CREATION AND ENGINEERING OF OPTICAL CENTRES IN DIAMOND FOR QUANTUM-BASED APPLICATIONS

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Colour centres in diamond such as the Nitrogen-Vacancy or Silicon-Vacancy centres demonstrated unique optical and spin properties for quantum information processing and sensing applications. As atom-like systems in the solid state, they show good coherence, can be easily manipulated with electromagnetic fields and hold the promise of scalability.

The creation and engineering of such systems and the search for new optical centres by ion implantation is a central topic for our group.
In this talk, the state of the art methods for the creation and engineering of optical centres in diamond will be reviewed. Nowadays, high spatial resolution below 10 nm and even deterministic implantation of single atoms were demonstrated. However, the creation yield of the centres, the control of their environment and their individual addressing at short length-scales are still highly challenging issues. The last advances will then be discussed.