

# ADAPT Confidence Campaign

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## Scope:

Methods: exact, HF, hardcoded VQE, Qiskit VQE, ADAPT-UCCSD(adapt/fixed), ADAPT-CSE

Sites: [2, 3]

## Gates:

VQE:  $L2 \leq 1.0e-08$ ,  $L3 \leq 1.0e-06$

ADAPT-UCCSD fixed:  $L2 \leq 1.0e-08$ ,  $L3 \leq 1.0e-06$

ADAPT-UCCSD adapt:  $L2 \leq 1.0e-07$ ,  $L3 \leq 1.0e-05$

ADAPT-CSE: gap\_closure  $\geq 0.90$

## Run caps:

per\_method\_max\_time\_s=300.0

adapt\_trial\_max\_time\_s=120.0

adapt\_fixed\_trial\_max\_time\_s=180.0

## L=2 (n\_up=1, n\_down=1)

Exact=-0.836057118155 HF= 4.500000000000

Hardcoded VQE (UCCSD) E=-0.836057118127 |dE|=2.794e-11 t=0.25s gate\_pass=True

Qiskit VQE (UCCSD) E=-0.836057117595 |dE|=5.600e-10 t=2.26s gate\_pass=True

ADAPT-UCCSD (Fixed Sequence) E=-0.507936507937 |dE|=3.281e-01 t=55.77s gate\_pass=False

ADAPT-UCCSD (Adaptive) E=-0.507936507937 |dE|=3.281e-01 t=26.64s gate\_pass=False

ADAPT-CSE (Adaptive) E=-0.506312970694 |dE|=3.297e-01 t=7.41s gate\_pass=True

## L=3 (n\_up=2, n\_down=1)

Exact=-1.236067977500 HF= 4.000000000000

Hardcoded VQE (UCCSD) E=-1.236067974170 |dE|=3.330e-09 t=30.05s gate\_pass=True

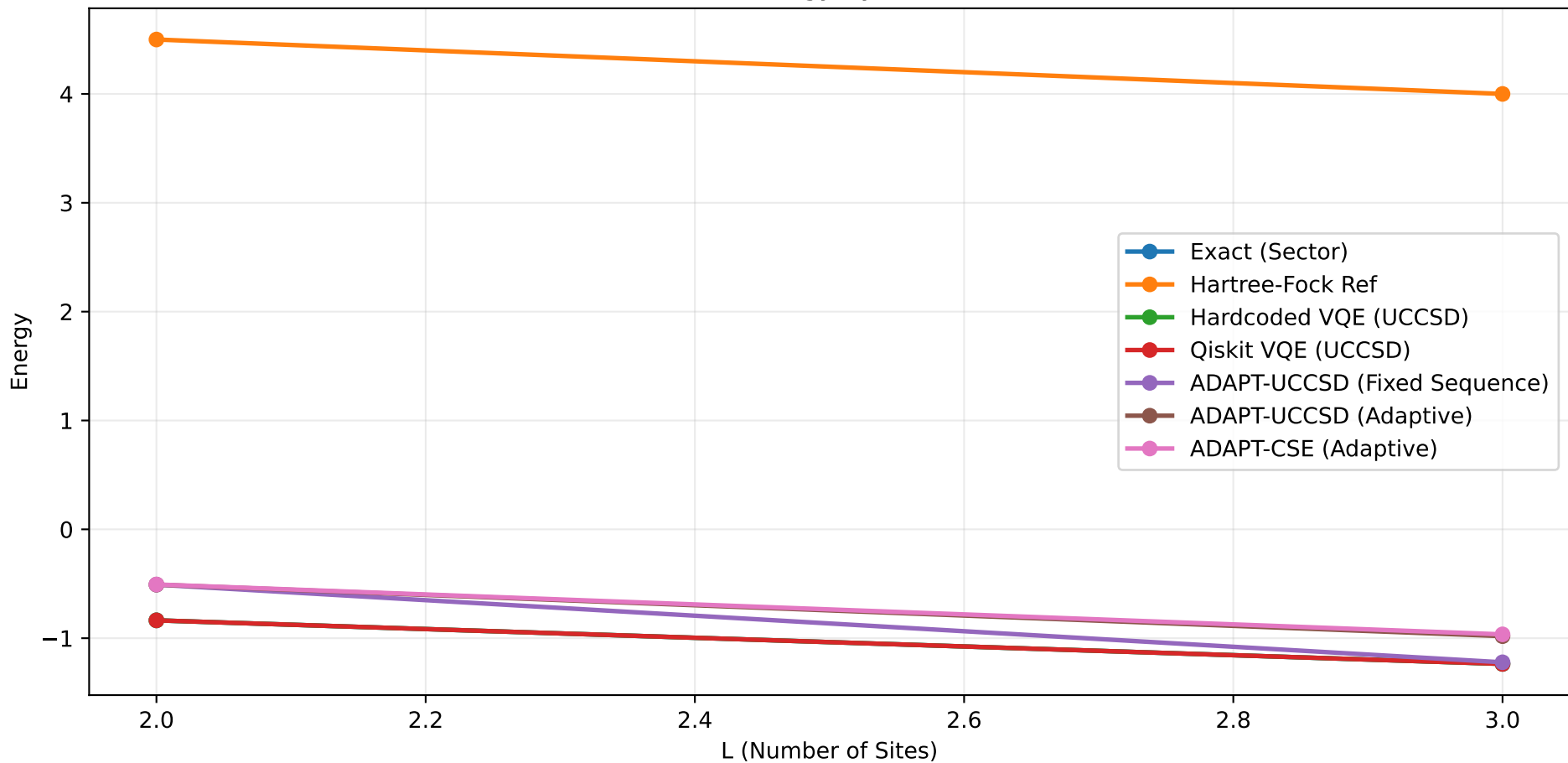
Qiskit VQE (UCCSD) E=-1.236067972049 |dE|=5.451e-09 t=233.12s gate\_pass=True

