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QUANTUM'S BUSINESS BREAK- THROUGH

Quantum computing has long promised to solve problems beyond the capabilities of traditional supercomputers. That promise is now beginning to translate into measurable scientific progress. IBM and Israeli startup Qedma Quantum Computing recently announced a major step toward this reality, demonstrating that commercially available quantum systems can model physical phenomena beyond the reliable reach of leading classical approaches.

The achievement is significant not only for researchers, but also for organizations considering how quantum computing could eventually affect their industries. It suggests that the conversation is moving beyond theoretical potential and isolated laboratory experiments toward trusted results, practical workflows, and a new form of computational infrastructure.

Using commercially available IBM quantum computers together with Qedma's advanced error-mitigation software, researchers observed complex and long-lived quantum dynamics in systems of up to 74 qubits. According to the companies, the results represent one of the clearest demonstrations yet of "trusted quantum advantage", a point at which quantum computers outperform classical approaches while maintaining accuracy that can be scientifically validated.

"This is the first time commercially available quantum hardware and software have achieved quantum advantage with a level of trust suitable for scientific discovery," said Jay Gambetta, IBM Fellow and Director of IBM Research.

Trust is essential in this context. Producing an answer faster is not enough if researchers cannot determine whether that answer is correct. The collaboration between IBM and Qedma

therefore focused on both computational scale and verification, addressing one of the central questions facing the quantum industry: how to obtain useful results from current quantum systems while providing rigorous evidence that those results can be trusted.

BEYOND CLASSICAL COMPUTERS

Researchers tested the technology on a complex physics problem that becomes increasingly difficult for classical computers to solve as scale and complexity grow. To evaluate the quantum outputs, the teams compared them with leading classical methods, including calculations performed on Fugaku at Japan's RIKEN Center for Computational Science. As the simulations increased in complexity and covered longer timescales, the classical approaches began producing inconsistent results. By contrast, the quantum approach based on IBM hardware and Qedma software continued to generate stable outputs.

Quantum advantage cannot be established through scale alone. Careful benchmarking is essential to demonstrate that quantum results can serve as credible inputs to research and future business applications.

REDUCING ERRORS

The achievement also addresses one of quantum

computing's biggest challenges: noise. Qubits are extremely sensitive to their environment, and even small disturbances can introduce errors into a calculation. Fully fault-tolerant quantum computers are designed to overcome this problem through extensive error correction, but systems at that scale are still under development.

Qedma's approach is to improve the usefulness of the hardware available today. Its QESEM software characterizes, reduces, and mitigates errors so that researchers can extract more accurate results from quantum circuits. Combined with improvements in IBM's processors, system performance, and software stack, this creates a path for meaningful experimentation before large-scale fault tolerance arrives.

"For decades, quantum computing promised discoveries beyond the reach of classical systems," said Dr. Asif Sinay, CEO and co-founder of Qedma. "We're now starting to see that promise become reality."

FROM SCIENCE TO BUSINESS

The immediate result belongs to fundamental physics, but its implications extend further. More capable simulation of quantum materials could contribute to advances in energy technologies,

chemistry, and materials science. Industries that depend on discovering or optimizing complex materials may be among the first to benefit as quantum techniques mature.

The milestone also highlights that useful quantum computing will depend on an ecosystem of hardware, software, cloud infrastructure, and specialist expertise. This full-stack approach is important because useful quantum computing will depend on integrating many technologies rather than relying on a quantum processor in isolation.

As a result, success in quantum computing is unlikely to depend solely on access to quantum hardware. Competitive advantage may come from developing scarce skills, identifying high-value use cases, preparing data and workflows, and building partnerships with researchers and technology providers. Organizations that begin this groundwork early will be better positioned to evaluate progress realistically and act when quantum methods become relevant to their operations.

A HYBRID FUTURE

Quantum computers are not a replacement for classical supercomputers. Instead, the future of computing is hybrid: classical systems will continue handling most enterprise workloads, while

quantum processors will be used selectively for problems suited to their distinctive capabilities. The two will work together, with classical computing supporting data preparation, orchestration, optimization, validation, and interpretation of quantum results.

For business leaders, this means preparation can start without betting on uncertain timelines. Companies can identify promising use cases, engage with the quantum ecosystem, and run carefully defined experiments. They should also track technical progress using evidence-based measures—accuracy, scale, runtime, and comparison with the best classical methods—rather than focusing only on qubit counts.

Today's quantum machines remain early-stage technologies, and a single milestone does not mean broad commercial advantage has arrived. Nevertheless, the ability to produce validated scientific outcomes beyond the reliable reach of classical computation marks an important shift. Quantum computing is beginning to move from promise toward practical computational value. The strategic question for leaders is no longer simply whether quantum will matter, but where it could create advantage, and whether their organizations will be ready when it does.