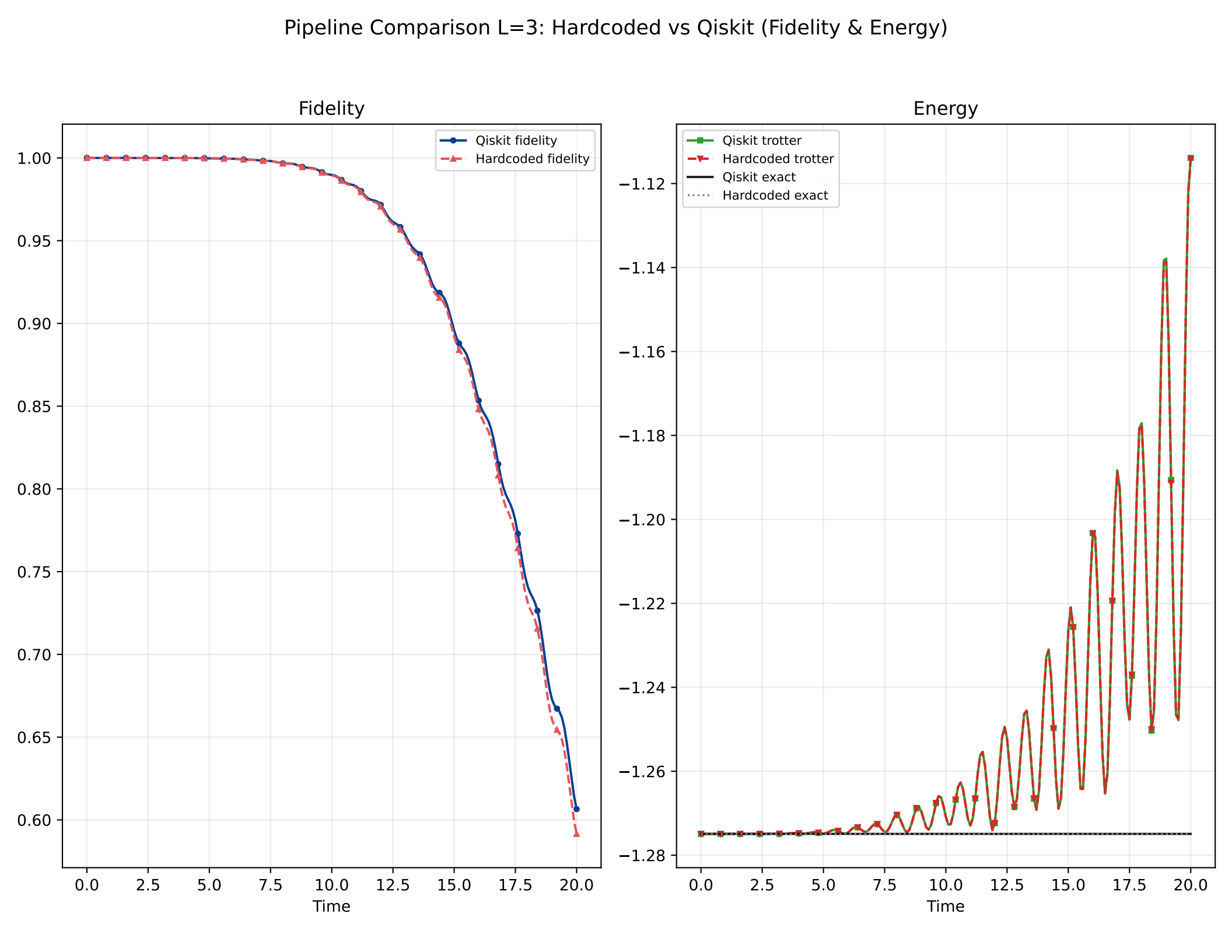
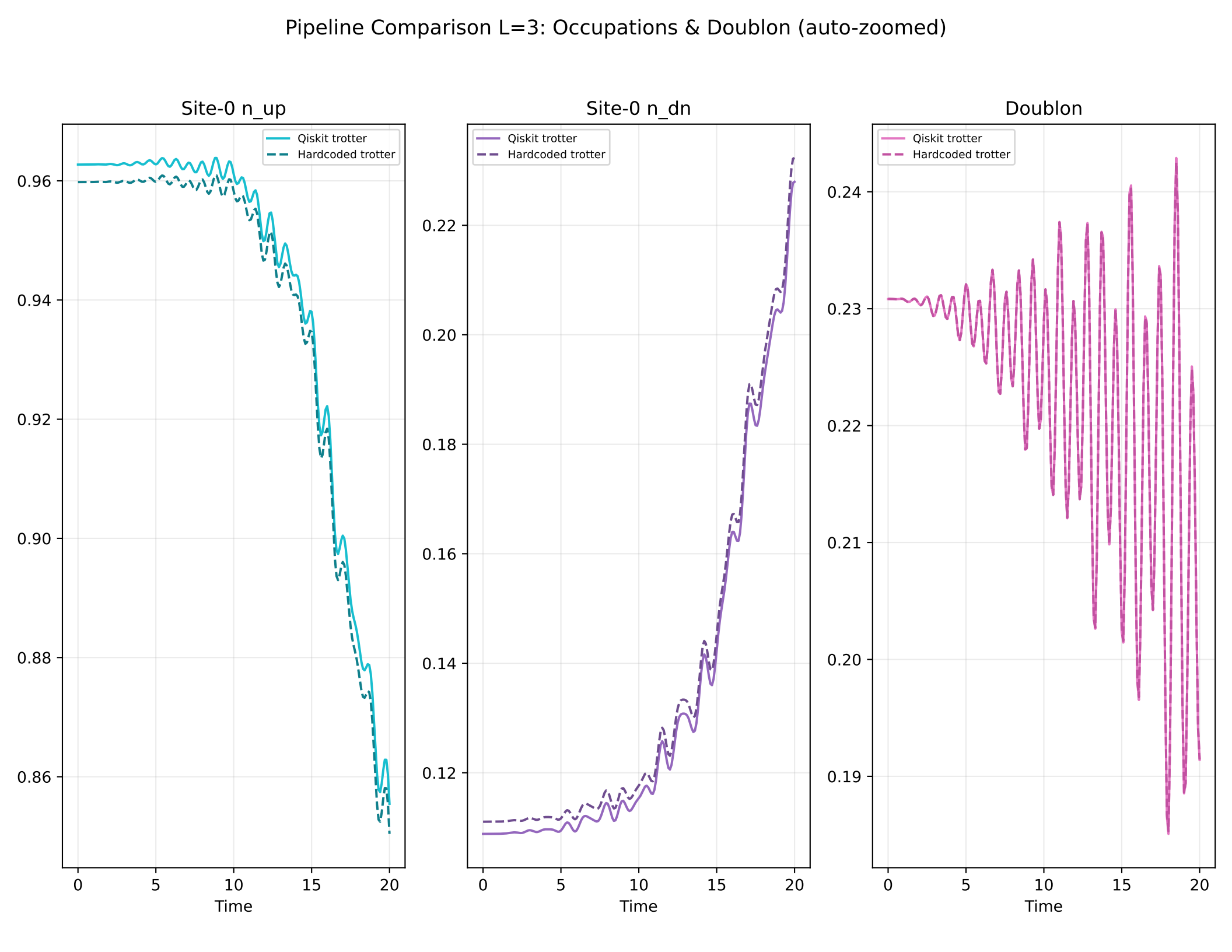
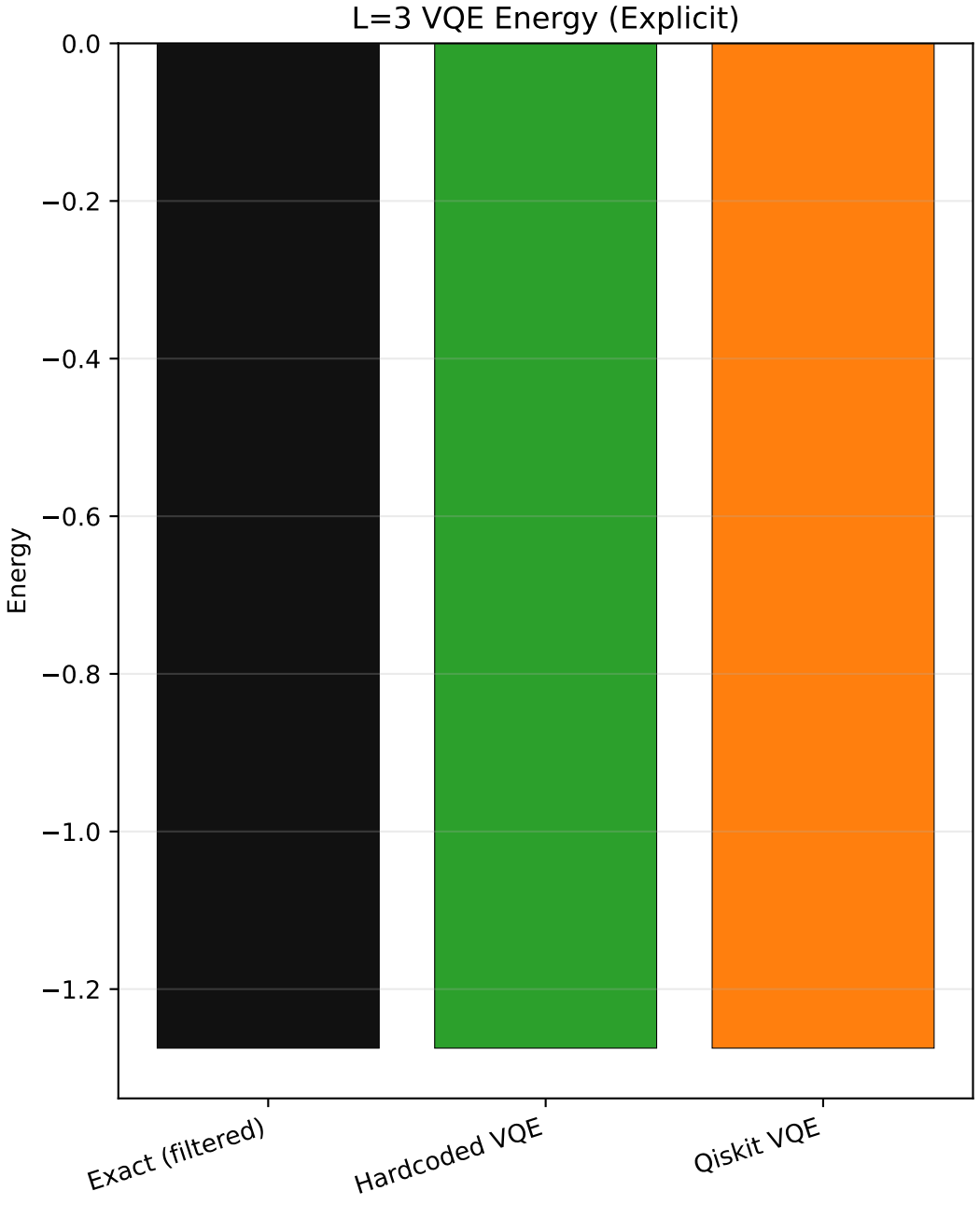
L=3 Run Settings & Metrics Summary

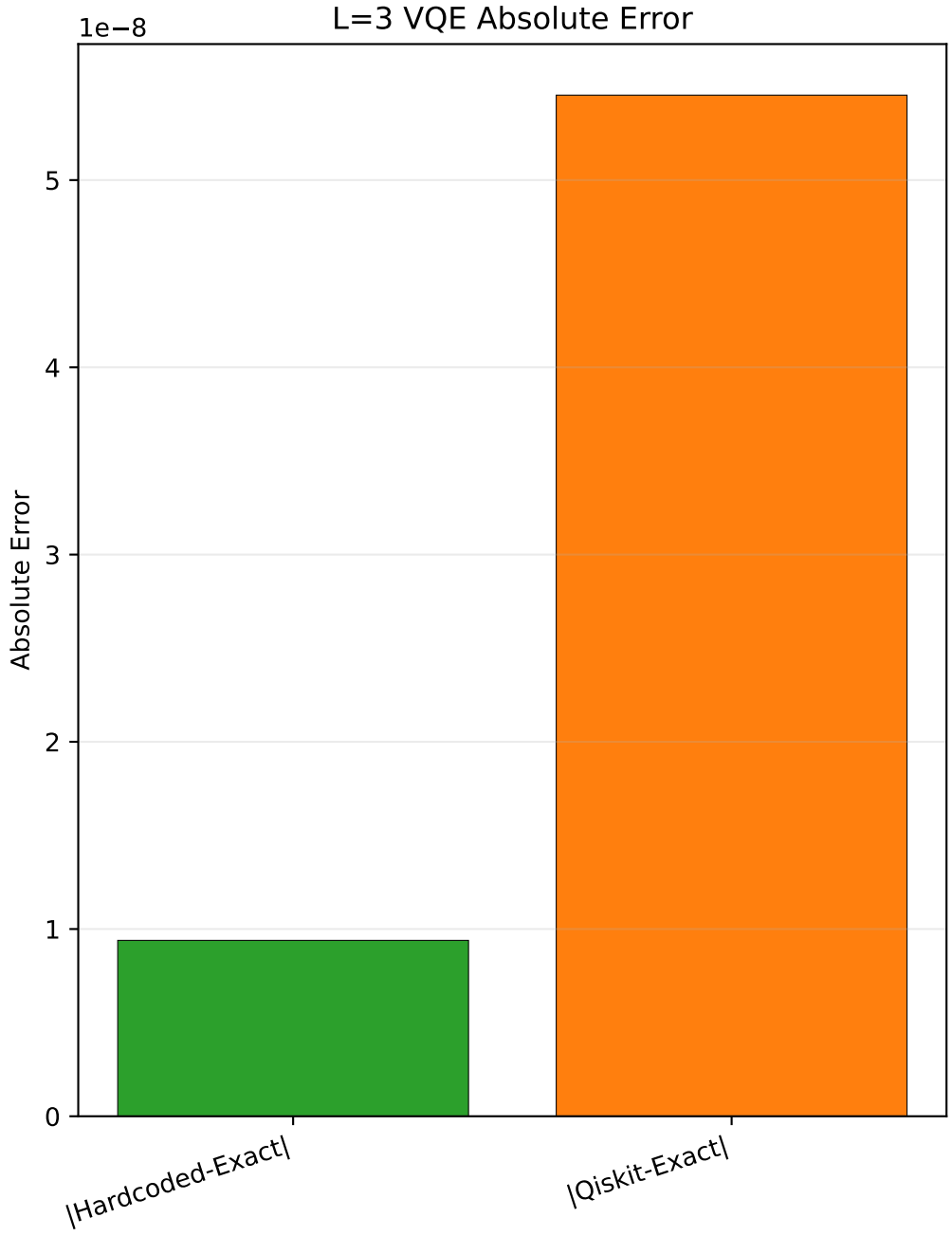
```
L=3  t=1.0  u=4.0  dv=0.0  boundary=periodic  ordering=blocked  initial_state_source=vqe  t_final=20.0  num_times=201  suzu

