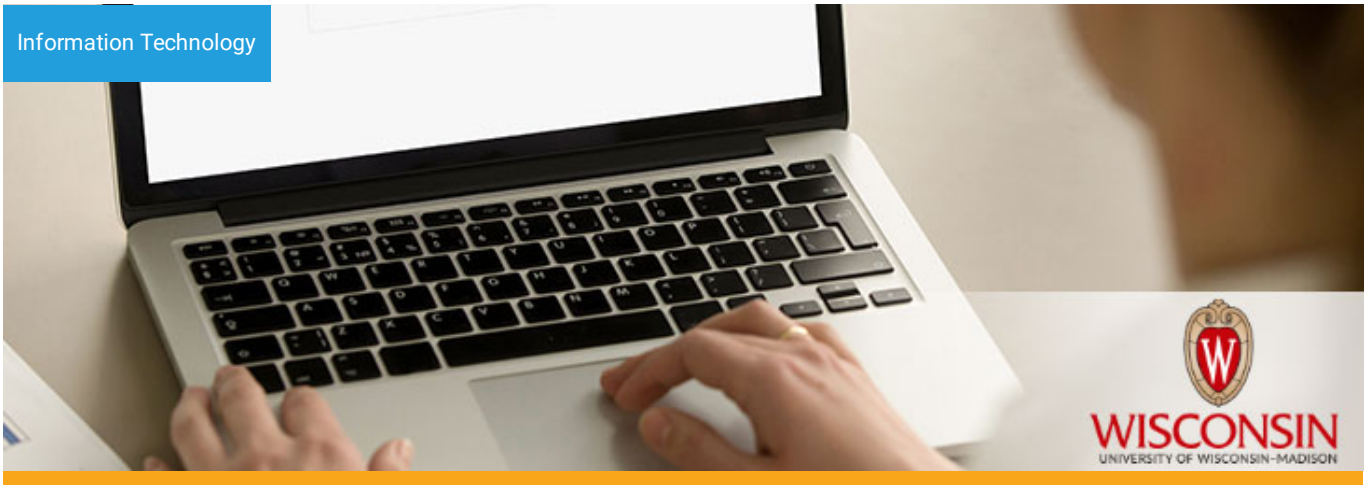
Information Technology



Simplified Optical Traps for Quantum Computing

View U.S. Patent No. 10,559,392 in PDF format.

WARF: P190053US01

Inventors: Mark Saffman

The Wisconsin Alumni Research Foundation (WARF) is supporting the development of optical traps for neutral atom quantum computing. This technology simplifies the apparatus for particle trapping and is expected to reduce the cost and complexity of quantum computing devices.

Overview

Quantum computing is expected to revolutionize the field of computation and provide major improvements for optimization, modeling and cryptography. Over the course of decades, different methods to make a functional quantum supercomputer have emerged, all with various advantages and at different stages of development. One method, neutral atom quantum computing, is based on atomic particles confined and controlled by optical traps created by lasers.

To date, solutions to implement optical traps are highly complex and present inherent control problems during scale-up. As tech giants and startups continue to advance in this space, there is strong interest in making optical confinement techniques more stable and scalable, and reducing crosstalk among trapped particles.

The Invention

A UW–Madison researcher has developed a novel method and hardware to create optical traps for neutral atom quantum computing. The new design is a simple yet efficient method for creating large arrays of bright or dark optical patterns for particle trapping and for arrays of atomic qubits for quantum computing.

Rather than using a relatively complex arrangement of optical elements, the new approach requires only lenses and circular apertures. Compared to prior designs, this approach is cheaper to implement and has improved technical characteristics for efficient utilization of laser light and improved localization of the trapped particles.

Applications

- Quantum computer hardware, simulation experiments, atomic clocks and sensors

Key Benefits

- Potential to improve the performance of quantum computers and sensors
- Simpler and easier to implement than prior technology
- Traps are more stable, effective and efficient.
- Requires less power to trap each particle
- Robust and less susceptible to source phase noise

Additional Information

For More Information About the Inventors

- Mark Saffman

Publications

- This technology won a 2019 WARF Innovation Award.

Tech Fields

- Information Technology : Hardware

For current licensing status, please contact Emily Bauer at emily@warf.org or 608-960-9842