d-fine

Press Release

d-fine and planqc win contract for the development of quantum algorithms for battery simulations

Frankfurt | 06/12/2024

- The German Aerospace Center (DLR) chose planqc and d-fine for developing quantum algorithms for battery simulations as part of the DLR Quantum Computing Initiative (DLR QCI).
- The objective is to enable powerful battery simulations that are inaccessible even to classical high-performance computers via quantum computing.
- d-fine is a European consulting firm specialized in analytically challenging topics, with a focus on the practical application of quantum computers.
- planqc is located in the Munich Quantum Valley and was founded in 2022 by scientists from the Max Planck Institute of Quantum Optics and the Ludwig Maximilian University of Munich.
- Keywords: quantum technology, quantum algorithms, partial differential equations, quantum computing

Frankfurt, June 12th, 2024 – d-fine and planqc support the DLR Quantum Computing Initiative (DLR QCI) in the project „QCI BASIQ" by developing new quantum algorithms for solving partial differential equations and utilizing them for efficient battery simulations.

The DLR Quantum Computing Initiative (DLR QCI) has announced another contract with consulting firm d-fine and quantum computer manufacturer planqc in the field of quantum algorithms. Within the project QCI BASIQ (**BA**ttery Material **SI**mulation with **Q**uantum Computers), DLR QCI is advancing the simulations of battery materials using gate-based quantum computers. Specifically, partial differential equations (PDEs) that simulate the interaction of different components in an electrochemical cell are being examined. Currently, the numerical solution of PDEs is performed using classical computers, which, however, do not achieve sufficient results when simulating highly resolved heterogeneous structures such as porous electrodes.

d-fine

Press Release

As part of the project, quantum algorithms will be researched and tested to solve PDEs describing battery cells on quantum computers. Due to the exponential growth of the solution space with the number of qubits, even with a moderate number of qubits (of the order of 100), multidimensional solutions of PDEs can be described that cannot be represented classically. The algorithms for this project will be developed using a hardware-software co-design approach. It is crucial to incorporate hardware metrics and error models into the algorithms such that they can be efficiently implemented on quantum hardware. The hardware backends for this project are the new quantum computers of the DLR QCI, including one based on neutral atoms, provided by planqc.

d-fine and planqc impressed with their expertise in describing nonlinear optimization problems using quantum computers, as well as in the development of algorithms and software tools. Martin Kiffner, who has been the Head of Algorithms at planqc since September 2023, also played a significant role as a Senior Research Fellow at the University of Oxford in a study on solving nonlinear optimization problems using a quantum computer.

END

d-fine

Press Release

NOTES FOR EDITORS

Press Contact

Astrid Döring
Head of Marketing & Communication

d-fine GmbH
An der Hauptwache 7
D-60313 Frankfurt/Main
+49 69 90737 0
astrid.doering@d-fine.com

About d-fine

d-fine's success is built on the expertise of its over 1,500 employees who possess a university degree and a strong research background (90% in the fields of physics, mathematics, and computer science, with a 50% doctorate rate). This is evidenced by the excellent ranking in the CASE Employer Ranking for employee qualifications and the three-time consecutive win of the „Hidden Champion of the Consulting Market" award in the „Data & Analytics" category. d-fine supports its customers from strategy development to technical design and the development of preliminary studies and prototypes, right through to IT implementation and go-live, and attaches great importance to close, trusting and fair cooperation.

Further information can be found at https://www.d-fine.com/

d-fine

Press Release

About planqc

planqc builds quantum computers and stores quantum information in individual atoms – inherently the best qubits. The quantum information is processed by arranging these qubits in highly scalable registers and then manipulating them using precisely controlled laser pulses. planqc is characterized by a unique combination of quantum technologies that opens up the fastest path to quantum processors with thousands of qubits, thereby creating the necessary prerequisites for an industry-relevant quantum advantage. planqc was founded in April 2022 by Alexander Glätzle, Sebastian Blatt, Johannes Zeiher, Lukas Reichsöllner together with Ann-Kristin Achleitner and Markus Wagner. planqc is based in Garching near Munich.

Further information can be found at https://www.planqc.eu

About the DLR Quantencomputing-Initiative (DLR QCI) of the German Aerospace Center (DLR)

The DLR Quantum Computing Initiative (DLR QCI) involves start-ups, industry, and research institutions to collaboratively develop quantum computers, software, applications, and the necessary enabling technologies. Funding for this initiative has been provided by the Federal Ministry of Economics and Climate Protection (BMWK). This creates the industrial and economic basis for quantum computers from Germany, the quantum computing ecosystem.

Further information can be found at https://qci.dlr.de/