Fermi SPM

SPM in a Temperature Range
from 15 K to 400 K

- Temperature Range: 15 K to 400 K
- Compact Design
- Tip Exchange & 2D Coarse
- Sample & Tip in Thermal Equilibrium
- Low Thermal Drift
- STM, AFM & Spectroscopy
- Sub pA STM

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Fermi SPM

SPM in a Temperature Range
from 15 K to 400 K

Tip & Sample Cooled!

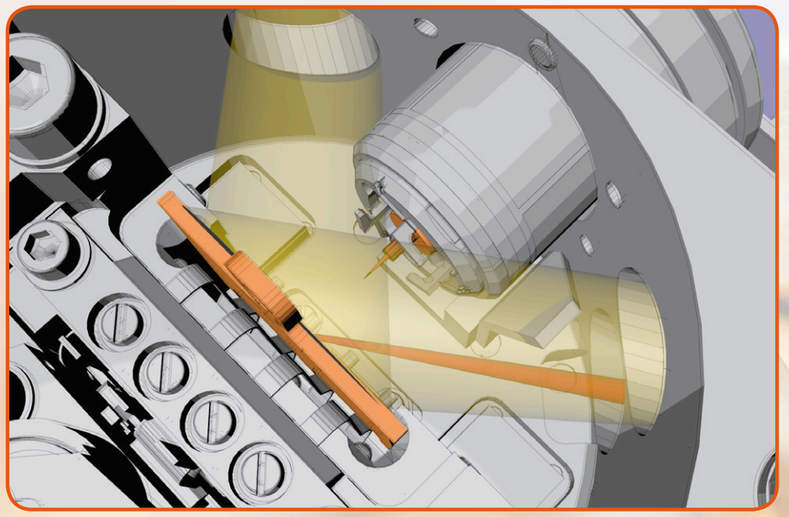
The Fermi SPM is a compact and cost effective solution for UHV SPM in a temperature range from 15 K to 400 K.

The compact design with a LHe flow cryostat and thermal shields keep tip and sample at the same temperature during cooling experiments. This guarantees low thermal drift between tip and sample and makes the Fermi SPM an ideal and cost effective solution for imaging, tunnelling spectroscopy and atom manipulation experiments.

Like all our SPM's it offers in-situ tip exchange, sample coarse positioning and internal eddy current damping for highly effective vibration isolation. A new compact scanner design and ultra-light tip carriers offer high stability and the capability for higher speed scanning. AFM operation (QPlus AFM) is also available as an option.

For STM operation the Fermi SPM employs the proven preamplifier with in-situ I/V converter offering a tunnelling current range from < 1 pA to 330 nA.

Piezo inertia motors allow for sample coarse positioning in x and z direction (R-Φ motor). The microscope is mounted on a DN100 flange and is easily integrated into multi-technique UHV systems using the proven bolt-on concept. The Fermi SPM is also available as an ultra compact turnkey UHV system.



Ultra compact scanner design for high stability and high speed scanning. Yellow marked: optical access. Orange marked: in-situ evaporation.