ADAPT-UCCSD (Fixed Sequence) E=-1.221399776886 |dE|=1.467e-02 t=691.00s gate\_pass=False

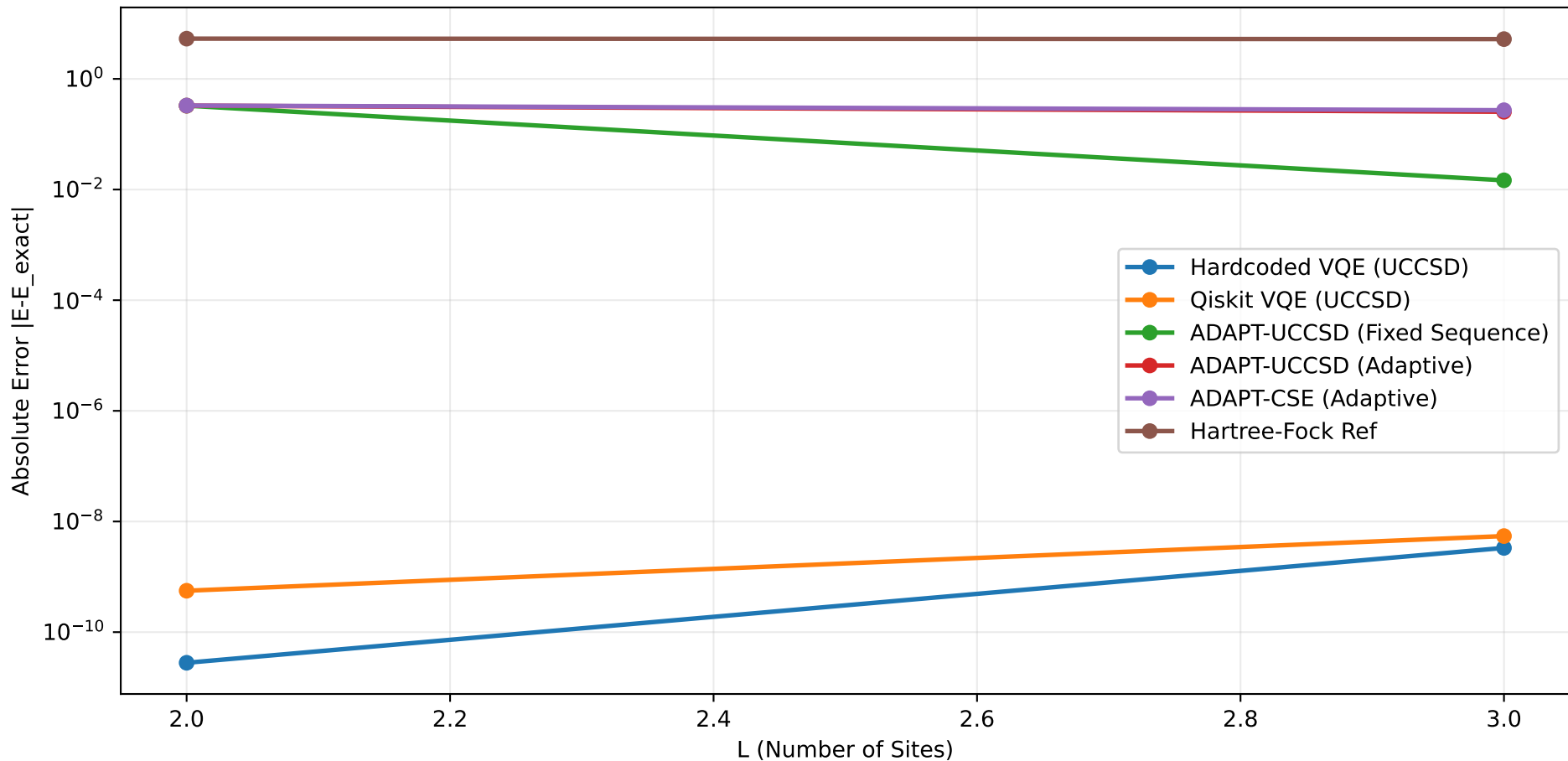
ADAPT-UCCSD (Adaptive) E=-0.981275244453 |dE|=2.548e-01 t=242.75s gate\_pass=False

