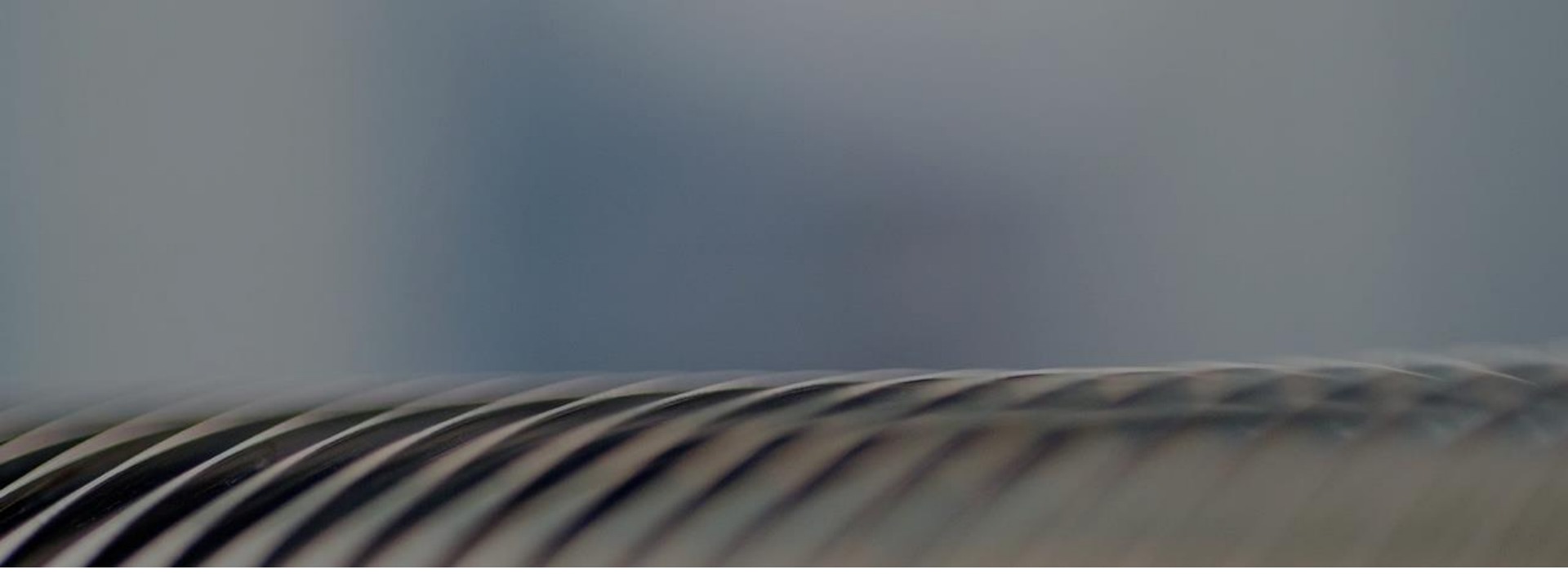

Scientific Instruments Overview

March 2020

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Nobel Prize technologies supporting science and industry

NOBEL PRIZE FOUNDATION

- Kai Siegbahn (20 April 1918 – 20 July 2007) was awarded the 1981 Nobel Prize in Physics, for developing the method of Electron Spectroscopy for chemical analysis (ESCA/XPS). Creating the starting point for Scienta in 1983.
- Scienta Omicron has supported Nobel prize research ever since its inception and will continue to do so.

OUR MISSION: YOUR SCIENTIFIC SUCCESS

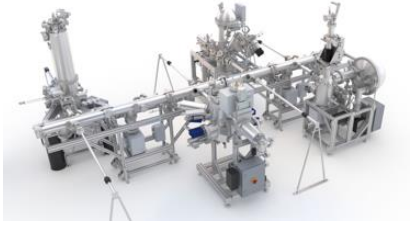
- Focus on fundamental material physics and surface science in ultra high vacuum.
- Serving top scientists at universities and research institutes across the world, with 96% of top-50 universities as customers.
- Global sales and services. Main operations in Uppsala, Sweden and Taunusstein, Germany. Approximate 185 employees and 45 million EUR in turnover.

WIDE RANGE OF SCIENTIFIC INSTRUMENTS, PACKAGED SOLUTIONS AND SERVICES

Electron Spectroscopy instruments to measure chemical states, electronic structures etc.

