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Coupling diamond defect centers to Fabry-Perot microcavities¹

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The long-lived, optically accessible spin states of defect centers in diamond provide a promising platform for quantum network applications, with entanglement distribution between distant nitrogen-vacancy defects already demonstrated. By integrating defect centers into optical resonators, more efficient or even deterministic protocols could be possible. While systems based on diamond nanophotonics have been pursued for more than a decade, Fabry-Perot microcavities present a complementary approach that may be better suited to nitrogen-vacancy centers. This talk will give an overview of the potential benefits and challenges to this approach, examine progress over the last few years, highlight recent results demonstrating coupling of germanium-vacancy defect centers in a diamond membrane to a high finesse microcavity at room temperature, and discuss development of an actively stabilized cryogenic system.

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