T. Palmer (2026): A 1000-qubit-ceiling on quantum computers, due to gravity. Sure?

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PQC (Post-Quantum Cryptography)

RaQM (Rational Quantum Mechanics)

RaQM - N qubits

Digital encoding of a qubit into L bits

Digital encoding of N qubits into $N \times L$ bits

Ceiling N_{max}

Was the ceiling installed ab ovo by hand?

Why is the ceiling N_{max} about 1000 qubits?

PQC (Post-Quantum Cryptography)

1977 **RSA** (Rivest-Shamir-Adleman) classical cryptosystem
1994 **Shor** q-algorithm, prime factorization in polinomial time
2026+yy **Q-Day**, universal Q-computer breaks RSA

Risk until the Q-Day: "Harvest now, decrypt later".
Answer: Great Migration of classical RSA to classical **PQC**.

Palmer:
Relax, q-computer will never be big enough.
Q-computers break down below the **1000-qubit-ceiling**.
The predicted breakdown of QM could be testable in < 5 yy.
PNAS **123**, e2523350123 (2026)

RaQM (Rational Quantum Mechanics)

$$|\theta, \Phi\rangle = \cos\frac{\theta}{2}|1\rangle + e^{i\Phi}\sin\frac{\theta}{2}|-1\rangle$$

$$\cos^2\frac{\theta}{2} = \frac{m}{L}; \qquad \frac{\Phi}{2\pi} = \frac{n}{L}$$

L : degree of granularity

in QM: $L = \infty$; in RaQM: $L < \infty$

RaQM - N qubits

$$e.g.: N = 3$$

$$\underbrace{\cos\frac{\theta_1}{2}|1\rangle}_{1}\times\left(\begin{array}{c}\underbrace{\cos\frac{\theta_2}{2}|1\rangle}_{2}\times(\underbrace{\cos\frac{\theta_4}{2}|1\rangle+e^{i\phi_4}\sin\frac{\theta_4}{2}|-1\rangle}_{3})+\\ +\underbrace{e^{i\phi_2}\sin\frac{\theta_2}{2}|-1\rangle}_{2}\times(\underbrace{\cos\frac{\theta_5}{2}|1\rangle+e^{i\phi_5}\sin\frac{\theta_5}{2}|-1\rangle}_{3})\end{array}\right)+$$

$$+\underbrace{e^{i\phi_1}\sin\frac{\theta_1}{2}|-1\rangle}_{1}\times\left(\begin{array}{c}\underbrace{\cos\frac{\theta_3}{2}|1\rangle}_{2}\times(\underbrace{\cos\frac{\theta_6}{2}|1\rangle+e^{i\phi_6}\sin\frac{\theta_6}{2}|-1\rangle}_{3})+\\ +\underbrace{e^{i\phi_3}\sin\frac{\theta_3}{2}|-1\rangle}_{2}\times(\underbrace{\cos\frac{\theta_7}{2}|1\rangle+e^{i\phi_7}\sin\frac{\theta_7}{2}|-1\rangle}_{3})\end{array}\right)$$

Digital encoding of a qubit into L bits

$$|\theta, \Phi\rangle = \cos\frac{\theta}{2}|1\rangle + e^{i\Phi}\sin\frac{\theta}{2}|-1\rangle$$

$$\cos^2\frac{\theta}{2} = \frac{m}{L}; \qquad \frac{\Phi}{2\pi} = \frac{n}{L}$$

$$\text{qubit} \Rightarrow L \text{ bits}$$

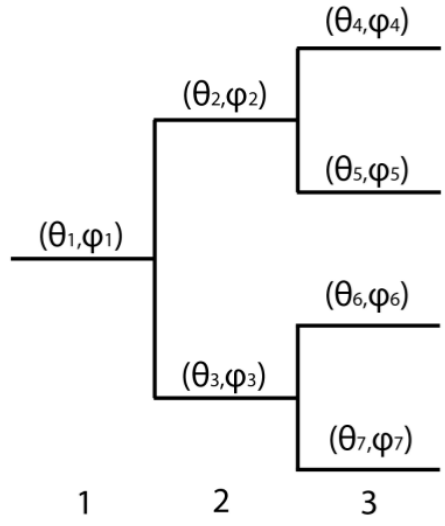
$$|\psi(\theta,\phi)\rangle \equiv \{\underbrace{1,\ 1,\ 1,\ \ldots\ 1,\ 1,\ 1,\ -1,-1,-1,\ \ldots\ ,-1,-1,-1}_{\theta,\phi}\} \mod \xi$$

