Technology Offer

TLB
Technologie-Lizenz-Büro
der Baden-Württembergischen Hochschulen GmbH

Advanced Quantum Computing Technologies: Optical Tweezers, Quantum Optical Cells, and Neutral Atom Qubits

Fields of application

Quantum computing, quantum information processing, advanced scientific research in quantum mechanics, and potential applications in cybersecurity and data encryption.

Background

These technologies represent significant advancements in quantum computing, addressing key challenges in manipulating quantum states for enhanced computing power.

Problem

Existing quantum computing systems face limitations in precision and control, especially in manipulating Rydberg atoms and quantum states.

Solution

The key innovation pertains to a quantum computing device utilizing neutral atoms, specifically in the field of quantum computing using neutral atoms as qubits. The technology is an advancement over conventional quantum computing systems which use ionic qubits or superconductive qubits.

The main technological steps for the implementation of the quantum computing system are:

- Neutral atom qubit device for improved qubit manipulation and connectivity.
- Optical tweezers using acousto-optic deflectors for dynamic atom manipulation.
- Quantum optical cell with transparent, conductive electrodes for precise electric field control.

Contact

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Development Status

TRL3

Patent Situation

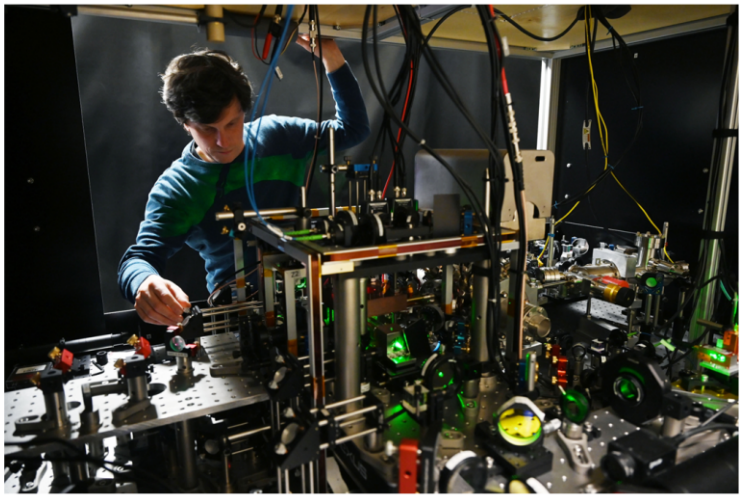
CN 202 180084144.8 pending
CA 3202037 pending
JP 2023-536141 pending
KO 10-2023-7023804 pending
US 18/267,066 pending
EP PCT/EP/2021/084363 pending
US 18/071,598 pending
EP 21 211 024.1 pending
US 18/530,288 pending
EP 22 211 813.5 pending

Reference ID

20/065TLB

Service

TLB has been entrusted with the commercialisation of this pioneering technology and is looking for investors for further development up to market maturity



Current setup of the quantum computer in the Stuttgart University laboratory [Photo: Patrik Pfeiffer].

Pubilcation and links

Pagano A et al.; Physical Review Research 4 (3), 033019 (2022): Error budgeting for a controlled-phase gate with strontium-88 Rydberg atoms

Unnikrishan G et al.; preprint at: arxiv: 2401.10679 (3/2024): Coherent Control of the Fine-Structure Qubit in a Single Alkaline-Earth Atom