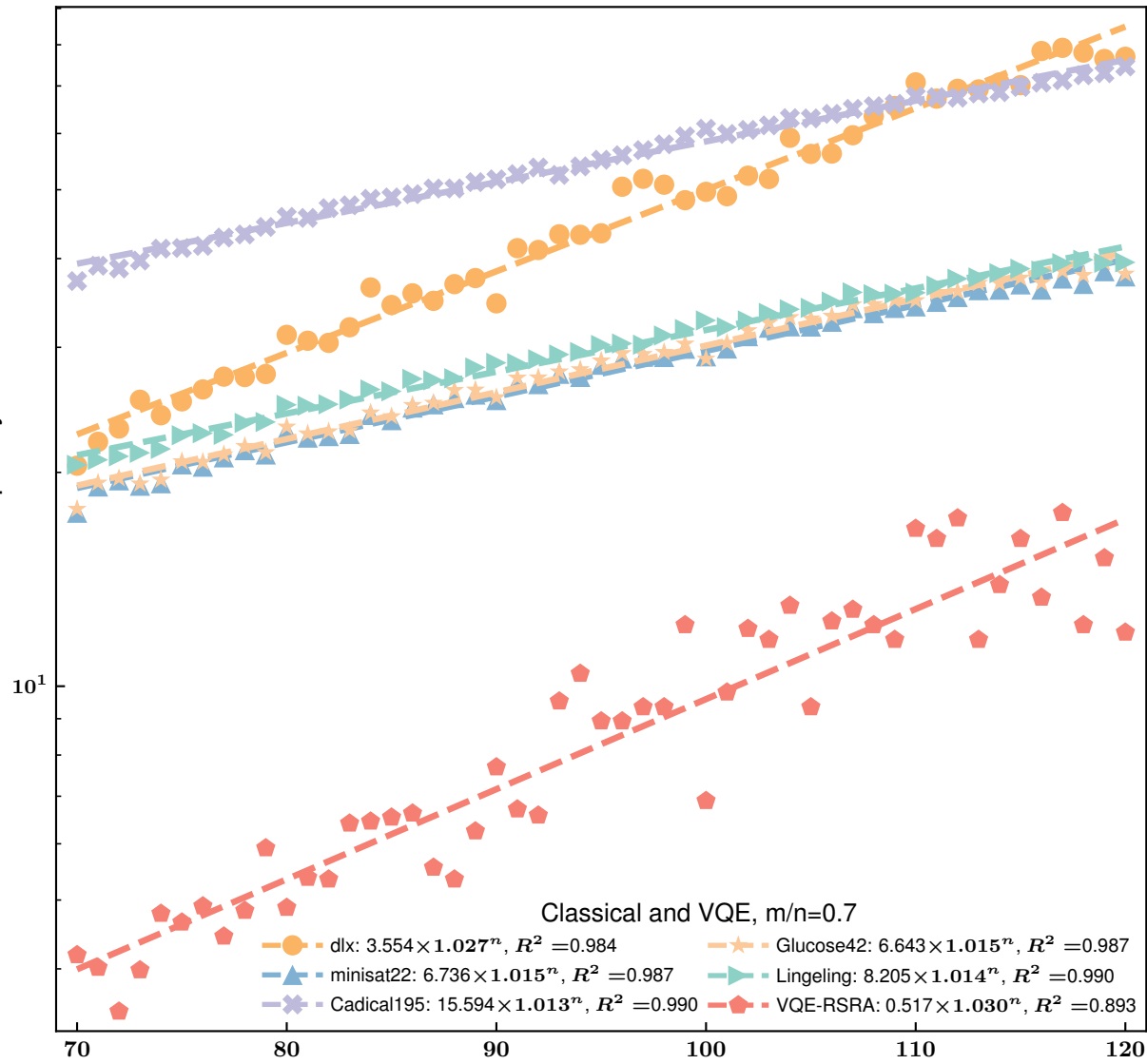


a

Time complexity



b

Time complexity

n

100 layer QAA,  $m/n=0.7$

Legend:

- QAA-RSRA:  $0.771 \times 1.010^n$ ,  $R^2 = 0.974$
- QAA:  $0.927 \times 1.046^n$ ,  $R^2 = 0.991$

The plot shows time complexity on a logarithmic scale (y-axis) versus problem size  $n$  on a linear scale (x-axis, ranging from 5 to 65). The QAA-RSRA algorithm (dark blue circles) shows lower complexity than the standard QAA algorithm (light blue triangles).

c

Time complexity

n

25 layer QAOA,  $m/n=0.7$

Legend:

- QAOA-RSRA:  $0.832 \times 1.010^n$ ,  $R^2 = 0.951$
- QAOA:  $0.883 \times 1.044^n$ ,  $R^2 = 0.961$

The plot shows time complexity on a logarithmic scale (y-axis) versus problem size  $n$  on a linear scale (x-axis, ranging from 10 to 40). The QAOA-RSRA algorithm (dark blue circles) shows lower complexity than the standard QAOA algorithm (light blue triangles).