

ProteusQ™

Capture surface magnetic fields at the atomic scale



Next level in precision

ProteusQ is a complete quantum microscope system. It is the first scanning NV (nitrogen-vacancy) microscope for the analysis of magnetic materials at the atomic scale.

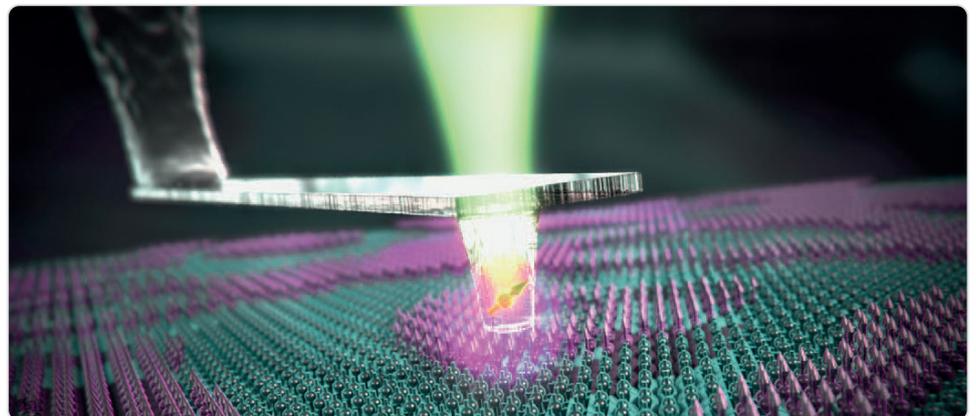
The ProteusQ system comes with state-of-the-art electronics and software. Its flexible design allows for future adjustments and scaling, expansion and capability upgrades.

The proprietary ProteusQ quantum technology provides high precision images for you to see directly the most subtle properties of your samples and the effect of microscopic changes in your design or fabrication process.

The ProteusQ opens a new window on your research and gives you a new level of control to drive innovation in the design, creation and delivery of smart and energy-efficient electronics.

Key features

- **Quantum performance**
New level of mapping a wide range of magnetic signals for materials science and more
- **Ease of use**
Automated operations, tip and sample exchange in just a few minutes
- **Robust and stable**
Proven SPM platform. Tips with unbeatable lifetime
- **Atomic precision**
Sensitivity down to the single atomic layer combined with nanoscale resolution
- **Intuitive**
No quantum expertise required
- **Customizable**
Synchronize your measurements and run your own protocols using Jupyter Notebook (Python)
- **Unlimited potential**
Extend to standard SPM modules (AFM, LFM, EFM, MFM, KPFM, PFM, Force curves, etc...) and more quantum imaging modes
- **Powered by HORIBA**
World leader in AFM and optics



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Scanning NV microscope

1 Sample scanner

- closed-loop scanner and coarse positioner
- ultra-low drift

2 Confocal microscope

- high numerical aperture
- objective scanner
- stable design
- fiber-output

3 NV SPM head

- fast and safe tip exchange
- easy near-field antenna approach

4 Microwave signal generator

- GHz electronics for NV spin detection
- optional high-frequency pulsing capabilities

