

# Neutral Atoms in Tweezer Arrays for Hybrid Rydberg Quantum Computing

**Zhichao Guo<sup>\*1,2</sup>, M.L. Venderbosch<sup>1,2</sup>, R.A.H. van Herk<sup>1,2</sup>, J.D.D. del Pozo Mellado<sup>1,2</sup>, R.M.P. Teunissen<sup>1,2</sup>, R.S. Lous<sup>1,2</sup>, E.J.D. Vredendregt<sup>†1,2</sup>, S.J.J.M.F. Kokkelmans<sup>‡1,2</sup>**

*1. Eindhoven University of Technology*

*2. Center for Quantum Materials and Technology, Eindhoven*

on behalf of the Neutral Atom KAT-1 Collaboration ([www.tue.nl/rydbergQC](http://www.tue.nl/rydbergQC))

The KAT-1 project in Eindhoven is developing a full-stack quantum computer, accessible online via QuantumDelta NL's Quantum Inspire platform. Our quantum processor unit (QPU) is made of strontium atoms in a 2D optical tweezer array generated by a spatial light modulator. High-fidelity single-qubit control is achieved by laser coupling of the clock transition, and two-qubit gates by using Rydberg excitations to control the interaction of atoms between different tweezer sites. The QPU will be used to solve problems in quantum chemistry with pulsed-based quantum optimization algorithms. This poster reports on the progress of our new strontium machine, including cooling and loading atoms into tweezers and the control software for the experimental setup. We explore the possibility of introducing a fiber array for single qubit driving into our platform to extend its addressability and parallelizability. Furthermore, we are investigating a method to enhance the connectivity of the two-qubit gate by adjusting the tweezer position outside the plane of the atomic array.

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\*z.guo1@tue.nl

†e.j.d.vredendregt@tue.nl

‡s.kokkelmans@tue.nl