ADAPT-CSE (Adaptive) E=-0.964712231459 |dE|=2.714e-01 t=124.69s gate\_pass=True

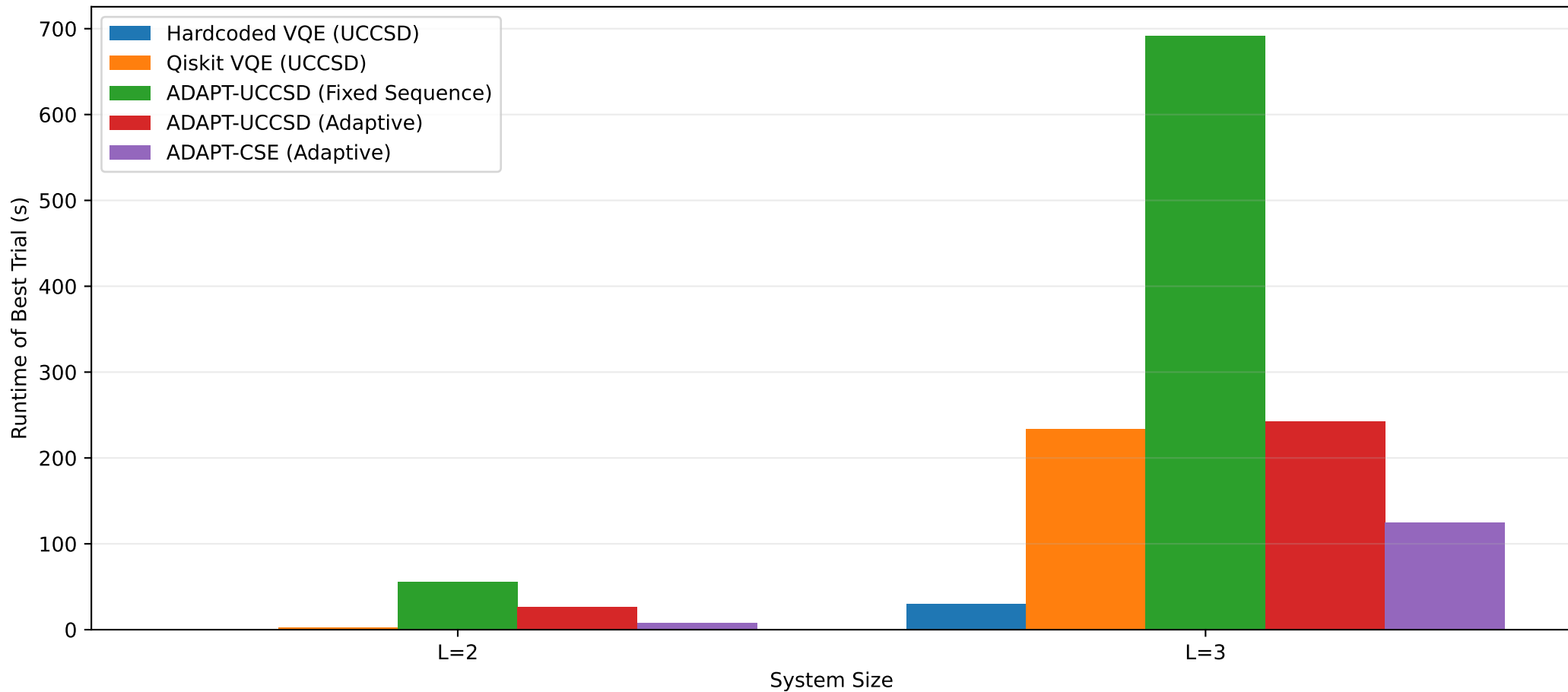
Best Energy by Method



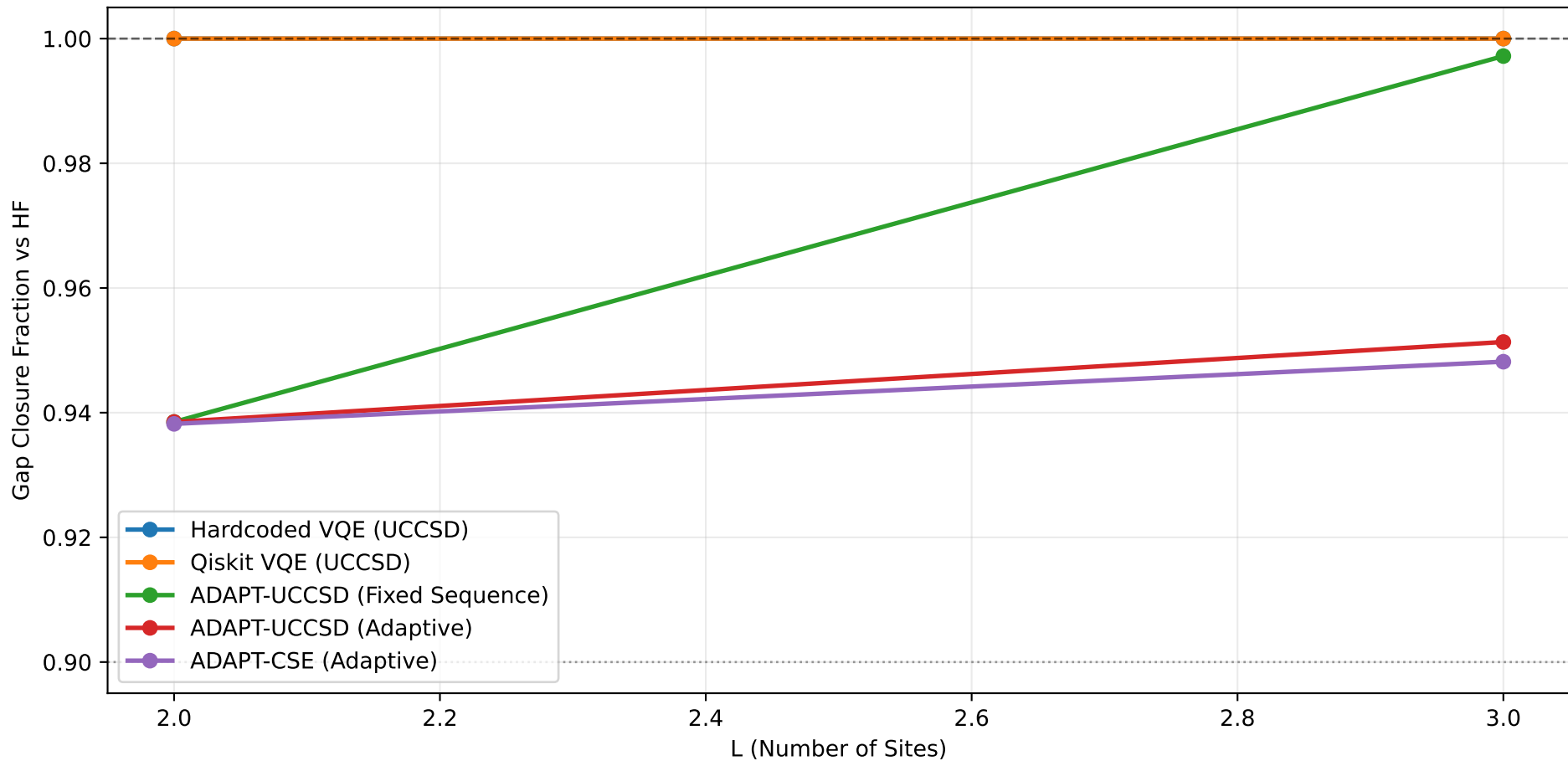
