



# **Bosch Quantum Sensing – Leading Innovation in Quantum Sensing**

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# Bosch Quantum Sensing

## Leading innovation in quantum sensing

- Bosch has been researching quantum technologies for 10+ years
- Start-up launched in 2022 to commercialize quantum sensing solutions
- Team of highly skilled technology and business experts
- CEO Dr. Katrin Kobe, CTO Dr. Frederik Schaal, CCO Dr. Andrea Bräuning
- Located in Ludwigsburg



# Agenda

What are we doing?

Why are we doing this?

How are we doing this?

Q&A

# What are we doing?

## Quantum technologies at Bosch

### QUANTUM COMPUTING



**Enable new differentiating products and services**  
by using quantum computing

- **Material simulations** for new functional materials & catalysts
- Solve some **complex** and so far unsolvable **engineering tasks**
- Improve **AI applications**

### QUANTUM SENSING



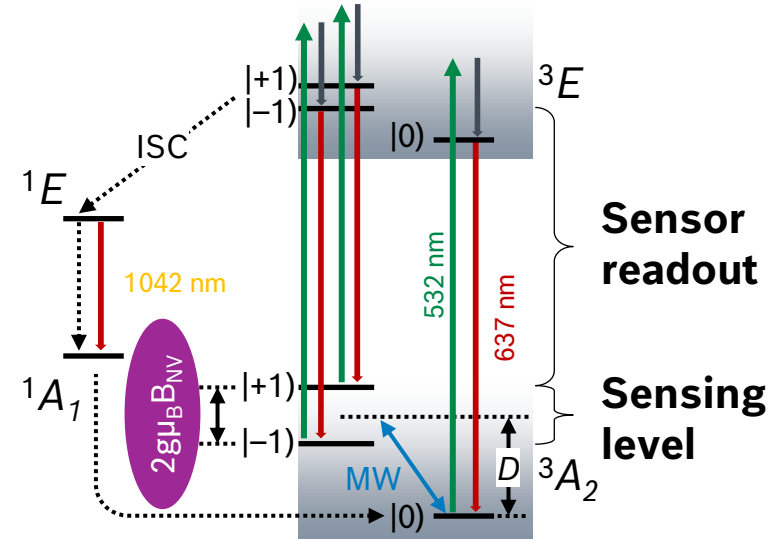
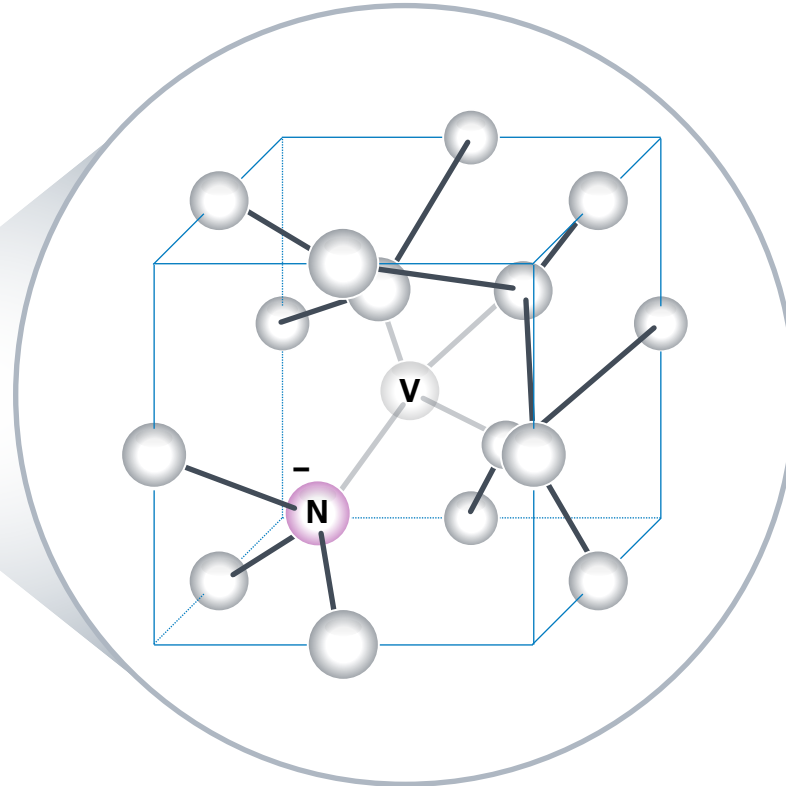
**Sustain leading Bosch position in sensor business**  
create new applications & markets with sensors that utilize quantum systems instead of artificially designed micromechanical structures

