

PASQAL Unveils Qadence, a Quantum Programming Library for Digital-Analog Quantum Computing

New Python-based software library makes digital-analog programs & quantum machine learning applications more accessible to researchers seeking quantum advantage

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/EINPresswire.com/ -- [PASQAL](#), a global leader in neutral atoms quantum computing, today announced the launch of Qadence, an open-source Python library that streamlines the process of building and executing digital-analog quantum programs on interacting qubit systems, demonstrating PASQAL's commitment to advancing new approaches to quantum computing.



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Mario Dagrada, VP of Quantum Software at PASQAL

Digital analog quantum computing (DAQC) is a hybrid approach that aims to combine the precision of digital quantum computing with the continuous control and interactions of analog quantum computing. In the expanding quantum computing landscape, there has been increased interest in alternative models such as analog and DAQC. This approach is viewed as a likely path to early quantum advantage and the next generation PASQAL's neutral atoms quantum computers will be capable of natively executing digital-analog quantum algorithms.

Qadence stands out particularly in quantum machine

learning applications with DAQC, boasting native symbolic parameters, integration with PyTorch automatic differentiation engine, and advanced parameter shift rules for higher-order differentiation on real quantum devices.

Qadence accelerates the evolution of DAQC and quantum machine learning by offering a

simplified interface, allowing developers to:

- Easily construct analog and digital-analog quantum algorithms
- Seamlessly transition from simulations to real devices, such as PASQAL's neutral atoms quantum computers
- Easily express complex interaction among qubits and readily incorporate them into efficient executions on simulator backends
- Translate certain types of analog or digital-analog operations into numerically efficient simulations similar to digital quantum circuits
- General and higher-order parameter shift rules for efficient differentiation of digital-analog quantum programs

"Qadence fills a gap in the current quantum software ecosystem by providing a user-friendly interface for the increasingly popular digital-analog quantum computing and accelerating the research in quantum machine learning leveraging this approach" says Mario Dagrada, VP of Quantum Software at PASQAL.

Qadence's goal is to become the gold standard for executing digital-analog programs, emphasizing a user-friendly interface, precise emulation of quantum platforms, and a seamless transition from simulation to real neutral atoms quantum hardware. PASQAL aims for Qadence to further enrich its library by incorporating noise channels, tailored error mitigation techniques for interacting qubit systems, and additional digital-analog emulation modes.

For more detailed information on Qadence, and the best way to gain access to this platform, please visit the [technical blog](#) and the [technical documentation](#).

About PASQAL

PASQAL builds quantum computers from ordered neutral atoms in 2D and 3D arrays to bring a practical quantum advantage to its customers and address real-world problems. PASQAL was founded in 2019, out of the Institut d'Optique, by Georges-Olivier Reymond, Christophe Jurczak, Professor Dr. Alain Aspect, Nobel Prize Laureate Physics, 2022, Dr. Antoine Browaeys, and Dr. Thierry Lahaye. PASQAL has secured more than €140 million in financing to date.

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