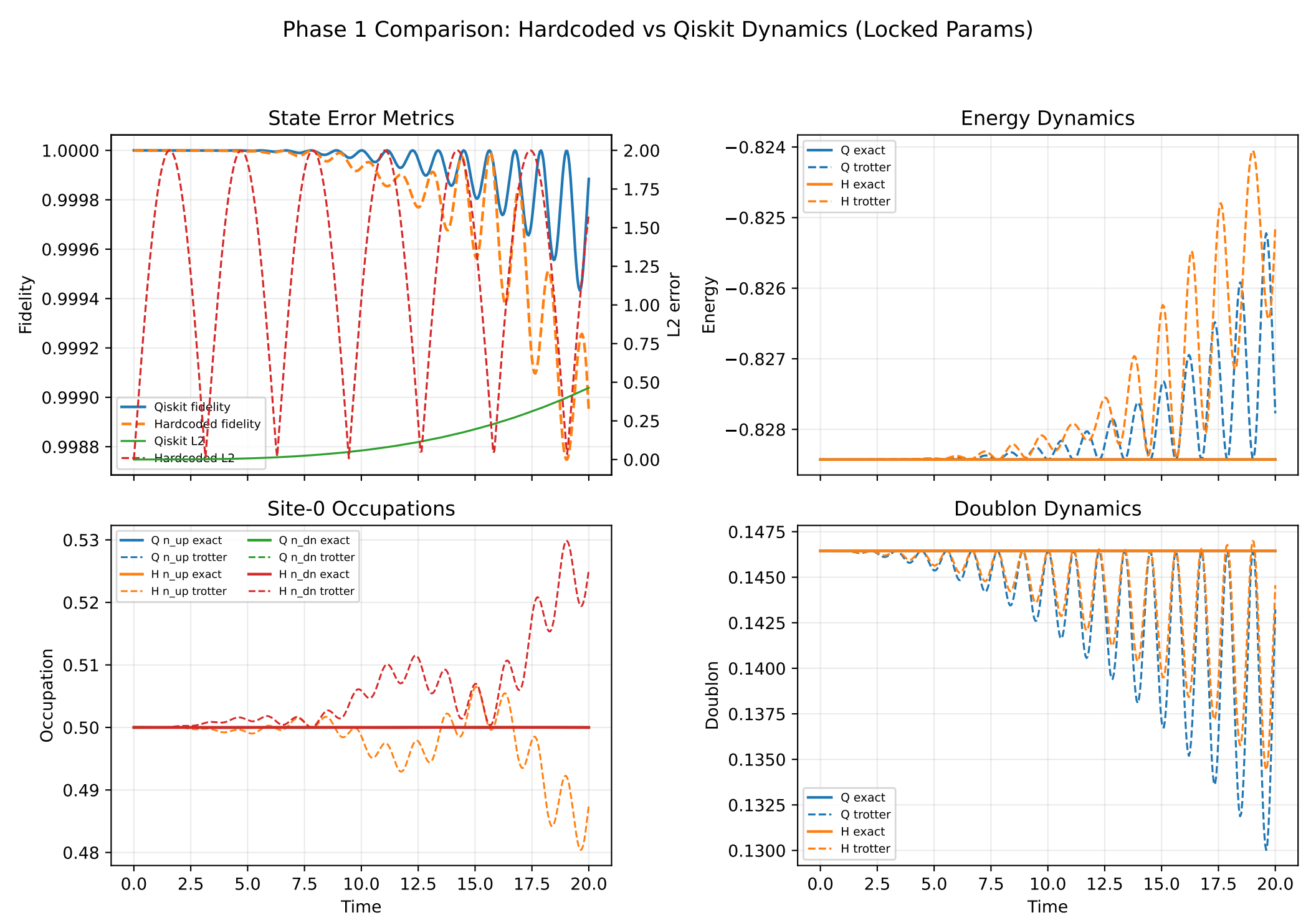

L=2, t=1.0, U=4.0, dv=0.0, boundary=periodic, ordering=blocked, t_final=20, num_times=401, suzuki_order=2, trotter_steps=128
Ground-state energies: hardcoded=-0.828427124476, qiskit=-0.828427122588, |delta|=1.888e-09, rel=2.279e-09; runtime mean(s): qiskit=79.41, hardcoded=10.54

```
Phase 1 Accuracy Comparison Summary

Parameter lock (from source files):
  num_sites=2, hopping_t=1.0, onsite_u=4.0, dv=0.0, boundary=periodic, ordering=blocked
  t_final=20.0, num_times=401, suzuki_order=2, trotter_steps=128
  Qiskit ansatz=UCCSD(reps=2), restarts=3, maxiter=1800, seed=7, noiseless statevector
  Hardcoded ansatz=HardcodedUCCSDAnsatz(reps=2), restarts=3, maxiter=1800, seed=7, noiseless numpy statevector

Ground-state energy: hardcoded=-0.828427124476, qiskit=-0.828427122588, abs_delta=1.888117e-09, rel_delta=2.279159e-09

Key max absolute deltas over time (hardcoded - qiskit):
  fidelity: 1.249588e-03
  state_l2_error: 1.999308e+00
  energy_exact: 1.888131e-09
  energy_trotter: 4.366136e-03
  n_up_site0_trotter: 1.965088e-02
  n_dn_site0_trotter: 2.987347e-02
  doublon_trotter: 4.391465e-03

Runtime summary (wall, seconds):
  qiskit runs: 78.76, 80.05 (mean 79.41)
  hardcoded runs: 10.56, 10.53 (mean 10.54)
  speedup hardcoded_vs_qiskit: 7.53x

Reproducibility check (run1 vs run2):
  qiskit settings_equal=True, max_abs_summary_delta=0.000e+00, max_fidelity_delta=0.000e+00
  hardcoded settings_equal=True, max_abs_summary_delta=0.000e+00, max_fidelity_delta=0.000e+00

Diagnosis:
  material_difference=True
  Differences are material for strict apples-to-apples dynamics: hardcoded and Qiskit runs use very similar but not id
```