- **Quantum-Magnetometers**
- **Quantum-Gyroscopes**

# What are we doing?

## Quantum magnetometry based on NV centers in diamond

Negatively charged nitrogen vacancy center (NV<sup>-</sup>)



# Agenda

What are we doing?

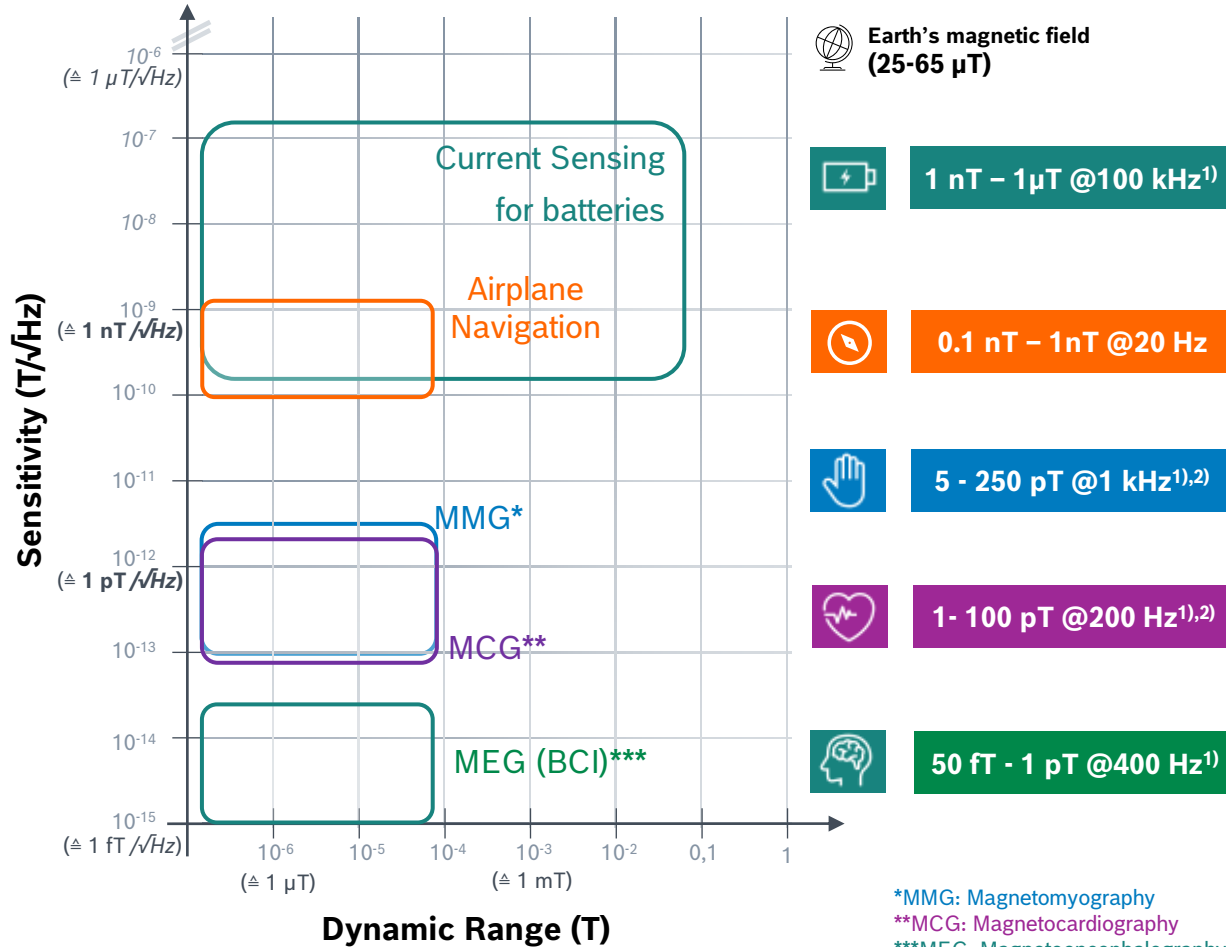
Why are we doing this?