Ultra compact scanner design

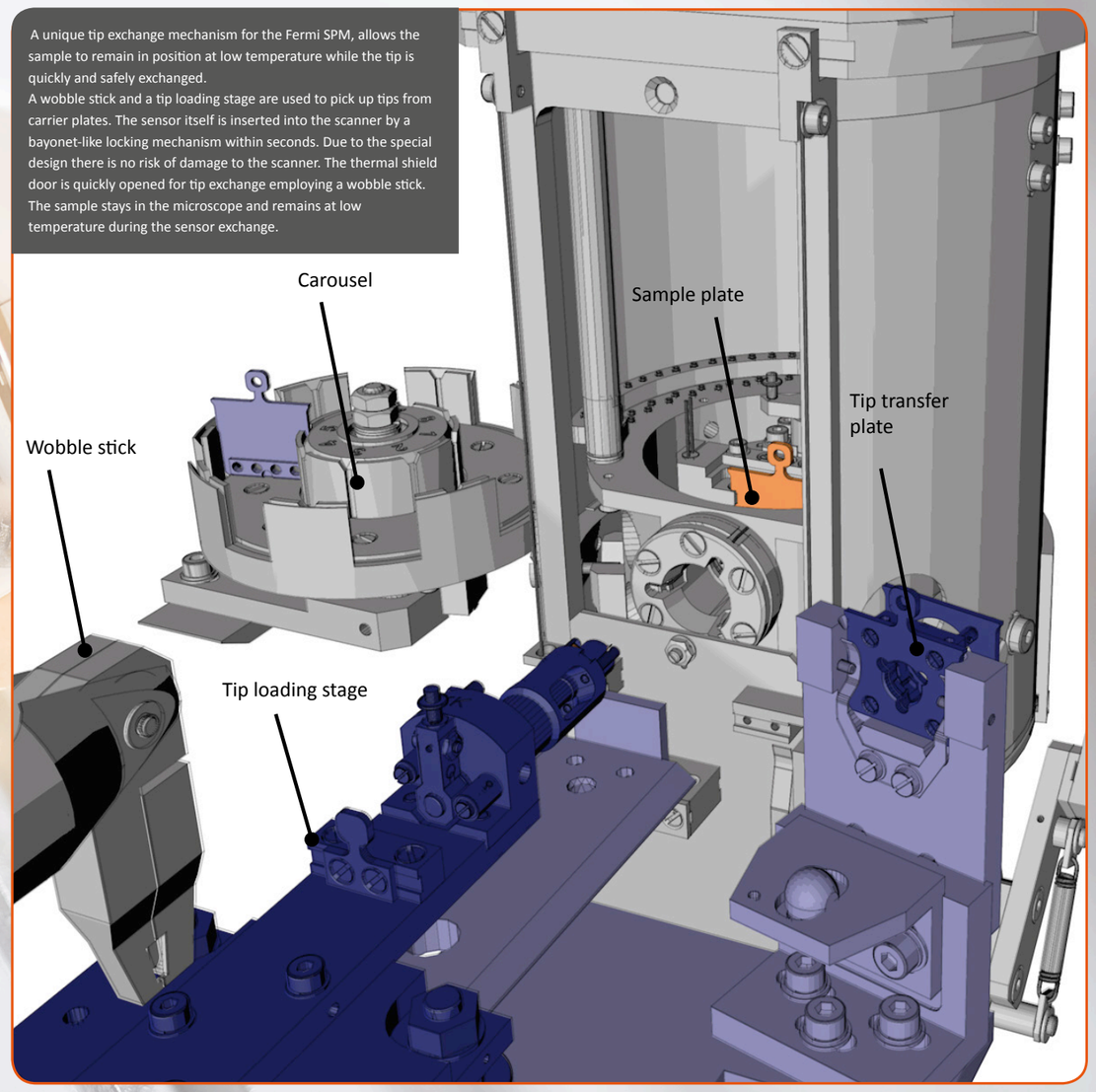
A new compact and rigidly mounted scanner with light and small tip carriers enables high stability and high speed scanning. The sample is mounted on a coarse positioning device for sample positioning in x and z direction. Four electrical sample contacts are available as an option.

Tip transfer plate

Tip holder

A Unique Tip Exchange Mechanism!

A unique tip exchange mechanism for the Fermi SPM, allows the sample to remain in position at low temperature while the tip is quickly and safely exchanged.
A wobble stick and a tip loading stage are used to pick up tips from carrier plates. The sensor itself is inserted into the scanner by a bayonet-like locking mechanism within seconds. Due to the special design there is no risk of damage to the scanner. The thermal shield door is quickly opened for tip exchange employing a wobble stick. The sample stays in the microscope and remains at low temperature during the sensor exchange.



