Progress towards a robust, calibration free and ultra-sensitive quantum technology-based magnetometer for fire-and-forget applications

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Motivation

Magnetic field Sensing used in:

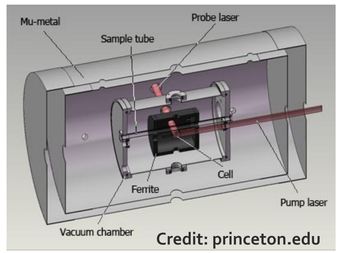
- ❑ Navigation
- ❑ Mineral and Oil Exploration
- ❑ Outer space exploration
- ❑ Airborne Mapping
- ❑ Geophysical surveys

Remotely operated Vehicles are used

Requirements

- Highly sensitive (nT/√Hz)
- Lightweight
- Compact
- Calibration free

Existing magnetometer



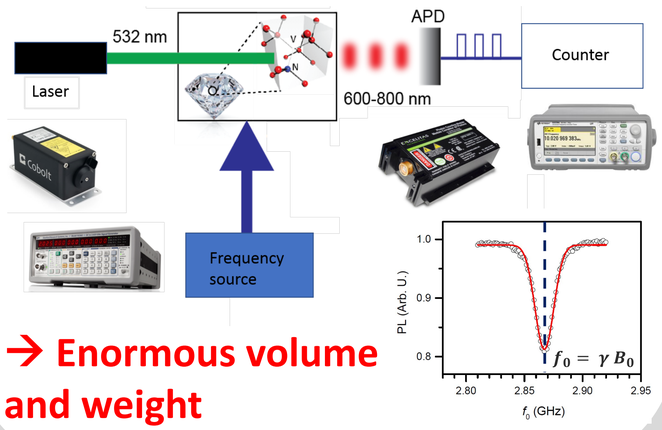
Atomic magnetometer

Airborne magnetometer

→ **Highly sensitive but massive weight**

NV center-based magnetometry

- Quantum physics based → fundamental constant dependent.
- Works in harsh environment
- Highly sensitive (pT/√Hz)

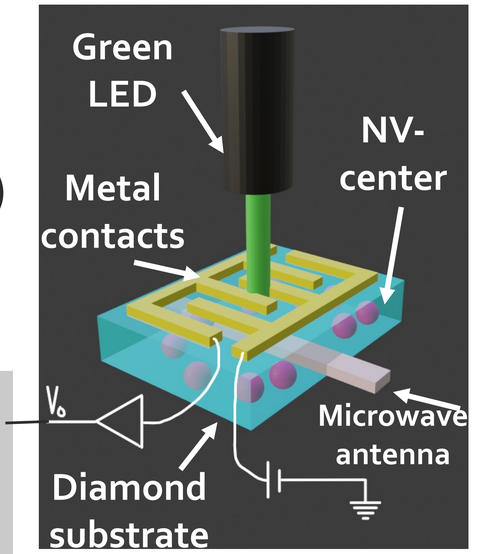


→ **Enormous volume and weight**

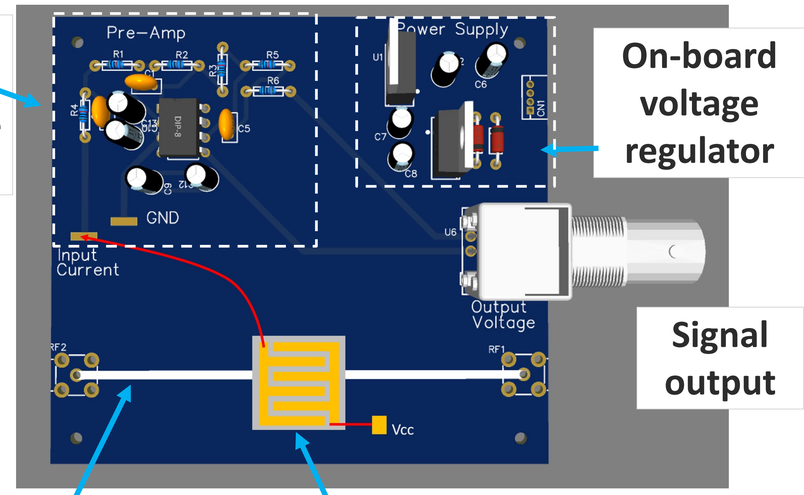
Our approach

- ❑ Electrical detection[3]
- ❑ On-chip
- ❑ Compact (75 x 75 x 20 mm)
- ❑ Lightweight (< 50 gm)
- ❑ Fast detection

Sequential Bayesian experiment; an adaptive strategy for fast measurement[1]



Progress: On-chip NV^- center-based magnetometer



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Acknowledgements

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