Best Absolute Error vs Exact



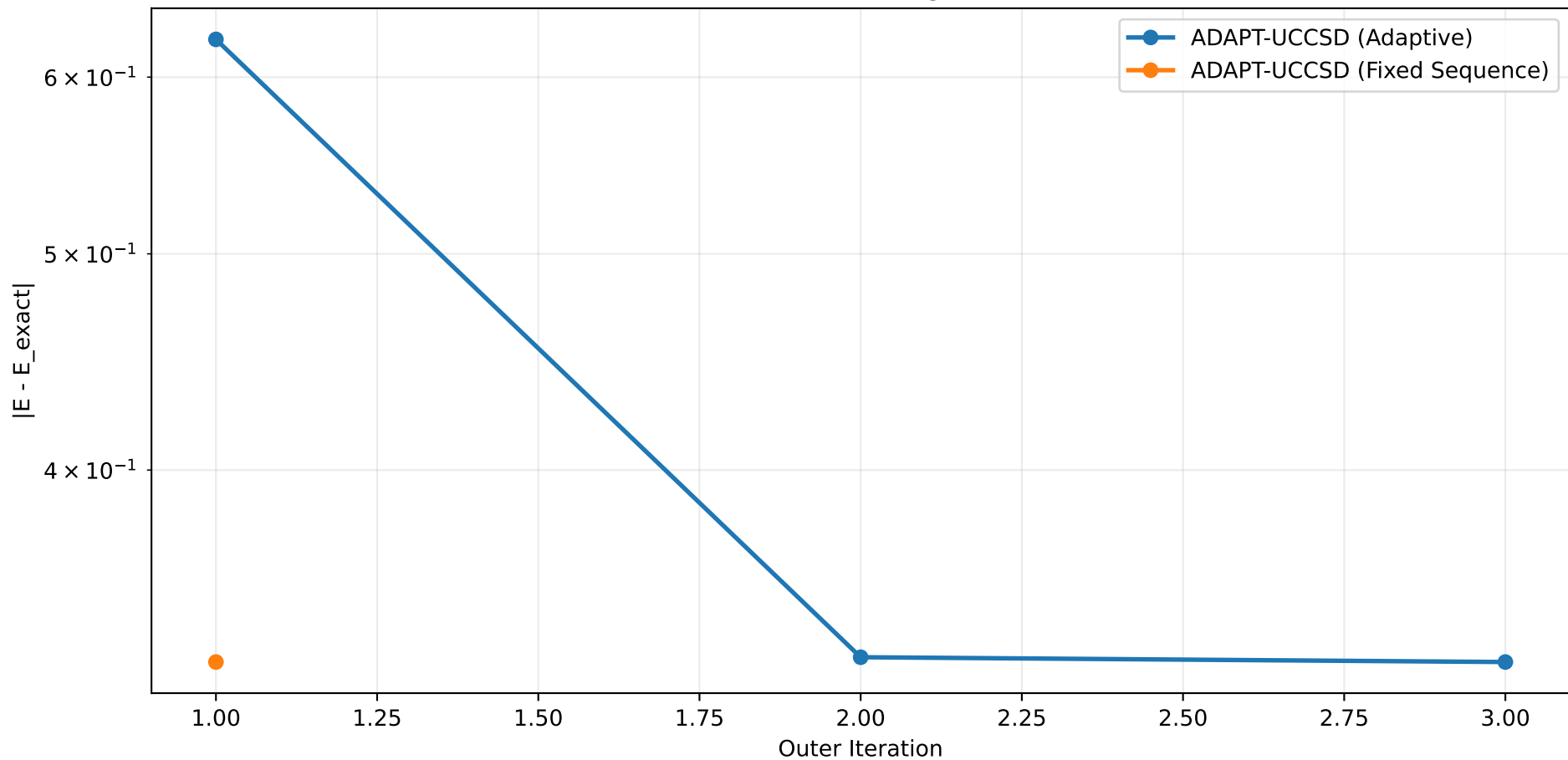
Best-Trial Runtime by Method