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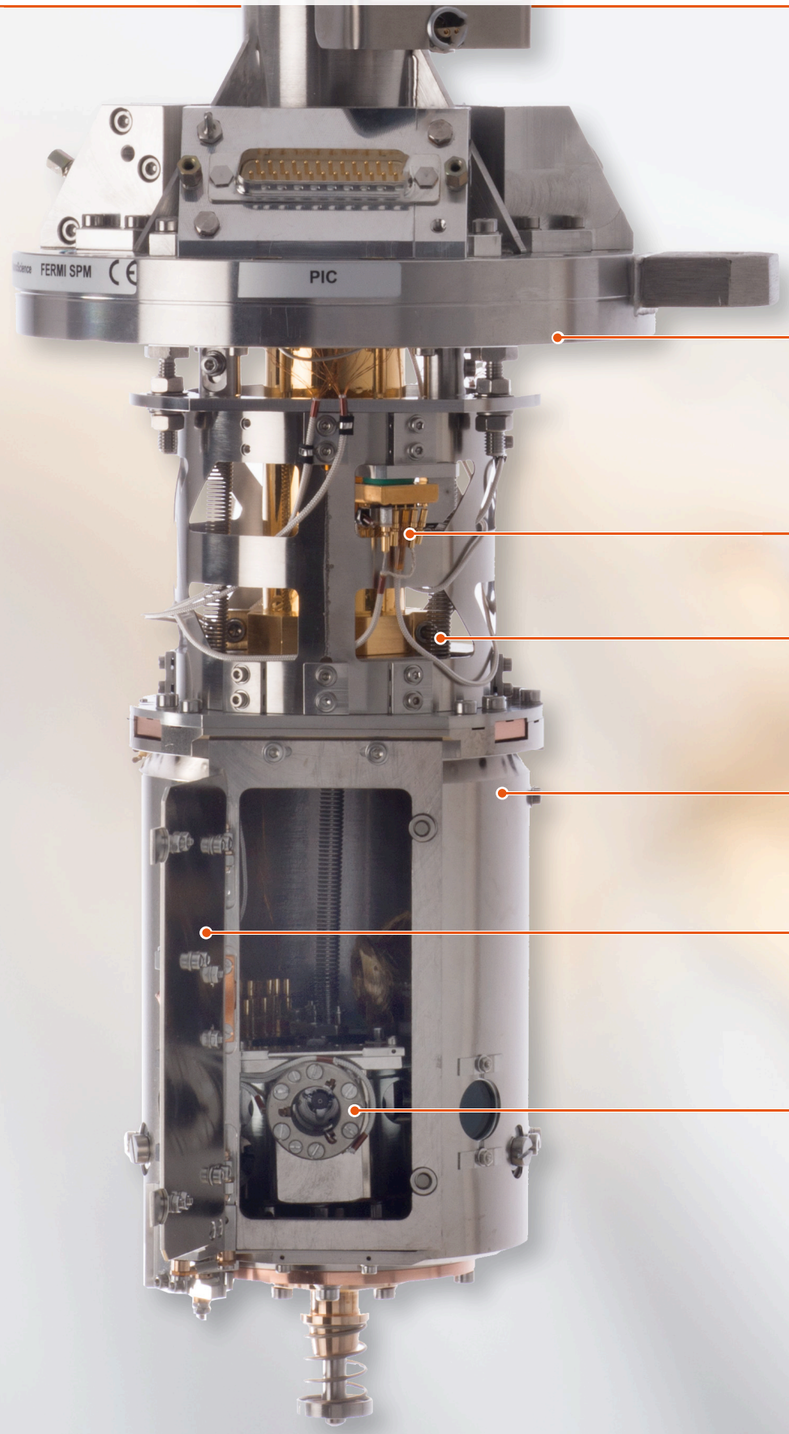


Fermi SPM

Key Features:

The new microscope is mounted on a small **DN100 flange** offering a compact and cost effective platform for low temperature SPM.

The **in-vacuum I/V converter** allows for excellent signal to noise, low tunnelling currents and spectroscopy.