Scanning Probe Microscopy instruments to measure the physical structure of surfaces

Molecular-Beam Epitaxy and other deposition techniques

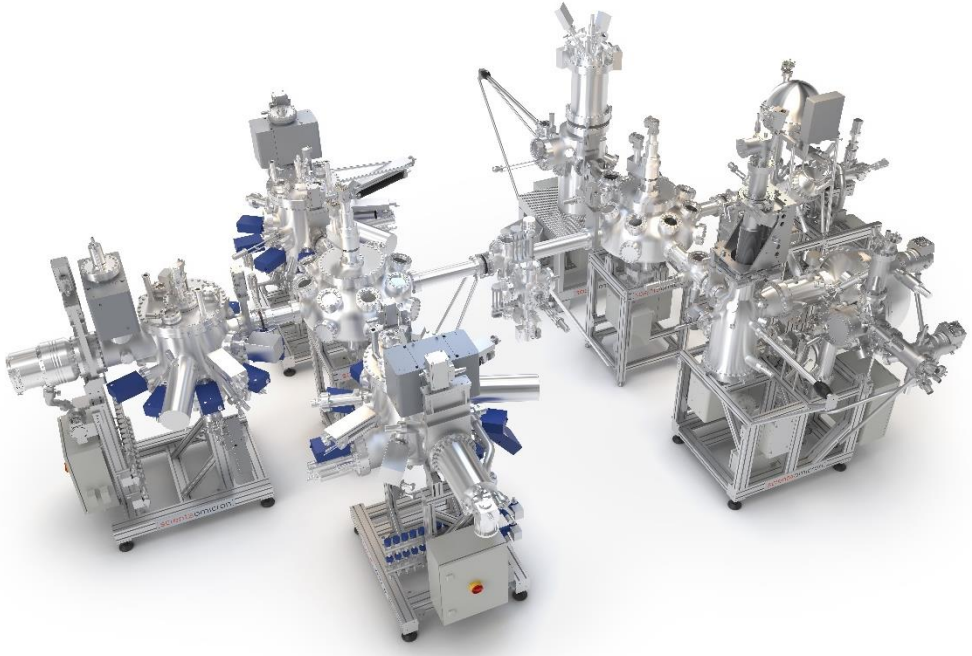


Clustered systems of combined instruments and methods for advanced research, “Materials Innovation Platforms” (MIP)

Extensive services providing installations, training, support, maintenance and all sorts of parts and upgrades – close to customers

Materials Innovation Platform (MIP)

Accelerating the Pace of Discovery



- Multiple deposition modules
- Different deposition technologies
- Surface analysis between steps
- Ultra-clean UHV environment
- Leading scientific components

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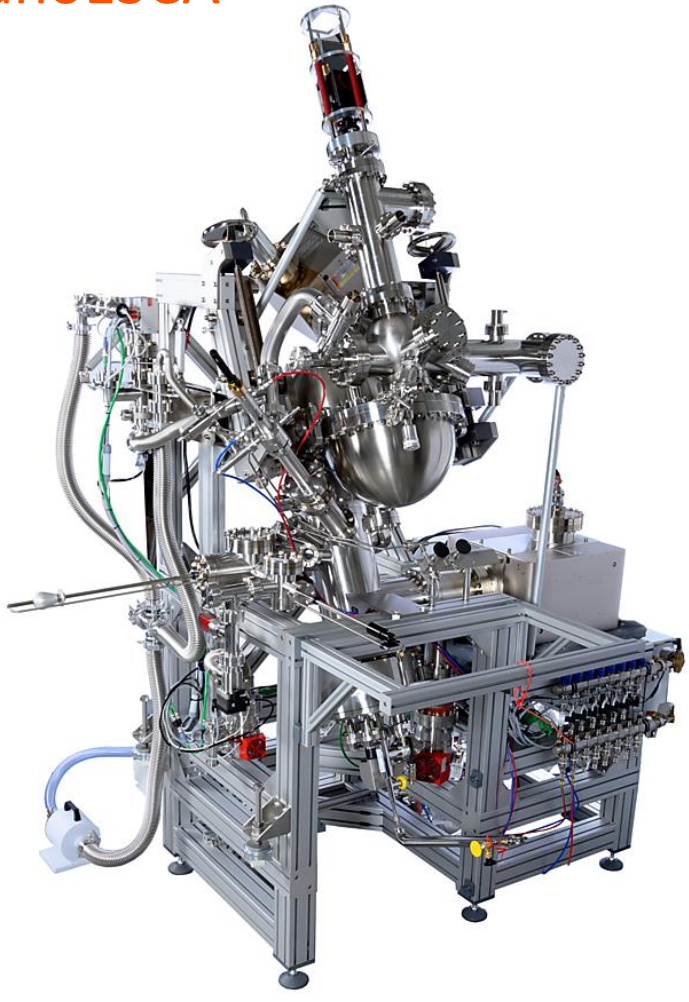
HAXPES Lab

A Window to the Bulk

- Laboratory-based HAXPES solution
- High flux 9.25 keV X-ray source
- Monochoromated
- Access to deep core levels
- Bulk sensitive

NanoESCA



Next Generation Photoemission Tool for Real- and Momentum Micrsocopy

- Live View energy-filtered imaging
- Small area ARPES
- 180° overview ARPES
- LHe cooled microscope sample stage
- Excellent imaging energy resolution