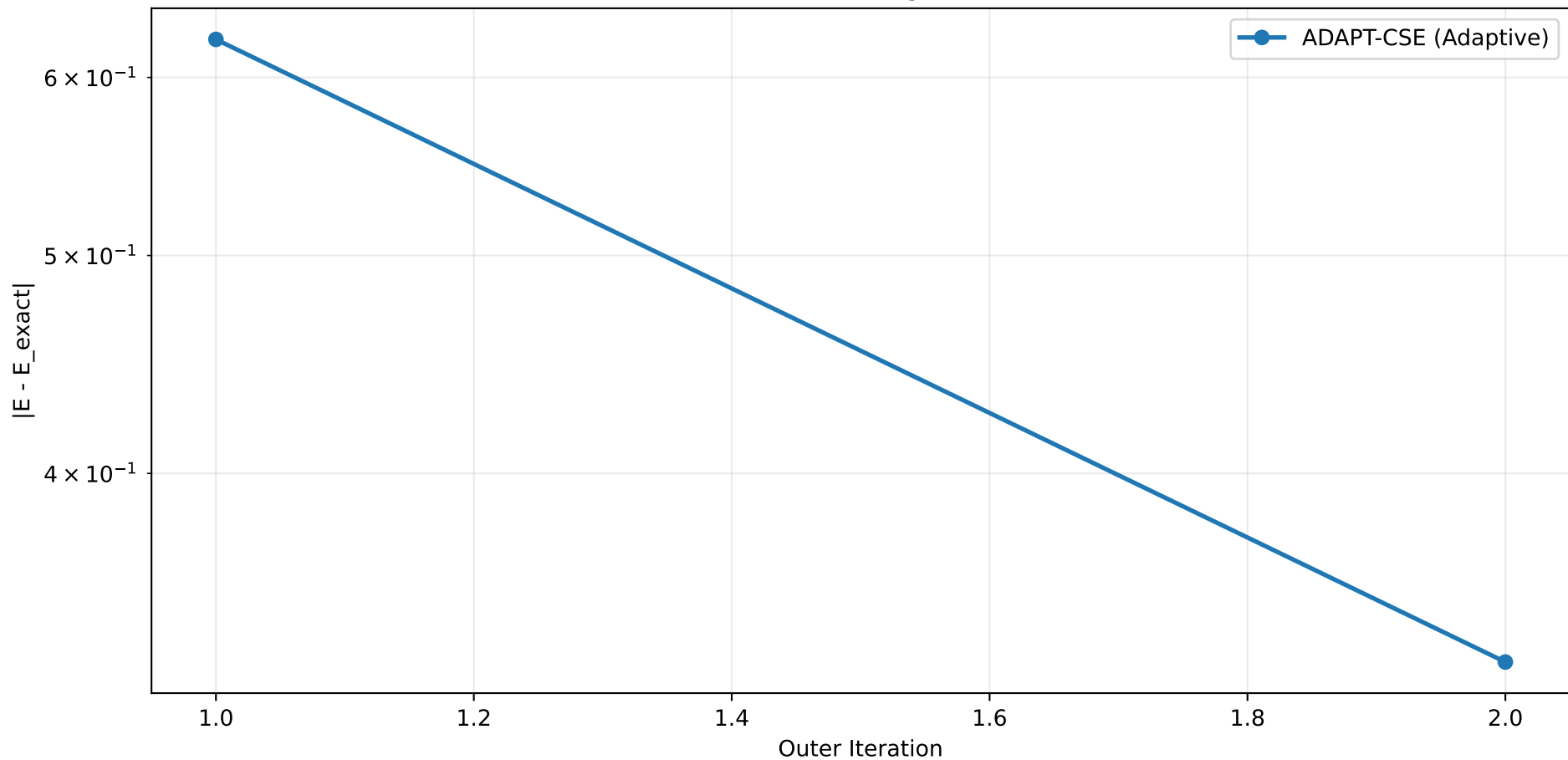
HF Gap-Closure by Method (1.0 = exact)