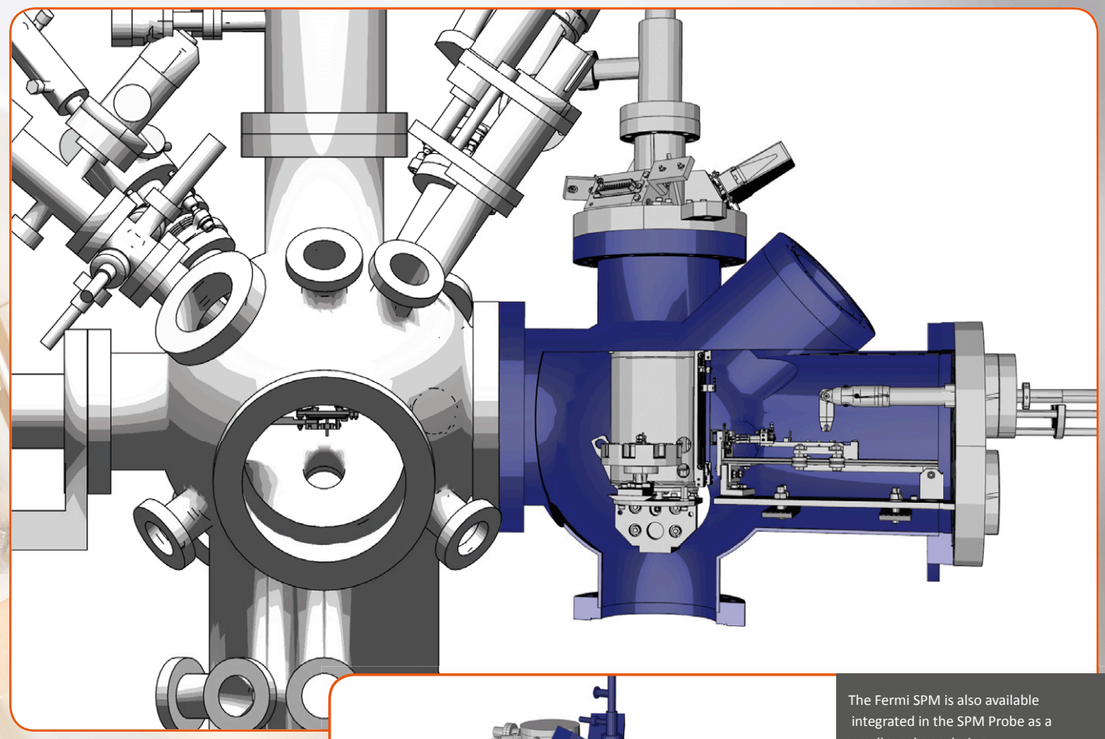
The **internal spring suspension** with eddy current damping ensures excellent vibration isolation.

Thermal shields keep tip and sample at the same temperature during cooling experiments. This guarantees low thermal drift between tip and sample.

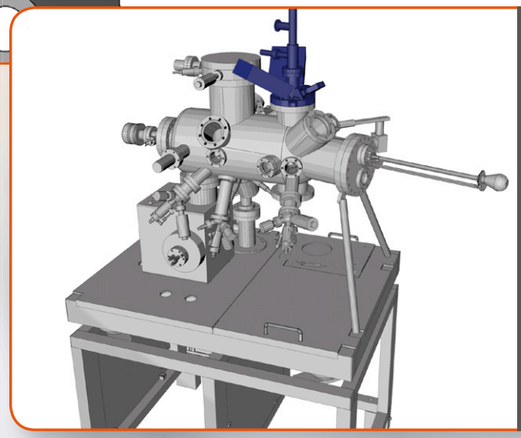
A **load/lock door** for quick and safe tip and sample exchange and thermal shielding. The sample remains in position at low temperature.

A new **compact scanner design** combined with ultra-light tip carriers enable high stability and high speed scanning. A new and unique tip exchange mechanism facilitates secure handling of miniaturised tip carriers.

System Integration



The Fermi SPM is housed in its own, dedicated UHV chamber which can either be mounted onto a standard Scienta Omicron system (MULTIPROBE…) or mounted to an existing vacuum system.
A wobble stick is used for fast and convenient tip and sample transfer and for operating the thermal shields. The bolt-on chamber includes a 8 position storage carousel for tip and samples. The design of the Fermi SPM offers optical access and allows for in-situ evaporation.
Our proven internal spring suspension system with eddy current damping ensures excellent vibration isolation.



The Fermi SPM is also available integrated in the SPM Probe as a small turnkey solution.
The SPM Probe is a compact and cost-effective UHV system for our SPMs.
The rigid bench is ideally suited for high resolution SPM work. The UHV SPM is directly mounted to the experimental chamber. The experimental chamber can be easily equipped with additional techniques for sample preparation and characterisation.

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Technical Information:

Scan (and offset) range (X/Y/Z):
2.9 µm x 2.9 µm x 0.9 µm (RT)
1.5 µm x 1.5 µm x 0.5 µm (LN_2)
0.8 µm x 0.8 µm x 0.3 µm (LHe)

2D coarse positioning (R-Φ):
Tip approach range: 6 mm
Lateral range: 6 mm

Maximal sample size: 11 mm x 11 mm

Tip exchange:
Fast in-situ tip exchange, sample can remain in cooling position during exchange

Tunnelling current:
< 1 pA – 330 nA
Variable temperature operation with LHe flow cryostat.
15 K – RT: tip and sample cooled
RT – 400 K: sample heated

Vibration isolation:
Internal eddy current damping

Maximum bakeout temperature: 150 °C

Vacuum achievable: 10^{-11} mbar range

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