Quantum Brilliance and Pawsey Advance Quantum Integration with Novel Hybrid Workflow Accelerated by NVIDIA

Milestone demonstrates practical path to exploring real-world quantum computing applications

Pawsey's Setonix and Quantum Brilliance Hardware

SINGAPORE, March 10, 2025 /EINPresswire.com/ -- Quantum Brilliance, a global leader in mass-deployable, room-temperature diamond quantum technology, and Pawsey Supercomputing Research Centre today announced a significant milestone in quantum computing integration. The collaboration has resulted in the development of a tightly integrated, HPC-oriented, flexible and scalable hybrid workflow that seamlessly combines GPU, CPU, and quantum processing capabilities. This breakthrough, led by Dr. Pascal Elahi and the Pawsey quantum team, demonstrates a practical path toward incorporating quantum computing into real-world applications.

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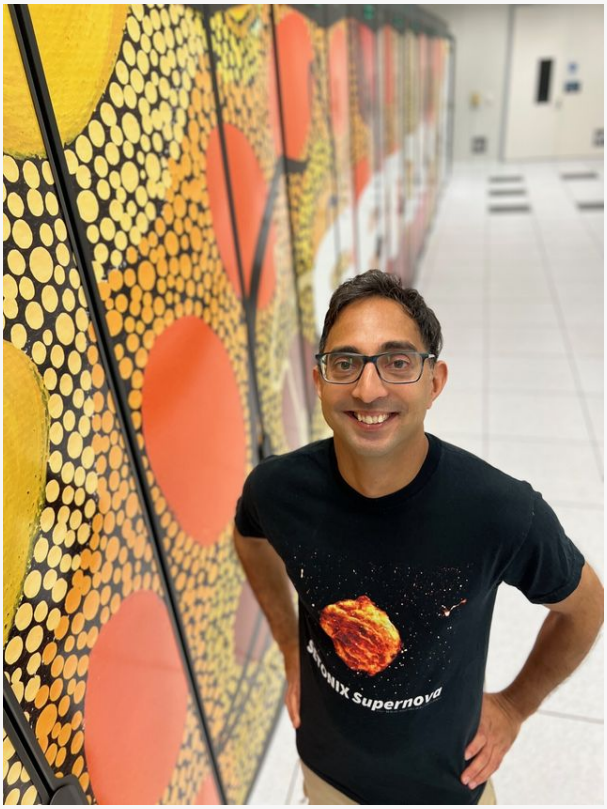
> *Dr. Pascal Elahi, Quantum Team Lead at Pawsey*

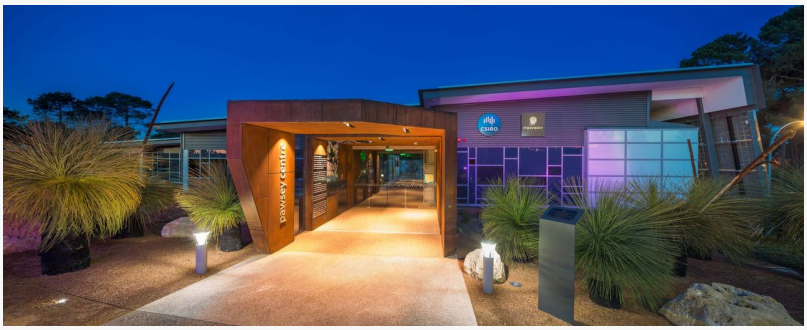
The workflow dynamically deploys Quantum Brilliance’s virtual Quantum Processing Unit (vQPU) alongside traditional and accelerated computing resources, offering researchers and enterprises a flexible and scalable pathway to explore quantum computing applications. Powered by NVIDIA GH200 Grace Hopper Superchips, hosted at Pawsey, the workflow is designed to be hardware-agnostic, much like a universal adapter that bridges multiple computing platforms.

The hybrid workflow functions like a universal translator for computing resources, enabling different types of processors to work together to solve complex problems. A key feature of the workflow is its ability to communicate with both virtual and physical quantum computers using

the same language and method and easily integrates with high performance computing (HPC) clusters by hooking into HPC tools like the SLURM job scheduler. This greatly simplifies integration and will accelerate quantum exploration by research groups and eventual adoption across industries.