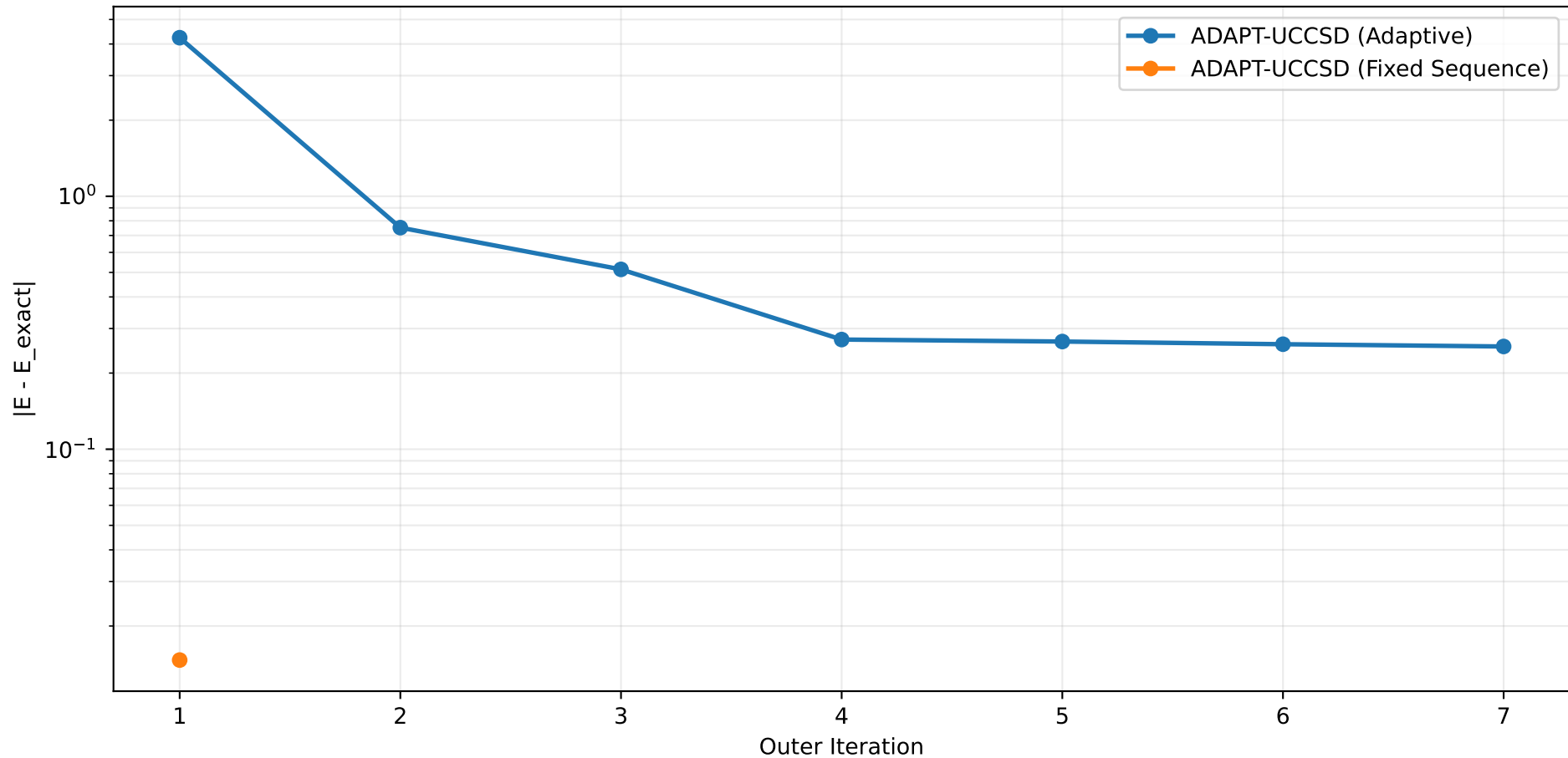
ADAPT-UCCSD Convergence (L=2)



ADAPT-CSE Convergence (L=2)



ADAPT-UCCSD Convergence (L=3)





ADAPT-CSE Convergence (L=3)

