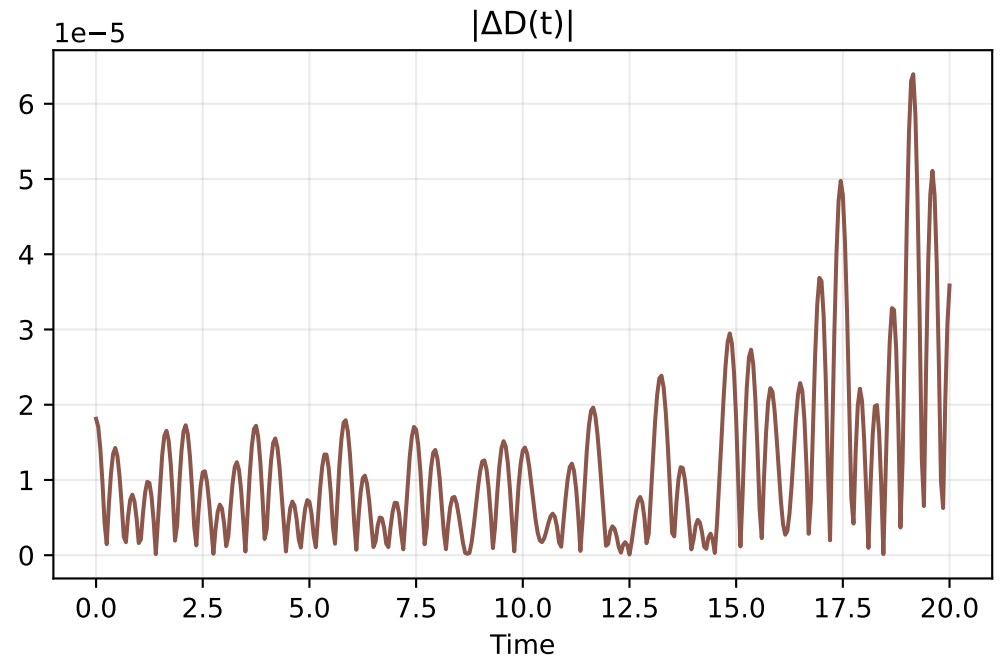
Bundle Delta Diagnostics L=3

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

```
L=3  t=1.0  u=4.0  dv=0.0  boundary=periodic  ordering=blocked  initial_state_source=vqe  t_final=20.0  num_times=401  suzuki_order=2  trotter_steps=128

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: 6.39e-05
  energy_trotter: 4.75e-05
  fidelity: 1.35e-03
  n_dn_site0_trotter: 2.41e-03
  n_up_site0_trotter: 3.15e-03
result: FAIL
```







```
Bundle metrics page L=3

Trotterization comparison uses each path's configured initial state.
For VQE-init runs, both exact(t) and trotter(t) start from the VQE ansatz state.

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 = 0.0013464071626839713 / 0.00019665025721909328 / 0.0013464071626839713
energy_trotter max/mean/final = 4.7458908048580994e-05 / 3.99668035453194e-06 / 4.7458908048580994e-05
n_up_site0_trotter max/mean/final = 0.0031496651890847716 / 0.002975898354829075 / 0.0031496651890847716
n_dn_site0_trotter max/mean/final = 0.0024109550934178353 / 0.00226718670337712 / 0.002368035185029038
doublon_trotter max/mean/final = 6.39293585977807e-05 / 1.1616930205037722e-05 / 3.5848731140875056e-05

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

PASS = False
```