How are we doing this?

Q&A

# Why are we doing this?

## Magnetic field quantum sensors offers a variety of applications



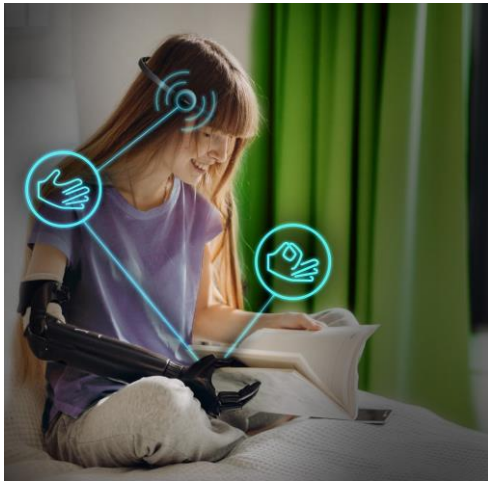
Quantum magnetometers open new and lucrative fields of application

- 1) Potential field of application with their signal amplitude and measurement frequency
- 2) MMG with measurement of action potentials, MCG with magnetic field measurement

# Why are we doing this?

## The bright future of biomagnetic sensing

- **Biosensing** is a hot topic for leading tech companies
- High sensitivity NV quantum magnetometers will enable game-changing **biomagnetic sensing** applications that address several mega trends in the long term





# Why are we doing this?

## Lucrative short- & mid-term business opportunities

### Magnetocardiogram



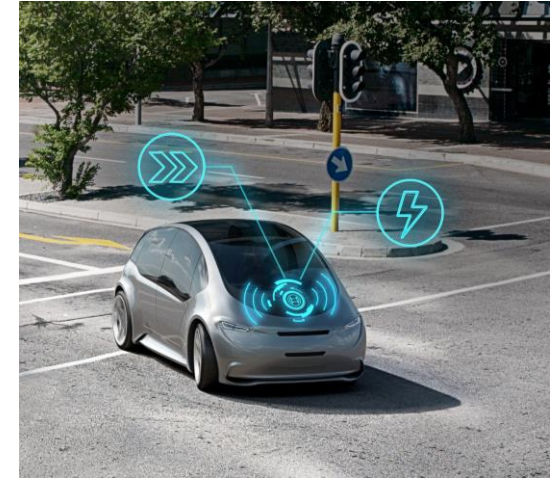
### Exploration



### Navigation



### Battery Control



# Agenda

What are we doing?

Why are we doing this?

