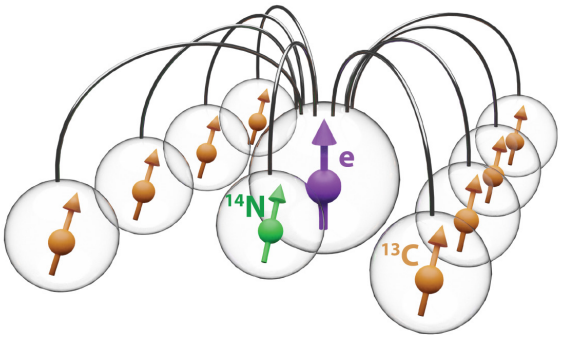
Open positions for master thesis project:
Nuclear spin control in color centers quantum networks and spin registers

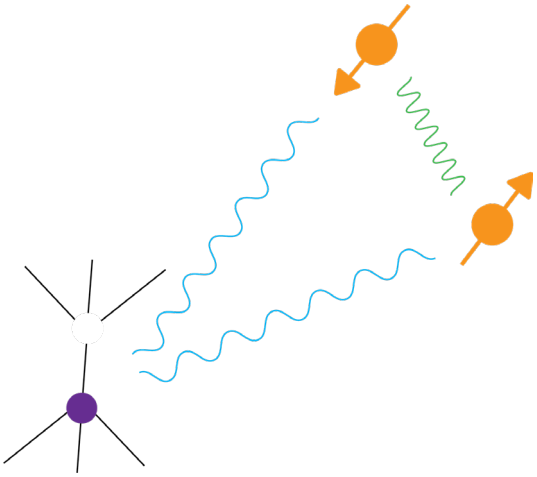
Taminiau Lab, QuTech

A **quantum network** is a network where the nodes are entangled, and each has a set of local **nuclear spins**, that allow us to store and process information.

We wish to investigate further the dynamics control and application of these nuclear spins as **qubits**, as a step towards a quantum netwroks[1] capable of distributated compution and quantum communication.



Nuclear spin register [2]



Nearest neighbour nuclear spins have shown extreme coherent times[3], making them an interesting resource. High fidelity qubit control of the system and understanding of their dynamics is necessary to enable this promising qubit in a quantum network.

Project Directions

There are two possible routes to explore. These topics offer you the flexibility and freedom to design your own project, aligning it with your interests.

1. Spin pairs in diamond with extreme coherence: dynamics, control and applications.
2. Developing physics simulations for nuclear qubit control in color centers for a quantum networks.

Interested?

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[1] Pompili, Matteo, et al. "Realization of a multinode quantum network of remote solid-state qubits." Science 372.6539 (2021): 259-264.
[2] Bradley, C. E., et al. "Robust quantum-network memory based on spin qubits in isotopically engineered diamond." npj Quantum Information 8.1 (2022): 122
[3] Bartling, H. P., et al. "Entanglement of spin-pair qubits with intrinsic dephasing times exceeding a minute."Physical Review X 12.1 (2022): 011048.