

Weak magnetic field effects on the photoluminescence of an ensemble of NV centers in diamond: experiment and modelling

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The relationship between the photoluminescence intensity of the ensemble of NV centers in diamond and external magnetic field was studied. The magnetic spectra exhibit two resonances. The broader one has a width of 20 G and its amplitude is independent of the polarization of the incident radiation. The narrow resonance with a width of 4 G is found to be polarization dependent and is only visible if the direction of magnetic field is more or less perpendicular to the laser light polarization. To describe the appearance of these resonances we have modified the 8-level model of the NV center by taking into account the cross-relaxation between the ground-state spin of the center and other surrounding electronic spins (those of differently aligned NV centers, substitutional N spins etc.).

Keywords: electronic spin resonance, optically detected magnetic resonance, NV center, magnetometry.

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