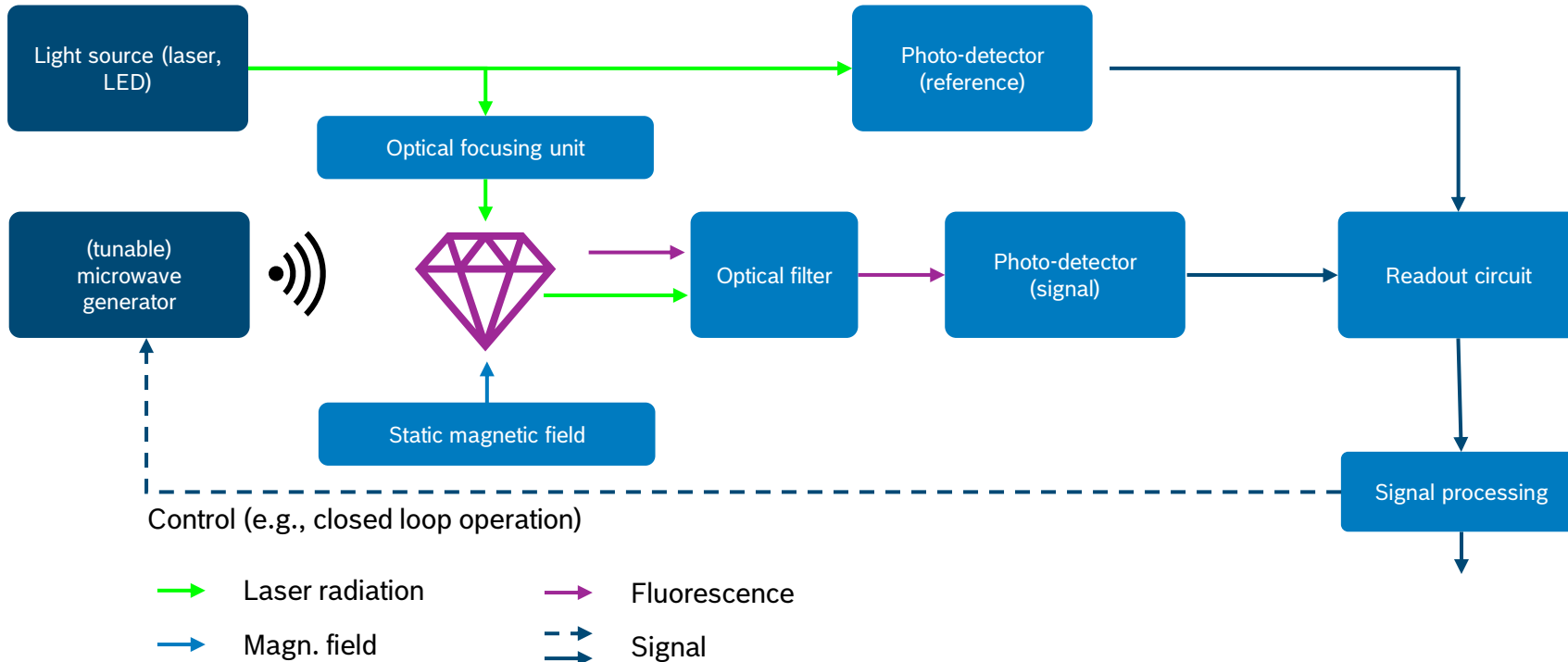
How are we doing this?

