

The Curious Case of Qubit Hyperinflation

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https://youtu.be/O2LTdgGdy3E&lc=UgwOzrBg0UI_4B4gKWd4AaABAq

A Comment on the [Conversations With Joe](#) YouTube post:

Beyond The Gobbledygook With Sabine Hossenfelder - Episode 26 (May 25, 2023)

<https://youtu.be/O2LTdgGdy3E?t=40m2s>

[40:02] SH: *"Logical qubits are ... perfect. [Researchers would] quote the number of logical qubits [needed for an application as] something like 150... I had to explain ... the number of physical qubits that [needed] is more like a million... In the maths [you use] the logical qubits... but ... in the real world ... the physical qubits ... have errors. This is why the number of physical qubits is so much larger than that of logical qubits."*

The distinction between logical and physical qubits developed only after a painful early period in which every researcher I talked to sincerely believed that even smaller qubit counts — I recall numbers like "15" and even "8" bandied about — would break all encryptions. Folks were genuinely shocked when it didn't work out that way. The then-new topic of quantum error correction got quite lively, and the qubit count goalposts began moving. At first, a handful of qubits became a few dozen... then a few hundred... then thousands... and now millions. If the qubits needed had been stock prices, anyone heavily invested then would be a billionaire now.

What I find surprising is how seldom folks question *why* the maths went so wrong since Peter Shor first shocked the world with his clever (but cryptic, wow — the explanations came later) algorithm. Blaming the disparity entirely on "bad hardware" or thermal issues alone seems disingenuous. What role, if any, did the maths also play?

One possible issue is that an overly confident application of David Deutsch's extreme version of Everett's many-worlds quantum interpretation played a deleterious role. If your model tells you with confidence that the computational capacity of an infinity of worlds is there for the taking, it's easy to get too optimistic about the generosity of the quantum world. Funding incentives and national security concerns might have easily contributed to that excessive optimism.