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Nitrogen-vacancy centers orientation identification by Rabi frequency for vector magnetometry[1] DAVID ROY-GUAY, DENIS MORRIS, MICHEL PIORO-LADRIÈRE, Institut quantique, Université de Sherbrooke — Nitrogen-vacancy (NV) centers are atomic defects in diamond which can be initialized and read-out by laser pulses and manipulated by microwaves, in an optically detected magnetic resonance experiment (ODMR). The microsecond coherence time of NV ensembles at room temperature and the four possible NV orientations can be used for vectorial magnetometry. However, the NV orientation identification in an ODMR spectra requires the application of a known external magnetic field, which can affect the magnetization of the object under study. In this work, the magnetic bias field is replaced by a microwave field. Instead of measuring ODMR lines displacement, the Rabi frequency of three optically detected magnetic resonance features is measured. The four possible NV orientations are linked to the Rabi frequencies by an optimization technique. We show that taking the average of the Rabi frequency for the m_s=+1 and m_s=-1 states is a valid approximation in the case of a quasi perpendicular external magnetic field. The technique allows quick, non-invasive, vectorial magnetometry, applicable to other atomic defects and the measurement of dynamical magnetization phenomena.

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