5 Photon counting module

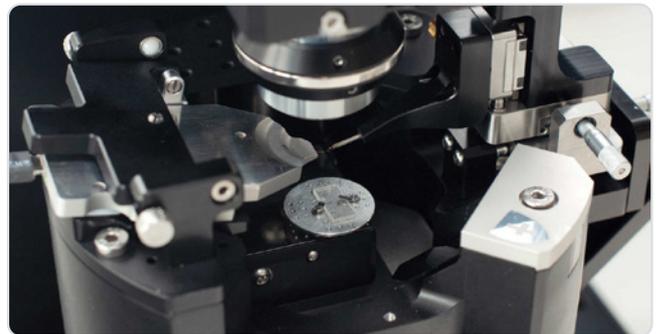
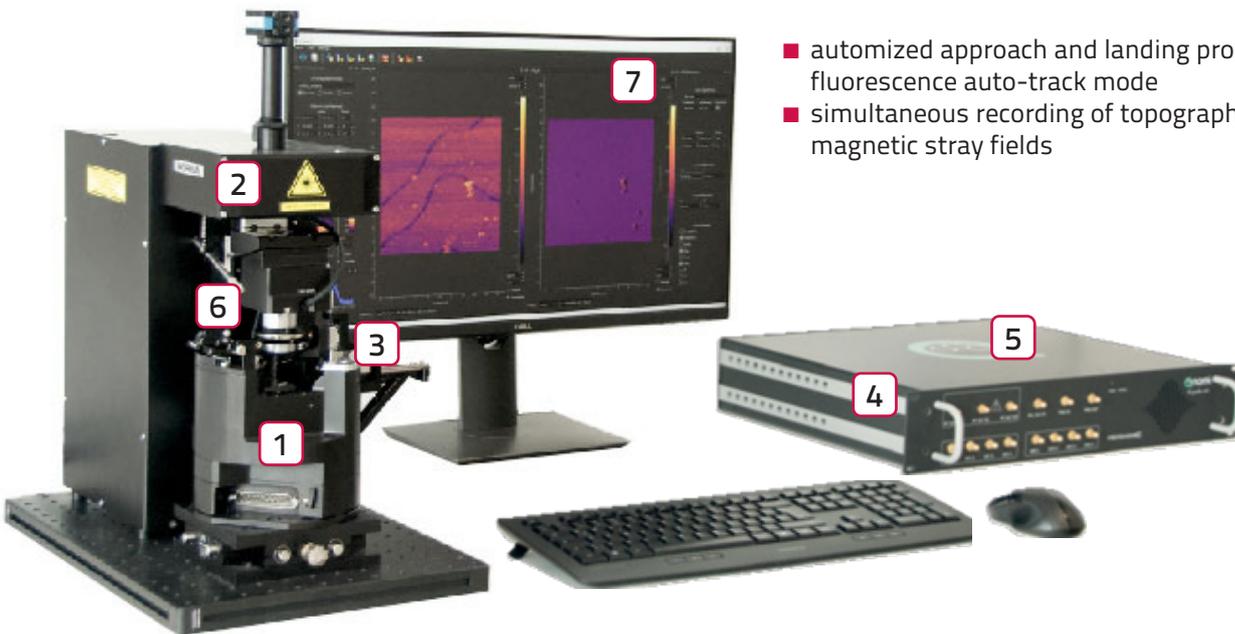
- single photon counting
- high quantum efficiency

6 Quantilever™

- single spin quantum sensor
- optimized architecture for high fluorescence throughput
- tuning-fork force-sensor

7 Software

- automated approach and landing procedures, fluorescence auto-track mode
- simultaneous recording of topography and magnetic stray fields

