Supplementary information

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1 Error calculation

In order to calculate dipolar magnetic fields from the experimentally-obtained SiC resonances, we used a linear fitting for the conversion, valid in the high magnetic field regime:

$$\nu(H_{ext}) = mH_{ext} + b \tag{1}$$

with m as 27.37 MHz/mT and b as 17.32. The errors from the linear fitting are 0.177 and 1.48 respectively.

From (1), we get:

$$\frac{\nu - b}{m} = H_{ext} \tag{2}$$

The error associated to ν comes from the Lorentzian fits used for our measurements. In the case for the easy axis measurements it was 0.48 MHz and for the hard axis it was 0.29 MHz.

For any Q such that

$$Q = \frac{ab \dots c}{xy \dots z} \tag{3}$$

The error associated to Q is given by [1]

$$\frac{\delta Q}{|Q|} = \sqrt{\left(\frac{\delta a}{a}\right)^2 + \left(\frac{\delta b}{b}\right)^2 + ... + \left(\frac{\delta c}{c}\right)^2 + \left(\frac{\delta x}{x}\right)^2 + \left(\frac{\delta y}{y}\right)^2 + ... + \left(\frac{\delta z}{z}\right)^2} \tag{4}$$

By using (2) and (4), the error associated to H_{ext} is given by

$$\delta H_{ext} = H_{ext}\sqrt{\left(\frac{\delta\left(\nu - b\right)}{\nu - b}\right)^2 + \left(\frac{\delta m}{m}\right)^2} \tag{5}$$

The error for $\nu - b$ is given by

$$\delta\left(\nu - b\right) = \sqrt{\left(\delta\nu\right)^2 + \left(\delta m\right)^2} \tag{6}$$

Using (5) and (6) the resulting averaged error for figure 3 b and c in the main text is 0.34 mT.

References

[1] Instructional Physics Laboratory, Department of Physics, Harvard University, *A Summary of Error Propagation* (2013).