Two-laser spectroscopy and coherent manipulation of color-center spin ensembles in silicon carbide
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55. SiC is birefringent, with one index of refraction along the c-axis, and another perpendicular to it. Thus, if light is not polarized along one of these axes, its polarization will rotate throughout the sample. Since the roughness of the samples is more than the wavelength, the optical path length is not the same everywhere in the laser spot. As a result of this, when light exits the SiC, the polarization over the spot has been effectively randomized, an effect called polarization scrambling. This restricts any experiment on SRA to only use polarizations along or perpendicular to the c-axis. In the experiments presented here, only the projection of the beams perpendicular to the c-axis was seen to contribute to SRA. Thus, with light propagating along the basal plane, there is no combination of polarizations that simultaneously: gives SRA; is not scrambled by the SiC; gives orthogonal polarizations after the sample, which can be separated for detection purposes. It might be possible to perform polarization filtering with the lasers propagating along the c-axis, which was not attempted yet.


65. An EOM generates a lower and higher frequency sideband from a split-off fraction of the laser, after which a tunable 70 MHz FWHM cavity filters out a single sideband for use. This beam can be applied to the sample, in addition to a split-off portion of the original laser beam. When the detuning gets close to the cavity FWHM, leakage of the carrier frequency and other sideband occurs, interfering with the experiment.