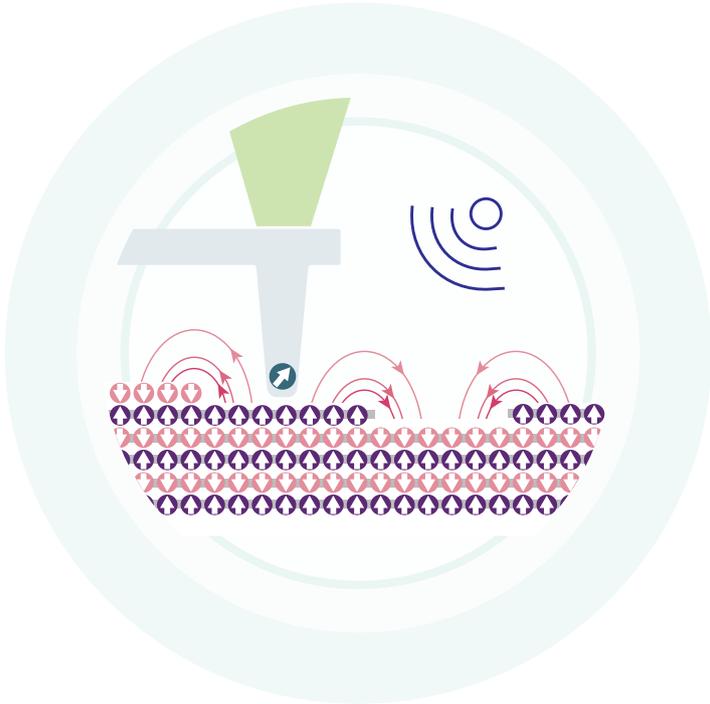


Probe and near-field antenna, with sample retracted

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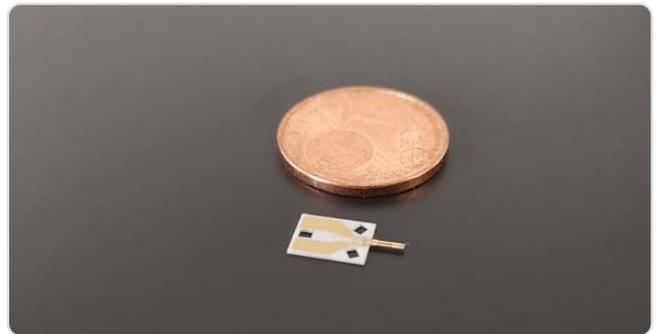
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How it works



Quantilever™ – An atomic defect in perfect diamond

The Quantilever MX series, designed for magnetic imaging, is based on the patented technology developed by Qnami. Each Quantilever MX behaves like a true single-spin, allowing non-perturbative analysis of a large variety of magnetic materials. Combined with the Qnami ProteusQ, the Quantilever MX provides a direct quantitative measurement of the magnetic field without the need for calibration.



NV magnetometry

A laser is focused on the diamond tip and excites the embedded single NV, which emits red light in return. A microwave signal is sent by the close-by near-field antenna to probe the NV spin resonance. The frequency of this resonance is identified by monitoring the NV fluorescence, a technique known as optically detected magnetic resonance (ODMR). The measured frequency directly translates into an exact value of the magnetic field, with no further calibration.

Scanning NV Microscopy

NV Magnetometry and Scanning Probe Microscopy techniques are combined onto a single platform, allowing the simultaneous acquisition of the sample's topography and surface magnetic fields. While the tip's radius of curvature determines the lateral resolution for the topography image, it is the distance between the NV center and the sample surface which determines the lateral resolution for the magnetic image.

LabQ – Community-built software

While the Qnami ProteusQ will give you new insight to the nanoworld, we did not want the quantum machinery behind it to get in your way. Built upon the open-source Qudi framework, the LabQ software intuitively guides you through the different measurement modes so that you get the answers you need as quickly as possible. For the experts, the Jupyter Notebook will allow you to write your own scripts and run custom-made protocols.



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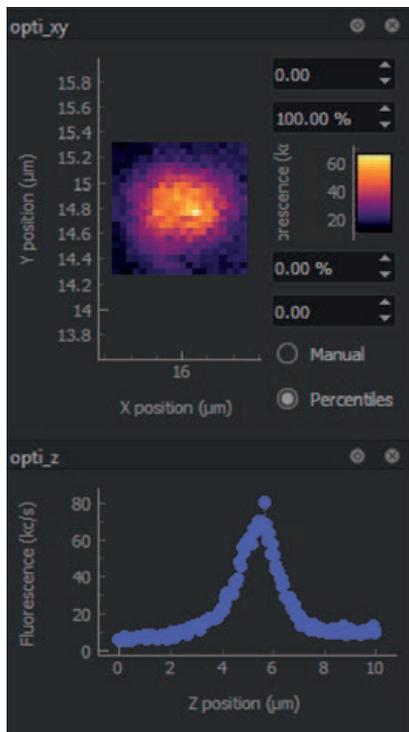
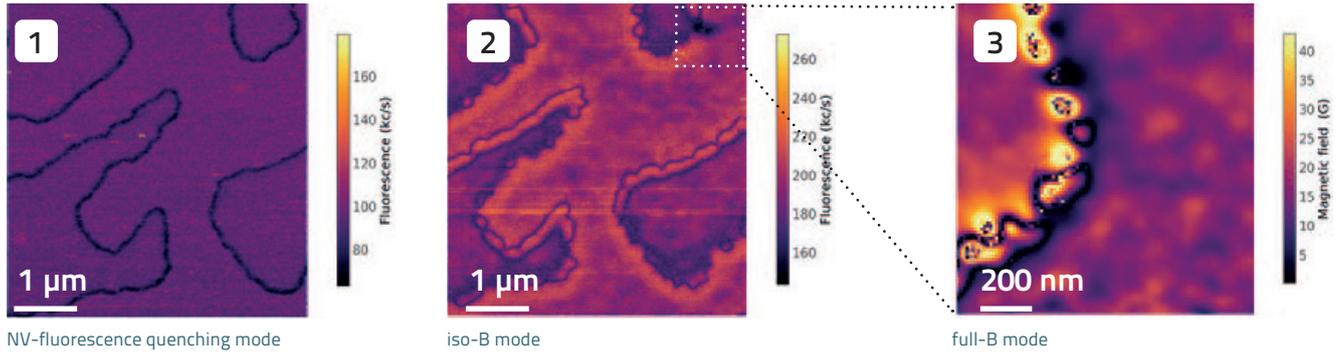
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Designed to improve your workflow...

