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The Quantum Hype

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Science Between Euphoria and Reality: Nicolò Crescini's Take – Researcher and Science Ambassador at FBK – on the Latest Quantum News

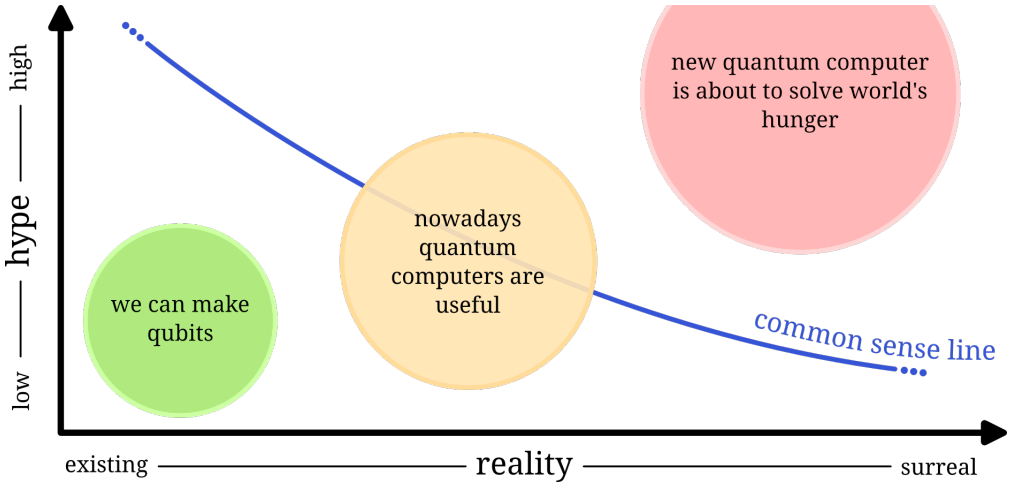
There is a stark contrast between how scientific advancements are imagined and how they actually unfold. In popular perception, a discovery, a new technology, or a scientific leap arise from the sudden intuition of a brilliant scientist, an instant revelation that sets off an unstoppable domino effect. In reality, **research** is far from this **narrative**. It is a painstaking process of iteration—imagine, fail, reconsider—where each step gradually refines the understanding of a subject. This process builds up a consistent picture of what a scientist studies, and eventually leads to an important, yet marginal, advancement.

It is to **scientists**' advantage to communicate their **results** in a way that matches how **research** is thought of, as it increases the engagement of the large public by leveraging the excitement of a new **discovery**. In most cases this is not harmful, but sometimes it can lead to **misleading narratives** that oversimplify complex findings, exaggerate their implications, or create unrealistic expectations about future developments. This can erode public trust when reality does not align with the initial excitement and may contribute to misunderstandings about the scientific process itself. Lately, this approach has veered into the wrong lane in the field of **quantum computing**.

Quantum technologies are still a subject of research. Even for the most mature technologies, where the technical aspects like optimization and scaling are drifting towards industry, many of their nuances are still research territory. Less mature technologies, meanwhile, have yet to demonstrate any practical applicability. An example of the latter are topological **quantum bits**, an outstanding idea dating back to **1997**[1], and which continues to drive significant research worldwide. Despite the exploratory nature of some approaches, bold claims can sometimes leap ahead of the science itself.

Recently, the **Microsoft Azure Quantum group** announced on their blog[2] that they had built a fully-fledged **topological quantum computer**, scalable and immune to errors. But as soon as the news broke, the **reaction split in two**. On one side, the press enthusiastically dedicated front pages to the achievement, and on another parallel and niche one, the scientific community was baffled to find that none of these claims were supported by the group's actual results. On

these very days, **Microsoft's** findings are being presented at a major scientific conference, and nobody is surprised to see that they fail to demonstrate any of the bold claims made earlier[3]. A similar case occurred with **D-Wave's** recent assertion of quantum supremacy, which was eagerly amplified by the press, only to be promptly questioned by the scientific community[4]. Also IonQ is now announcing[5] its own breakthrough—will the hype withstand expert scrutiny?



Events like these emerge from time to time, consider the claims of room-temperature **superconductivity** (twice), faster-than-light neutrinos, or the detection of **Majorana** zero modes (always by the Microsoft group). They share common traits: a lack of data confirmation, poor experimental rigor, or, in some cases, outright fraud. But the most striking aspect is that in each instance, the scientific community was fully aware of the claims' unreliability, and ultimately debunked them[6].

The need for a compelling narrative is understandable, an extraordinary breakthrough is far more captivating than a slow, incremental process. However, greater attention should sometimes be given to **verifying** these claims before embracing them, because after all this is science and not advertisement. This may leave us with a somewhat drier v**ision of scientific progress, but at least a reliable one.**

And yet, the scientific process does allow room for brilliant intuitions and sudden revelations. These moments find their space within the cycles of imagining, failing, and reconsidering—when an idea unexpectedly works and becomes a game-changer, at least for the few people in the room. The "eurekas" of science are often far more humble than one might imagine, but they remain a significant part of what keeps a scientist going.

1. A. Yu. Kitaev, Fault-tolerant quantum computation by anyons

2. C. Bolgar, Microsoft's Majorana 1 chip carves new path for quantum computing

3. D. Garisto,Microsoft quantum computing claim still lacks evidence: physicists are dubious

4. M. Sparkes, Doubts cast over D-Wave's claim of quantum computer supremacy

5. J. Mazur, IonQ and Ansys Achieve Major Quantum Computing Milestone

6. Documentary: Reproducibility in Condensed Matter Physics

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