Coupling color centers in diamond to fiber-based Fabry-Pérot microcavities

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Optical fibers with machined and coated end facets can serve as high reflectivity mirrors to build low loss optical resonators with free space access [1,2]. These microcavities feature a very small mode volume on the order of a few tens of cubic wavelengths and a very large Finesse of up to 105, corresponding to quality factors of several millions. Thus, the Purcell factor being proportional to the ratio of quality factor and mode volume can be as high as 104, which can dramatically increase the emission rate of an emitter inside the cavity.

We use the microcavities to couple solid state based emitters such as color centers in diamond to the cavity. First results from spectra of ensembles of nitrogen-vacancy centers coupled to the cavity show a strongly increased emission efficiency into the cavity mode. The emission behavior can be modeled with a modified Purcell factor accounting for the dephasing.

References:

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[2] D. Hunger, AIP Advances **2**, 012119 (2012).