From the software interface to the handling of every component, the Qnami ProteusQ is designed to let you focus on your work. Whether you work in an academic or industrial environment, Qnami ProteusQ will extend your range of available analytical techniques and support your research.

Move easily from fast sample preview...

... to detailed analysis



Fluorescence auto-track mode

Stay focused
minimize
turn-around
time

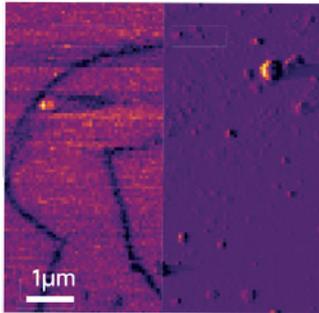


Quantilever exchange system (optional)

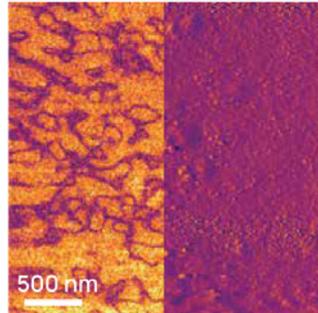
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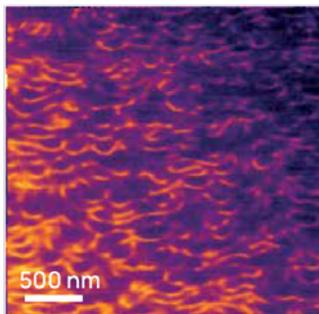
...and your understanding of the nanoworld



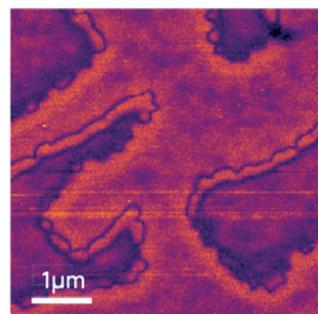
Bi:YIG



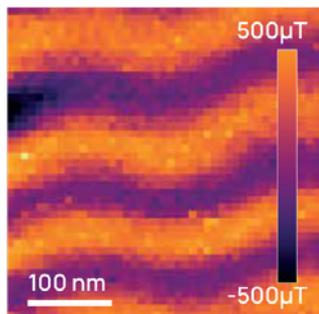
Mn₃GaN



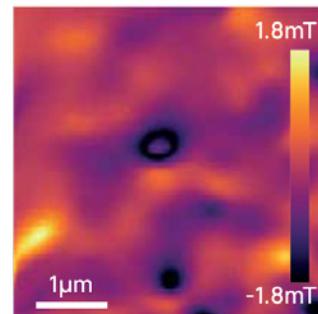
(Co/Pt)₂₅ (quenching)



Co/Ru/Pt/Co (iso-B)



BiFeO₃ (full-B)



Mn₃GaN (full-B)

T

mT

μT

nT