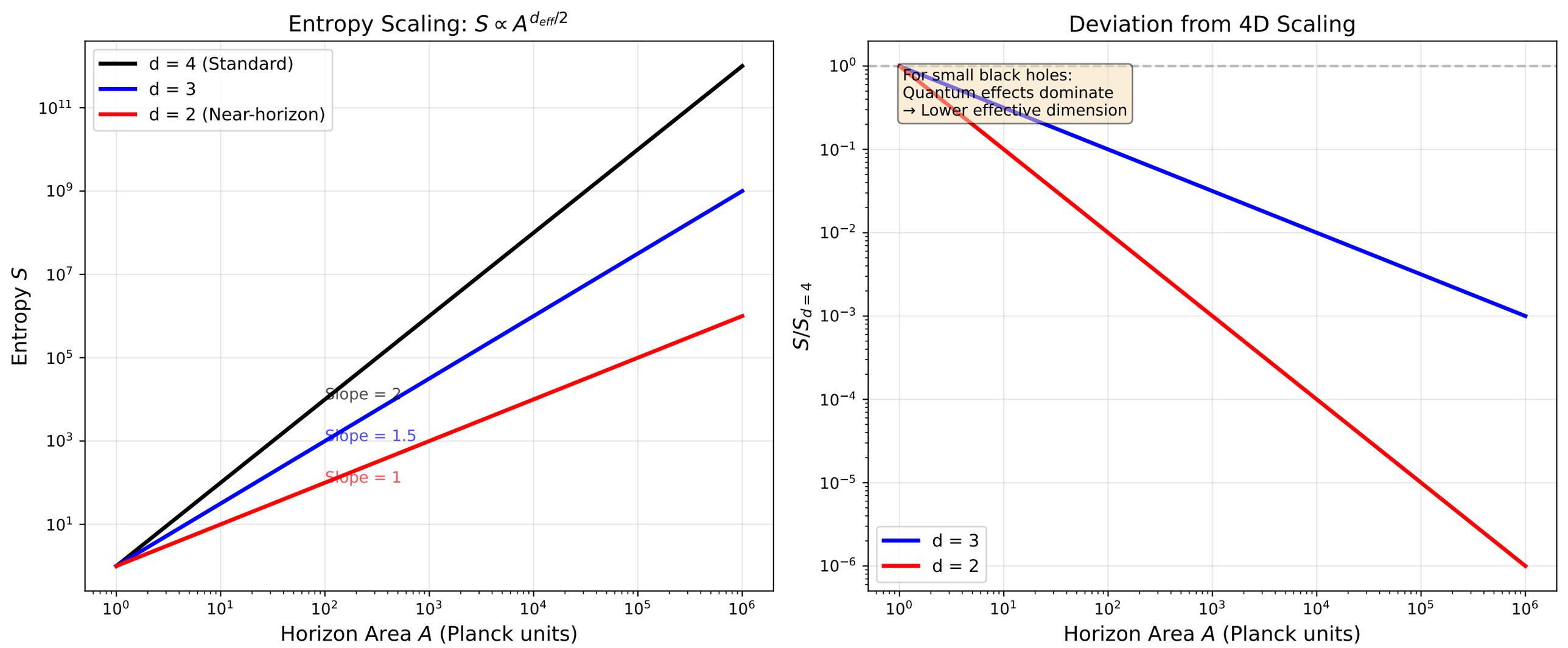
Entropy Scaling: $S \propto A^{d_{eff}/2}$
d = 4 (Standard)
d = 3
d = 2 (Near-horizon)
Slope = 2
Slope = 1.5
Slope = 1
Entropy S
Horizon Area A (Planck units)
Deviation from 4D Scaling
For small black holes:
Quantum effects dominate
→ Lower effective dimension
$S/S_{d=4}$
d = 3
d = 2
Horizon Area A (Planck units)