$m = \#$ *of* $1's$; $\quad n = \#$ *of* cyclic permutations

Digital encoding of N qubits into $N \times L$ bits

$$e.g.: N = 3$$

Tree of parameters:



$$|\psi\rangle \equiv \begin{cases} \{\underbrace{1,\ 1,\ 1,\ \ldots\ 1,\ 1,\ 1,}_{\theta_1,\phi_1}\ -1,-1,-1,\ \ldots\ ,-1,-1,-1\} & \mod \xi \\ \{\underbrace{1,1,\ \ldots,1,\ -1,-1,\ldots,-1}_{\theta_2,\phi_2}\ \underbrace{1,1,\ldots,\ 1,\ -1,-1\ldots\ ,-1}_{\theta_3,\phi_3}\} & \mod \xi \\ \{\underbrace{1,\ \ldots\ ,-1}_{\theta_4,\phi_4}\ \underbrace{1,\ \ldots\ ,-1}_{\theta_5,\phi_5}\ \underbrace{1,\ \ldots\ ,-1}_{\theta_6,\phi_6}\ \underbrace{1,\ \ldots\ ,-1}_{\theta_7,\phi_7}\} & \mod \xi \end{cases}$$

Ceiling N_{max}

$$|\psi\rangle \equiv \begin{cases} \{\underbrace{1,\ 1,\ 1,\ \ldots\ 1,\ 1,\ 1,\ -1,-1,-1,\ \ldots\ ,-1,-1,-1}_{\theta_1,\phi_1}\} & \mod \xi \\ \{\underbrace{1,1,\ \ldots,1,\ -1,-1,\ldots,-1}_{\theta_2,\phi_2}\ \underbrace{1,1,\ldots,\ 1,\ -1,-1\ldots\ ,-1}_{\theta_3,\phi_3}\} & \mod \xi \\ \{\underbrace{1,\ \ldots\ ,-1}_{\theta_4,\phi_4}\ \underbrace{1,\ \ldots\ ,-1}_{\theta_5,\phi_5}\ \underbrace{1,\ \ldots\ ,-1}_{\theta_6,\phi_6}\ \underbrace{1,\ \ldots\ ,-1}_{\theta_7,\phi_7}\} & \mod \xi \end{cases}$$

$$N \text{ qubits}, \quad 2^{N-1} - 2 \text{ dof's}, \quad N \times L \text{ bits}$$

"When

$$2^{N-1} - 2 > N \times L$$

there are simply not enough bits to allocate even one bit to each QM dof."

$$\mathbf{N_{max}} \approx \log_2 \mathbf{L}$$

Was the ceiling installed ab ovo by hand?

Palmer: N_{max} follows from the new RaQM.

LD: It follows from the heavily lossy digital encoding.

$$\cos^2(\theta_\alpha/2) = n_\alpha/L_\alpha; \quad \Phi_\alpha/2\pi = m_\alpha/L_\alpha$$

$$n_\alpha = \#\ of\ 1's; \quad m_\alpha = \#\ of\ cyclic\ perm's$$

$$|\psi\rangle \equiv \begin{cases} \{\underbrace{1,\ 1,\ 1,\ \ldots\ 1,\ 1,\ 1,\ -1,-1,-1,\ \ldots\ ,-1,-1,-1}_{\theta_1,\phi_1}\} & \mod \xi \\ \{\underbrace{1,1,\ \ldots,1,\ -1,-1,\ldots,-1}_{\theta_2,\phi_2}\ \underbrace{1,1,\ldots,\ 1,\ -1,-1\ldots\ ,-1}_{\theta_3,\phi_3}\} & \mod \xi \\ \{\underbrace{1,\ \ldots\ ,-1}_{\theta_4,\phi_4}\ \underbrace{1,\ \ldots\ ,-1}_{\theta_5,\phi_5}\ \underbrace{1,\ \ldots\ ,-1}_{\theta_6,\phi_6}\ \underbrace{1,\ \ldots\ ,-1}_{\theta_7,\phi_7}\} & \mod \xi \end{cases}$$

$$L_1 = L \qquad L_2 = n_1 \qquad L_3 = L_1 - L_2$$

$$L_4 = n_2 \qquad L_5 = L_2 - L_4 \qquad L_6 = n_3 \qquad L_7 = L_3 - L_6$$

θ_1, Φ_1 — L bits are allocated.

$\theta_2, \Phi_2, \theta_3\Phi_3, \ldots$ — fewer and fewer bits are allocated

Look at the tree: it stops at $\mathbf{N = N_{max} \approx \log_2 L}$ at the latest.

Why is the ceiling N_{max} about 1000 qubits?

Granularity L is related to gravity, via the DP time of quantum state reduction.

$$\tau_{DP}^{qdot} = \hbar / E_G \approx \frac{\hbar}{G m_e^2 / R_e} \approx 10^{20} s$$

Palmer: In RaQM, state reduction happens in L steps of duration $\tau_{Pl} = \sqrt{\hbar G / c^5} \approx 10^{-44} s$ each.

$$L \tau_{Pl} = \tau_{DP}^{qdot} \approx 10^{20} s$$

$$L \approx 10^{64}, \qquad N_{max} = \log_2 L \approx 200.$$

"N_{max} lies between about 200 and 400 for current qubit technologies and never will exceed 1000."