A new spin in diamonds for quantum technologies

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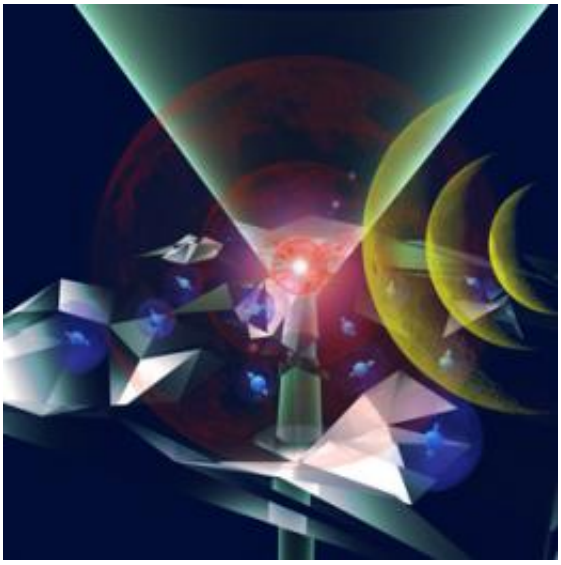

(PhysOrg.com) -- To explore the future potential of diamonds in quantum devices, researchers from Macquarie University have collaborated with the University of Stuttgart and University of Ulm in Germany towards developing new sensors based on the common defect found in the diamond structure known as the nitrogen-vacancy (NV) center.

These sensors measure weak magnetic and electric fields at the nanoscale and will become important in the future development of

quantum information devices and electrical and magnetic sensors.

“The NV centre is a favourable system for quantum engineering and measurement techniques which we hope to exploit,” says Professor Jason Twamley.

Known for their durability and structural strength, diamonds have been used in variety of modern mechanical industries over the years. Scientists are only now just beginning to explore some of the properties in diamonds that may be useful in the next generation of quantum devices.

It has been understood for some time that nitrogen-vacancy in diamonds holds immense possibility for quantum technologies but now for the first time, researchers have been able to make substantial headway in improving the sensitivity and high dynamic range of the sensors using a single electron spin in an NV centre. The theoretical protocol was developed by Macquarie graduate student Ressa Said and then was experimentally implemented by German team based at Stuttgart and Ulm, primarily by PhD student Gerarld Waldherr from Stuttgart.

“We have demonstrated improved magnetic field sensing and accuracy. This will become even more important for future research into quantum engineering and measurement techniques,” says Twamley.

Read the full paper 'High-dynamic-range magnetometry with a single nuclear spin in diamond' published by *Nature Nanotechnology*.

Provided by Macquarie University