Q&A

# How are we doing this?

A lot of components are necessary to build a quantum sensor

## Main Components and Sensing Principle



# How are we doing this?

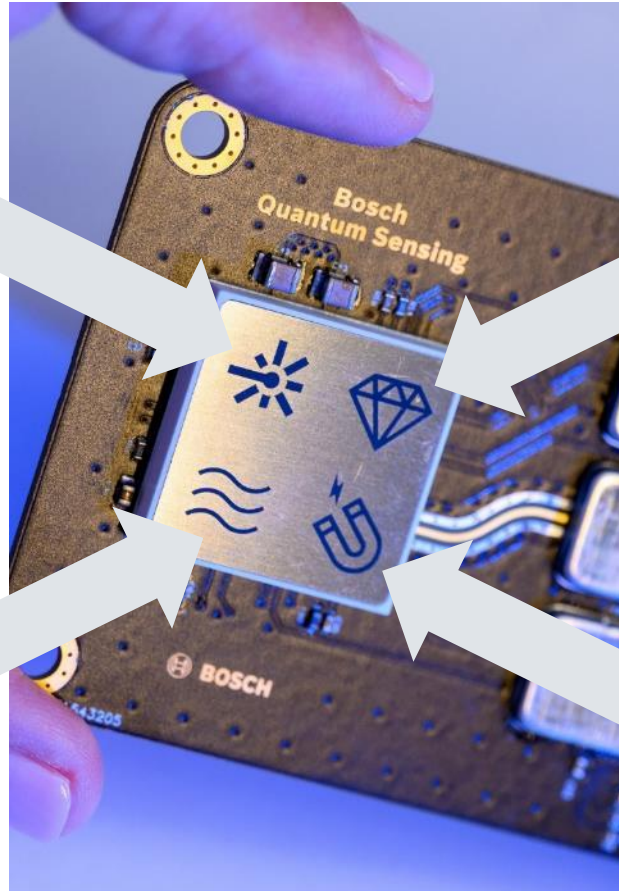
## Heterogeneous Integration

### InGaN

- Direct emitting green laser

### Si

- Silicon photodiode



### Diamond

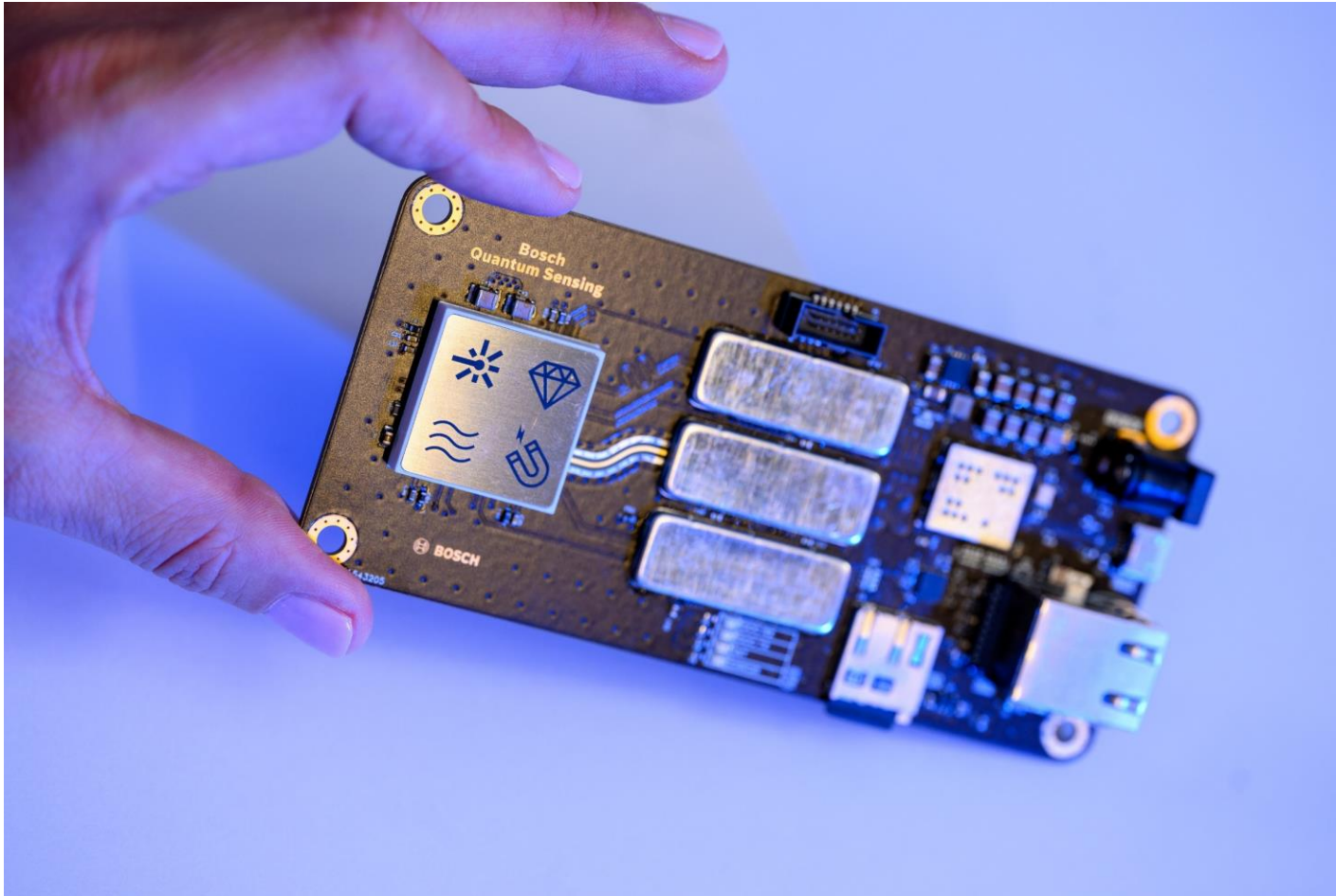
- NV-doped diamond

### Ceramic package

- non magnetic
- hermetic

# Bosch Quantum Sensing

## Leading Innovation in Quantum Sensing



### #IndustrializationLikeABosch

-  Miniaturization
-  Scalability
-  Sensitivity
-  High-quality production
-  Latest software standards

# Join us in the world of Quantum Sensing

## #CreateTheUnthinkable



**Bosch  
Quantum  
Sensing**

#CreateThe  
Unthinkable

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