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: 3.87e-04
  energy_trotter: 9.26e-04
  fidelity: 1.50e-02
  n_dn_site0_trotter: 4.43e-03
  n_up_site0_trotter: 5.05e-03
result: FAIL
```


Pipeline Comparison L=3: Hardcoded vs Qiskit (Fidelity & Energy)
Fidelity
Qiskit fidelity
Hardcoded fidelity
1.00
0.95
0.90
0.85
0.80
0.75
0.70
0.65
0.60
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
Time
Energy
Qiskit trotter
Hardcoded trotter
Qiskit exact
Hardcoded exact
−1.12
−1.14
−1.16
−1.18
−1.20
−1.22
−1.24
−1.26
−1.28
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
Time


Pipeline Comparison L=3: Occupations & Doublon (auto-zoomed)
Site-0 n_up
Site-0 n_dn
Doublon
Qiskit trotter
Hardcoded trotter
Time
0.96
0.94
0.92
0.90
0.88
0.86
0.22
0.20
0.18
0.16
0.14
0.12
0.24
0.23
0.22
0.21
0.20
0.19
0
5
10
15
20

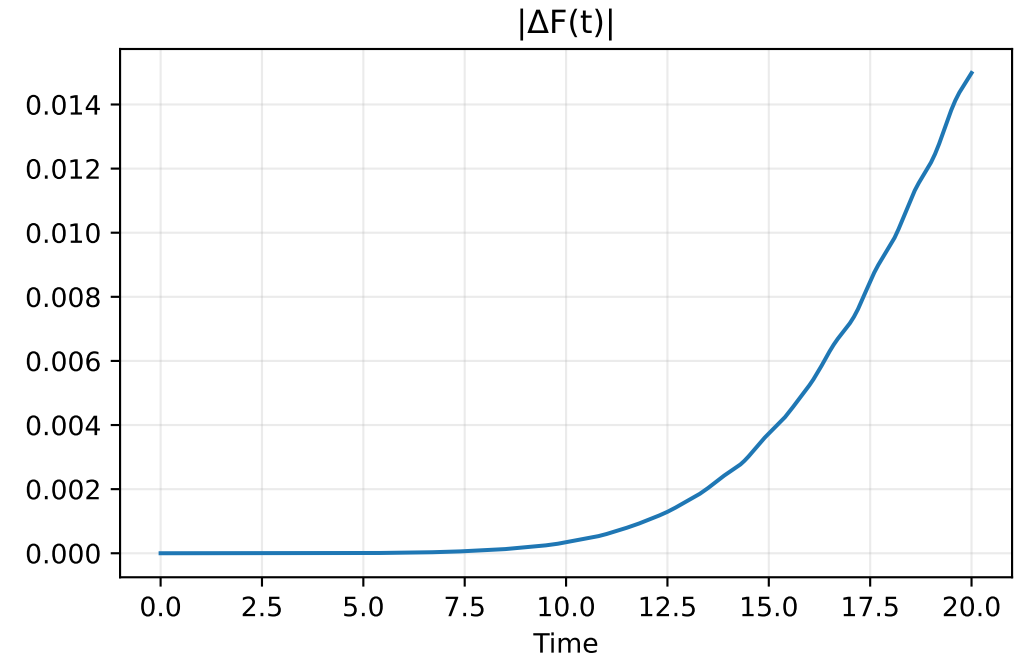
When initial_state_source=vqe, Trotter E(t=0) = ⟨ψ_vqe|H|ψ_vqe⟩ = VQE energy.
