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Light dark-matter search with nitrogen-vacancy centres in diamond

Tuesday, 9 December 2025 14:00 (30 minutes)

Diamond is a host for various defects, notably the nitrogen-vacancy (NV) centre. This colour centre consists of a substitutional nitrogen and a neighbouring missing carbon atom, and it has electron spin. It is sensitive to various quantities, for example magnetic fields, and as such it finds use as a sensor in many applications, from biology to electronics. Moreover, quantum sensors are interesting for fundamental physics, since in the search for new physics, detecting tiny signals is essential. We investigate how the NV centre can be employed as quantum sensor for light dark-matter search. Furthermore, we look at how, compared to conventional sensing methods, there are benefits for dark matter search using the nuclear spin. Finally, we tackle some challenges by proposing a novel quantum sensing method with both spins. We hope to improve the retina of the quantum-sensing eye for multimessenger astronomy.

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