Dark spins light up

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Want to see a diamond? Forget the jewellery store - try a physics laboratory. In the November issue of Nature Physics, Ryan Epstein and colleagues demonstrate the power of their microscope for imaging individual nitrogen atoms that sit at vacant sites in the diamond structure.

Such ‘vacancy’ centres have a long lifetime within the diamond host and could be used as the basis for a room-temperature quantum computer.

Because of the potential application as a bit of quantum information, the single magnetic spin (pointing up or down) associated with the extra electron of a nitrogen atom has featured in many different experiments.

The latest involves a room-temperature microscope that detects light emitted by a nitrogen vacancy centre. Through their precise control of the alignment of the magnetic field, the researchers can also detect local non-luminescing impurities that couple to the nitrogen vacancy centres.

The vacancy centres light the way to neighbouring 'dark' spins that normally would not be detected. These dark spins have a longer life-time than that of the vacancy atoms, and could be potentially more useful for applications involving quantum information processing.

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Anisotropic interactions of a single spin and dark-spin spectroscopy in diamond

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