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  - Magnotomotov
  - Electrometr
- Multimodality
  - $-\vec{B}$  and
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## **Quantum Spintronics**

Multimodal Spin Based Sensors

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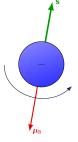
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- ► Motivation (SiC transistor (in place monitoring etc))
- ► Motivation2 : Microscope (As for diamond)



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## **Spintronic Devices**

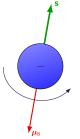


spin - transport - electronics



## **Spintronic Devices**

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## spin - transport - electronics

Exploit spin in the same way electronics exploit charge



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## Background

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## S = 1 Magnetometry

#### S = 1 Magnetometry Summary

- We can resolve two frequencies corresponding to the defect in the CW-ODMR spectra.
- 2. The ZFS parameters *D* and *E* are well known.
- 3. We can determine the magnitude using

$$B = \frac{\sqrt{\frac{1}{3}\left(f_1^2 - f_1 f_2 + f_2^2 - D^2 - 3E^2\right)}}{g\mu_B}.$$

4. We can determine the azimuthal angle using

$$\theta = \frac{\cos^{-1}(\eta/\mathit{D})}{2}.$$

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## S = 1 Electrometry

#### S = 1 Electrometry Summary

- We can resolve two frequencies corresponding to the defect in the CW-ODMR spectra.
- 2. The direction and magnitude of  $\vec{B}$  and the ZFS parameters D and E are well known.
- 3. In general

$$\Delta f_{\pm} = d_{\parallel} E_z \pm \left( F(\vec{B}, \vec{E}, \vec{\sigma}) - F(\vec{B}, 0, \vec{\sigma}) \right)$$

4. With  $\vec{B}$  parallel to the defect axis we have

$$heta = an^{-1}\left(rac{\mathcal{E}_\parallel}{\mathcal{E}_\perp}
ight), \quad \mathcal{E} = \sqrt{\mathcal{E}_\perp^2 + \mathcal{E}_\parallel}.$$



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#### Multimodality

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## Multimodality



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## $\vec{B}$ and T



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## So what?



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# Questions?