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Methods for deterministic production of colour centres in diamond

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Abstract

The NV centres in diamond are currently the only solid-state qubits that allow miniaturised construction and guarantee operation at room temperature. This is the only way to build processors for broad commercial use. While the methods for controlling and reading out these centres have been known and tested for years, the production of the centres has been the main unsolved technological challenge.

In order to achieve successful coupling of the NV centres, a very small spacing window has to be considered. When addressing the NVs, their defined alignment in the crystal is also necessary. Many NVs can only be read out electrically.

Here, many material-scientific but also technical boundary conditions have to be taken into account. The lecture shows new approaches to overcome this challenge. The solutions could also be of importance for other applications.