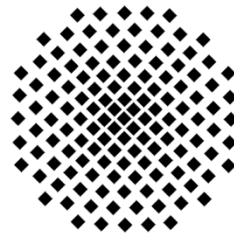


Stuttgarter Physikalisches Kolloquium

Fachbereich Physik, Universität Stuttgart
Max-Planck-Institut für Festkörperforschung
Max-Planck-Institut für Intelligente Systeme

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Universität Stuttgart, Pfaffenwaldring 57, 70569 Stuttgart-Vaihingen

Gastgeber: Prof. Dr. Tilmann Pfau, Universität Stuttgart, Telefon: 0711 - 685-60261

A multi-qubit quantum network node for quantum communication and computation

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Abstract

I will present the plans of a recently established research group in Stuttgart to realize multi-qubit quantum network nodes. To this end, an array of tweezer-trapped atomic qubits is prepared at the center of a high-finesse optical cavity. All atoms in the array are positioned to ensure strong coupling to the cavity, thus establishing a connection to a photonic quantum channel. I will discuss the prospects of this system as a versatile quantum network node for quantum computation and communication. Employing the system, a series of experiments is envisioned. I will outline these experiments, comprising photon-mediated quantum information processing between the intra-cavity atoms, the generation of photonic cluster states, and the generation of optical Gottesman-Kitaev-Preskill qubits. Finally, I will outline the prospects of connecting several atom-cavity systems in a quantum internet architecture.