Nanotesla sensitivity, compact NV center based vector magnetometer

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The prototype device constructed for this work (Figure 1, Left) achieves a magnetic field sensitivity of less than 2 nT/Hz$^{1/2}$ at a rate of 1 Hz with an accuracy of less than 1% and has a magnetic field sensing range of $\pm$ 0.5 mT. The power consumed by the device during operation is less than 10 W and the total mass is below 2 kg.

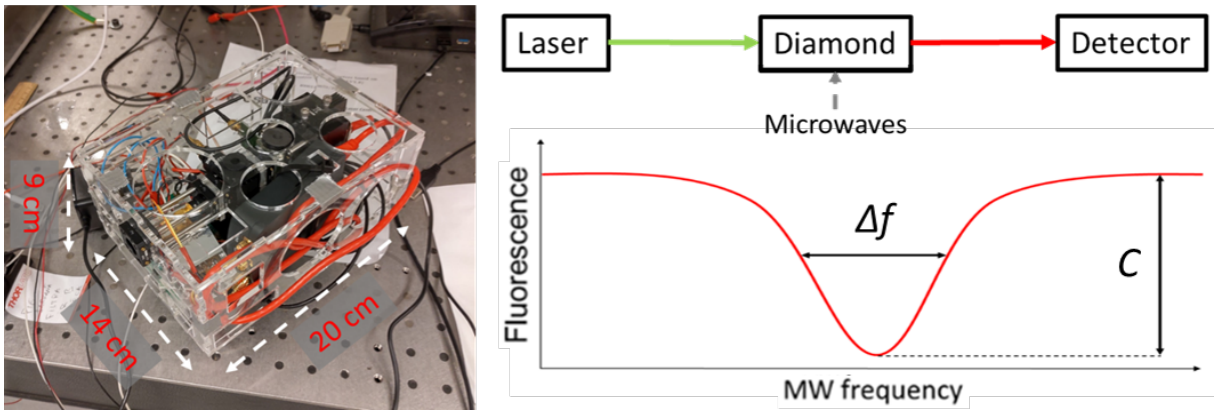

Figure 1: Left: magnetometer prototype device contained in a 20 x 14 x 9 cm^3 volume. Right: experimental scheme for the ODMR measurements to determine the magnetic field.

The CW ODMR [1] sensitivity of the magnetic field measurement [2] was estimated by (Figure 1, Right):

$$\eta_{sensitivity} \approx \frac{\Delta f}{C\sqrt{N_P}}. \quad (1)$$

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References

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