

Diamond Based Polarizer for Hyperpolarized MRI Technology

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Abstract:

Due to ground-breaking progress over the last two decades, fundamental quantum science has now matured sufficiently to allow deployment in novel devices with applications to sensing and imaging. A key development in this context has been the demonstration of the quantum properties of individual nitrogen-vacancy centers (NV centers) in diamonds [Jelezko et al., 2004].

At room temperature, the electron spin native to the NV center can be initialized to a highly polarized quantum state by green laser irradiation and coherently manipulated by microwave radiation. We have leveraged this unique control of NV centers in diamonds to achieve unprecedented polarization of nuclear spins while operating at room temperature.

In this talk I will present the concept and promise of hyperpolarized MRI, discuss results of nuclear hyperpolarization using sophisticated tailored dynamic nuclear polarization sequences and present the prospects for combination with MRI scanners.