Contribution ID: **421** Type: **Talk**

【513】Nuclear spins in a semiconductor quantum dot: through the looking-glass, and what we found there

Wednesday, 1 September 2021 15:00 (30 minutes)

Optically active spins in solids are often considered prime candidates for scalable and feasible quantum-optical devices. Numerous material platforms including diamond, semiconductors, and atomically thin 2d materials are investigated, where each platform brings their own advantages along with their challenges. Semiconductor quantum dots are the current state-of-the-art for optical properties such as tuneability, brightness and indistinguishability. Their nickname "artificial atom" was coined historically to highlight how similar they can be to isolated single atoms, but in fact they are far from the realisation of a simple two-level system. The inherently mesoscopic nature of a quantum dot leads to a multitude of dynamics between spins, charges, vibrations, and light. In particular, it offers a unique realisation of a tripartite interface between light, a single proxy qubit (electron spin) and an isolated spin ensemble (nuclei). Ability to control these constituents and their mutual interactions creates opportunities to realise an optically controllable ensemble of ˜50,000 spins. In this talk, I will present the two-decade journey from treating the quantum dot nuclei as noise to the observation of their collective magnon modes and eventually to their tuneable quantum correlations, all witnessed via a single electron spin driven by light.

Primary author: Prof. ATATURE, Mete (Cavendish Laboratory, University of Cambridge)

Presenter: Prof. ATATURE, Mete (Cavendish Laboratory, University of Cambridge)

Session Classification: Quantum Information and Quantum Computing

Track Classification: Quantum Information and Quantum Computing