Dr. Pascal Elahi, Quantum Team Lead at Pawsey



Pawsey Supercomputing Research Centre in Kensington, Western Australia

“What we've developed is essentially a conductor for a technological orchestra, where quantum and classical computers can work in harmony to solve complex problems,” said Dr. Pascal Elahi, Quantum Team Lead at Pawsey. “Previous approaches focused on quantum algorithms in isolation, but real-world problems require seamless integration of multiple computing technologies."

“This novel hybrid workflow demonstrates that accelerated computing is key to advancing quantum computing,” said Sam Stanwyck, Group Product Manager for quantum computing at NVIDIA. “NVIDIA collaborates with innovators, like Quantum Brilliance and Pawsey Supercomputing Research Centre, to bring us closer to running useful quantum applications.”

Quantum Brilliance’s vQPU provides a low-barrier entry to quantum computing by realistically emulating the user experience and behaviour of physical quantum processors with tens of qubits. Unlike physical quantum devices, which are limited in availability, the vQPU offers a scalable, high-performance solution that can be easily deployed in clusters within high-performance computing (HPC) environments. Utilising NVIDIA GH200 Grace Hopper Superchips, vQPU instances can be configured to accommodate circuits with varying depth and complexity, while their realistic noise modelling and shot result representation enable researchers to test algorithms under conditions that mimic real-world quantum hardware constraints.

“By successfully integrating our virtual QPU into Pawsey's workflow, we're demonstrating that

quantum computing is not just theoretical – it is set to become a practical tool for solving real-world problems," said Andrea Tabacchini, VP of Quantum Solutions at Quantum Brilliance. "This dynamic virtual-physical hybrid capability positions Australia at the forefront of quantum and supercomputing convergence, strengthening national infrastructure and quantum technology leadership."

Key applications of this technology include radio astronomy data processing, artificial intelligence workflows, and bioinformatics, where hybrid quantum-classical computing can accelerate computational tasks. The success of this initial phase paves the way for further advancements, with the next step involving the deployment of the workflow on Pawsey's Setonix supercomputer using a physical quantum computer.

By providing seamless access to CPU, GPU, and QPU computing resources, this technology positions researchers and enterprises to experiment with quantum-enhanced problem-solving, accelerating the practical adoption of quantum computing across diverse fields.

About Quantum Brilliance (QB)

Quantum Brilliance, founded in Australia in 2019 and grown out of research conducted at the Australian National University, is a global leader in diamond-based quantum technology.

QB specialises in the design, fabrication and manufacturing of small, ruggedized diamond quantum devices, operating at room temperature. As a full-stack hardware and software company, with operations in Australia and Germany, QB's mission is to enable the mass deployment of quantum technology, facilitating its integration into everyday devices and high-performance computing systems.

QB has attracted world-leading scientific and commercial talent in Australia and Europe. Its international partnerships extend into North America, Europe and the Asia-Pacific and include governments, supercomputing centers, research organizations, and industry partners.

For more information, visit quantumbrilliance.com

About The Pawsey Supercomputing Research Centre (Pawsey)

Pawsey Supercomputing Research Centre accelerates scientific discoveries, fostering Australian research innovation. Named after Australian scientist Dr. Joseph Pawsey, a pioneering figure in radio astronomy, we embody his legacy by propelling over 5000 researchers towards unparalleled achievements.

Spanning domains like radio astronomy, energy, resources, engineering, bioinformatics, and health sciences, we play a crucial role in Australia's scientific landscape. Collaboration underpins our unincorporated joint venture with CSIRO, Australia's national science agency, Curtin

University, Murdoch University, and The University of Western Australia.

Pawsey is an NCRIS facility funded by the Department of Education, which also supports national quantum computing initiatives. The Centre also receives funding from the Australian Government through a $70 million grant for the Pawsey Capital Refresh project, as well as support from the Western Australian Government and our partner organisations.

For more information, visit pawsey.org.au

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