VQE energy ≠ exact ground state energy unless VQE fully converged.

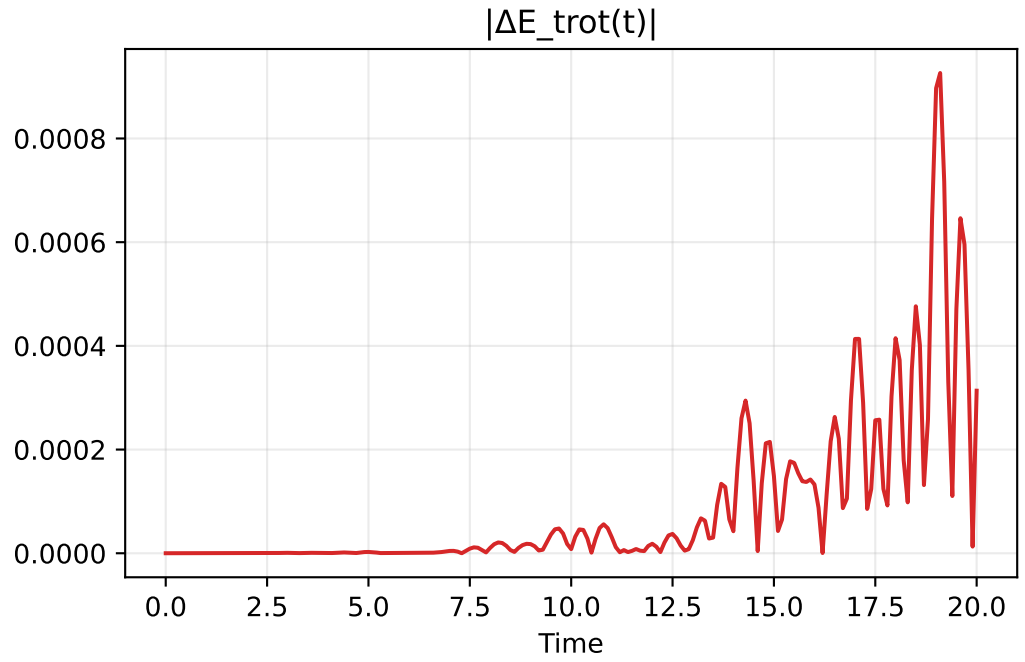


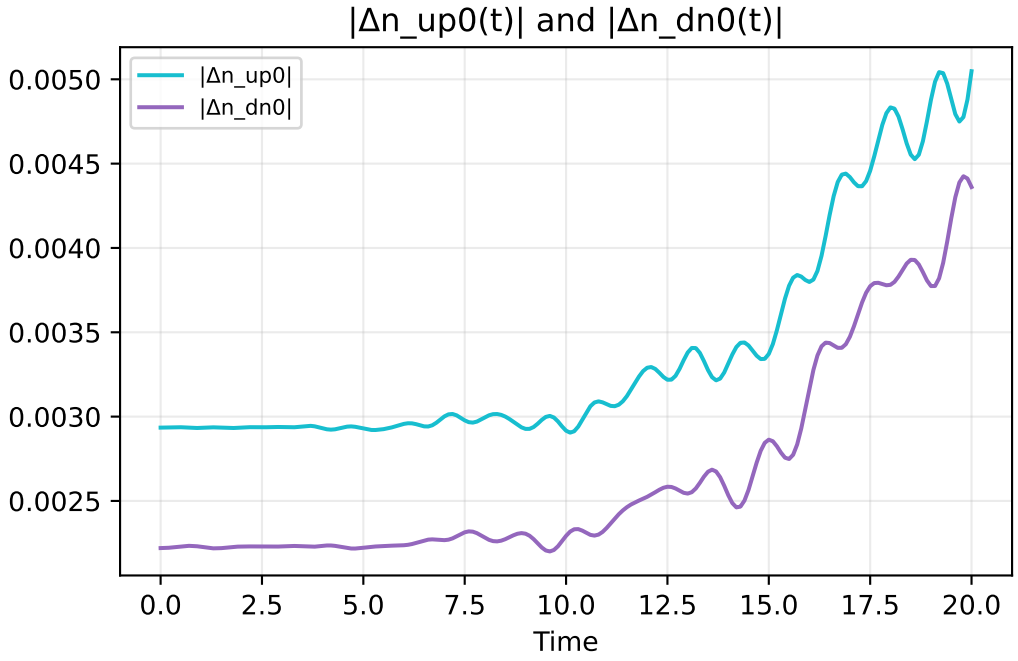


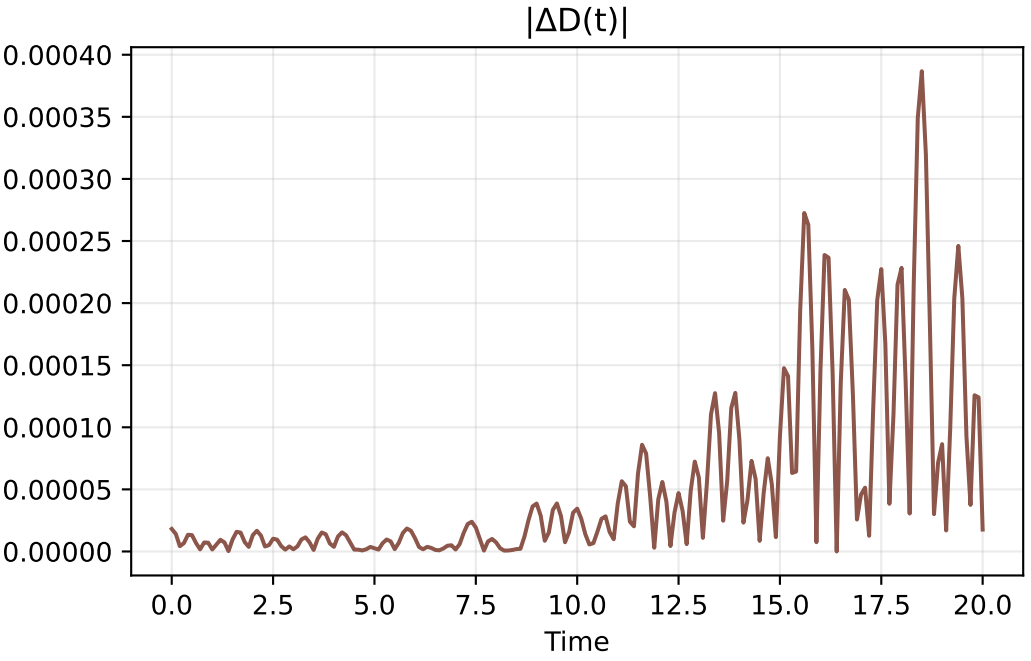
Delta Diagnostics L=3

ΔX(t) = |X_hc(t) − X_qk(t)|, where X_pipeline(t) is that pipeline's stored trajectory value.









```
L=3 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 = 0.01498211624223178 / 0.0026228128944948675 / 0.01498211624223178
energy_trotter max/mean/final = 0.0009262789164428131 / 8.661592784828267e-05 / 0.0003135182330653574
n_up_site0_trotter max/mean/final = 0.005047973459523791 / 0.003382685110198956 / 0.005047973459523791
n_dn_site0_trotter max/mean/final = 0.00442528828696051 / 0.002651645056505349 / 0.004361160282703724
doublon_trotter max/mean/final = 0.000386736648408631 / 5.238518717496887e-05 / 1.7647133442239005e-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': False}

PASS = False
```