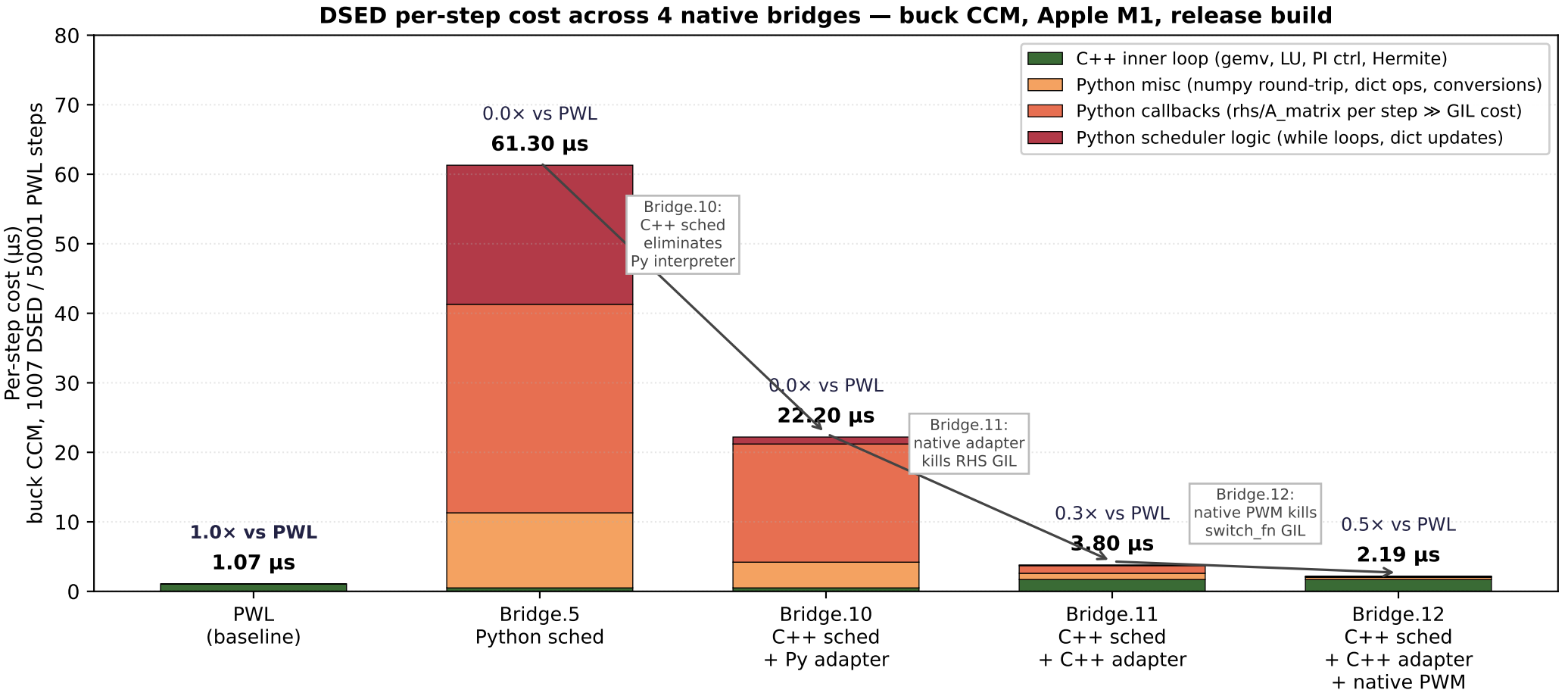
DSED per-step cost across 4 native bridges — buck CCM, Apple M1, release build
Per-step cost (µs)
buck CCM, 1007 DSED / 50001 PWL steps
0
10
20
30
40
50
60
70
80
C++ inner loop (gemv, LU, PI ctrl, Hermite)
Python misc (numpy round-trip, dict ops, conversions)
Python callbacks (rhs/A_matrix per step ≫ GIL cost)
Python scheduler logic (while loops, dict updates)
1.0× vs PWL
1.07 µs
0.0× vs PWL
61.30 µs
Bridge.10:
C++ sched
eliminates
Py interpreter
0.0× vs PWL
22.20 µs
Bridge.11:
native adapter
kills RHS GIL
0.3× vs PWL
3.80 µs
Bridge.12:
native PWM kills
switch_fn GIL
0.5× vs PWL
2.19 µs
PWL
(baseline)
Bridge.5
Python sched
Bridge.10
C++ sched
+ Py adapter
Bridge.11
C++ sched
+ C++ adapter
Bridge.12
C++ sched
+ C++ adapter
+ native PWM