

Figure S6 | QAOA angle selection via coarse-to-refined γ - β landscape search ($p = 1$). (a) Coarse (γ, β) grid evaluation of the expected Ising energy $\langle H \rangle$ for the 21-qubit QAOA surrogate (3-bit \times 7-parameter encoding), used to locate the basin of low cost. (b) Refined (γ, β) scan in a tight window centered on the best coarse cell to sharpen the optimum. In both panels, the star marks the selected angles (γ^*, β^*) that minimize the evaluated $\langle H \rangle$. These final angles are then used for shots = 4096 QAOA sampling, followed by best-shot bitstring decoding (with trust-region $\Delta=0.08$ and bounds in Table S1) to obtain the discrete parameter vector θ used in the final EIS overlays.

