Quantum
Technologies

Only the potential is immeasurable

It's here. The future of sensors.

Observing quantum effects usually requires large, cooled and expensive setups. With the microwave-free quantum magnetometer, Quantum Technologies has achieved a real coup in collaboration with duotec. Our sensor solution is **small, coolingless, cost-effective** and nanometers-length more precise than anything previously known – simply sensortional.

Precise and spot-on — QT-RH105 fiber-coupled quantum sensor

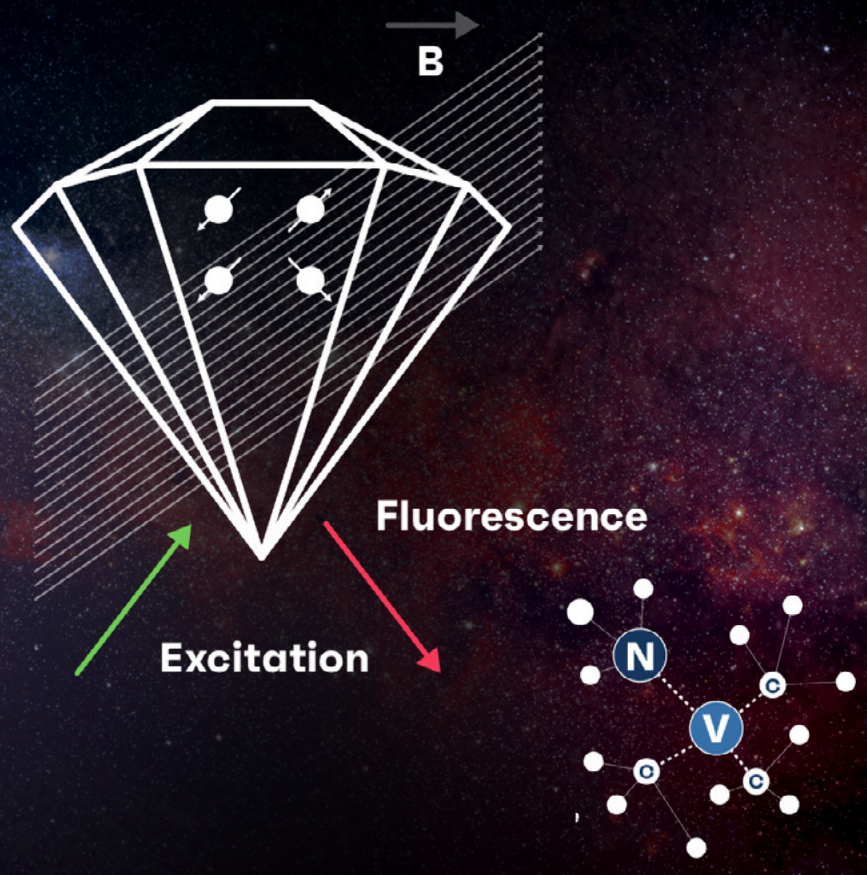
It is particularly well suited for:

- Non-contact measurement of current flows
- Automotive battery management systems
- Measurement of electric motor commutation for optimized switching operations
- Position measurement and visualization of (minimally) invasive medical instruments (e.g. catheters)
- Galvanically isolated in low, medium and high voltage networks, AC and DC
- Harsh-environment measurements

This is how the future works:

Our quantum sensor measures magnetic fields purely optically.

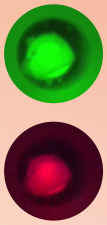
The quantum sensor uses the magnetic field dependence of the spin states of NV centers in the diamond and their fluorescence.



Status: May 2023

Quantum
Technologies

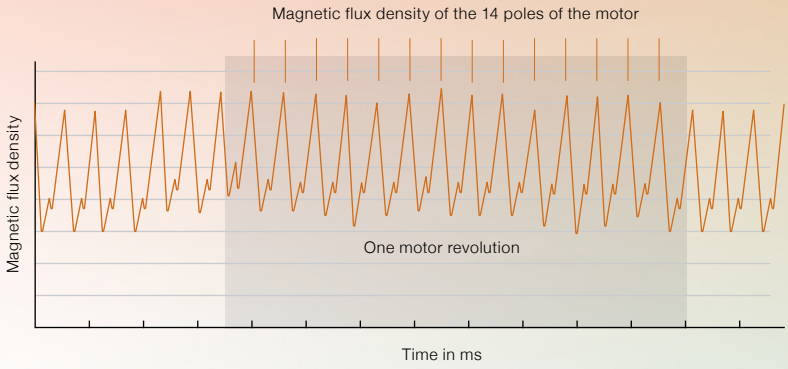
Design — Sensor head with nanodiamonds



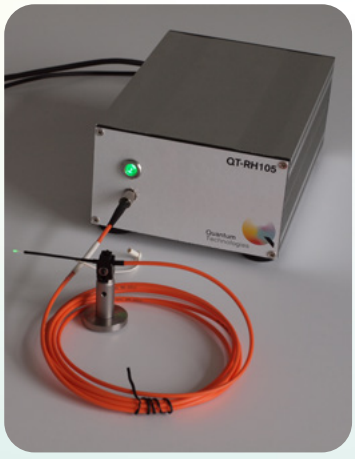
- The facet of the optical fiber is coated with nanodiamonds
- Embedded and set in a ceramic ferrule
- Measurement signal is read out via the optical fiber

Application — Magnetic field inside electric motor

- The extremely small footprint of our sensor allows measurements inside electric motors
- Due to the high bandwidth, it is possible to precisely determine the magnetic field variation within one motor revolution
- The dielectric sensor head does not influence the motor and is insensitive to electromagnetic interference



Technical data



- Magnetic measuring range: |B| = 5 — 50 mT
- Isotropic measurement of |B|
- Bandwidth: 0 — 50 kHz
- Relative error (at 50 kHz bandwidth): <1 %
- Galvanic isolation: fiber length >100 m possible
- Pure dielectric sensor head (non-conductive and non-magnetic)
- Small sensor footprint: ø 1.25 mm / 125 µm (ferrule / fiber diameter)
  (Sample distance to sensing volume < 1mm, sensing volume: approx. ø 100 µm x 50 µm)
- Suitable for harsh environments (diamond + fiber)
  (Vacuum suitable, operating temperature –100 to 200 °C, acid resistant, coating and encapsulation of sensor head possible, radiation resistant)
- Communication interface: USB

GEFÖRDERT VOM
Bundesministerium für Bildung und Forschung

Ra Qu El

Status: May 2023