PEEM Lab

The System Platform for Photoemission Microscopy

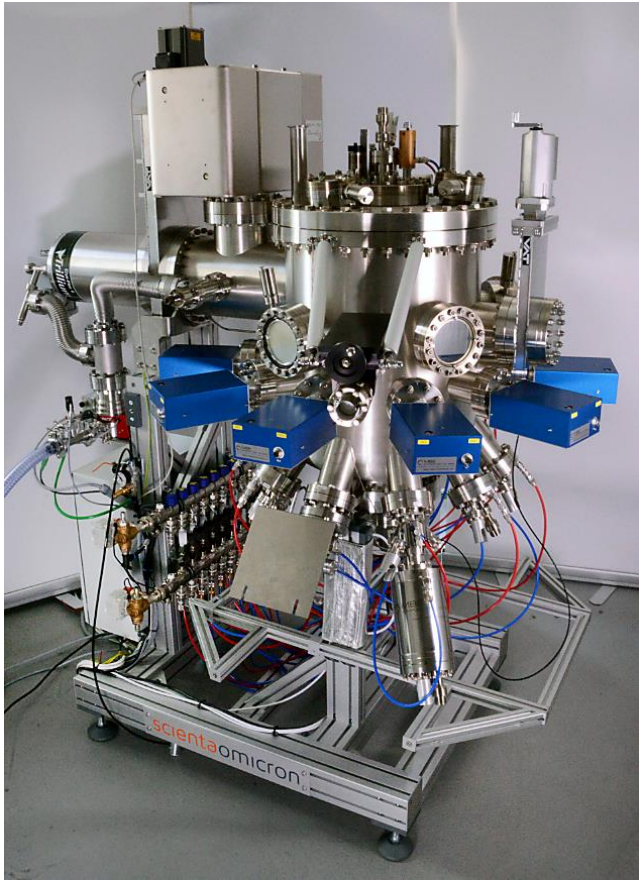
- Surface Sensitive Microscopy
- 20 nm Lateral Resolution
- k-Space imaging
- Time-of-flight energy filter
- Easy to operate

Lab10 MBE

Fundamental Research Tool for Epitaxial Layer Growth

- Explorative material research under UHV conditions
- Configurable and customizable
- Defined interface to Scienta Omicron analysis systems
- Low cost of ownership
- Growth process control via advanced software

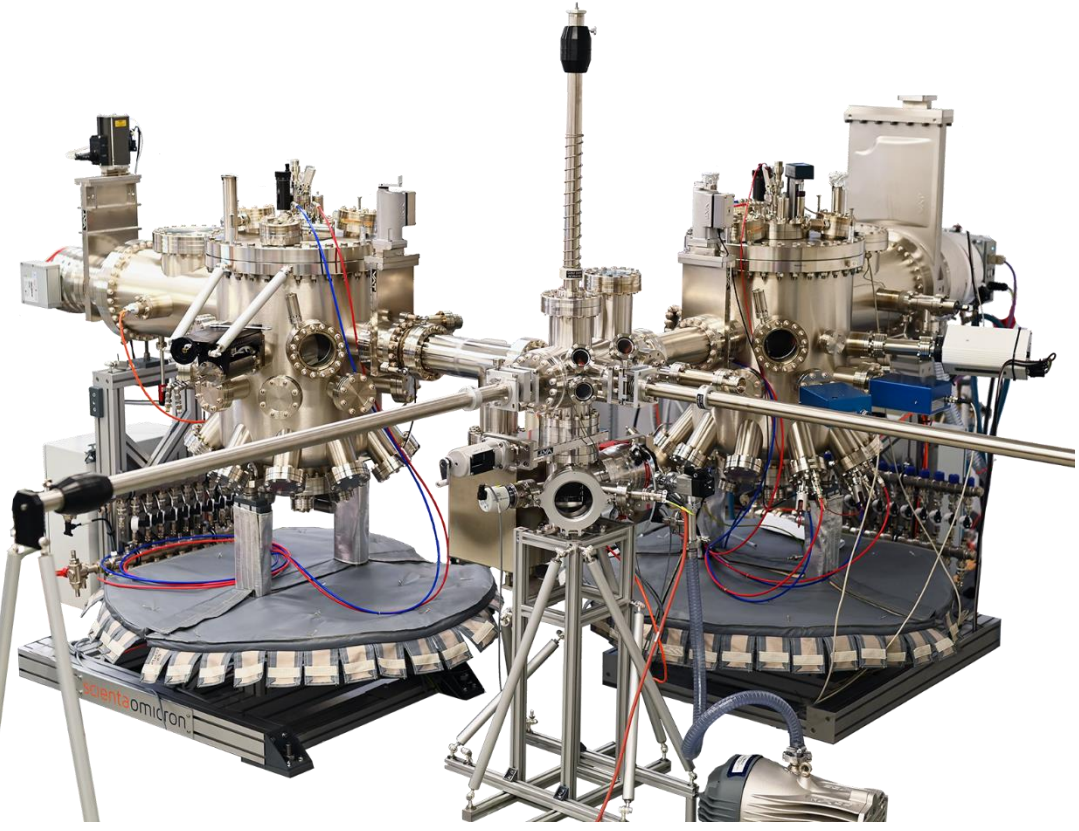
EVO 25/50 MBE



Small Scale Research Tools for Epitaxial Layer Growth

- MBE system optimised for 2 inch wafer growth
- Compact design and small system footprint
- Flexible configurations, from topological insulators to semiconductors and metal oxides
- Growth process controlled by advanced software

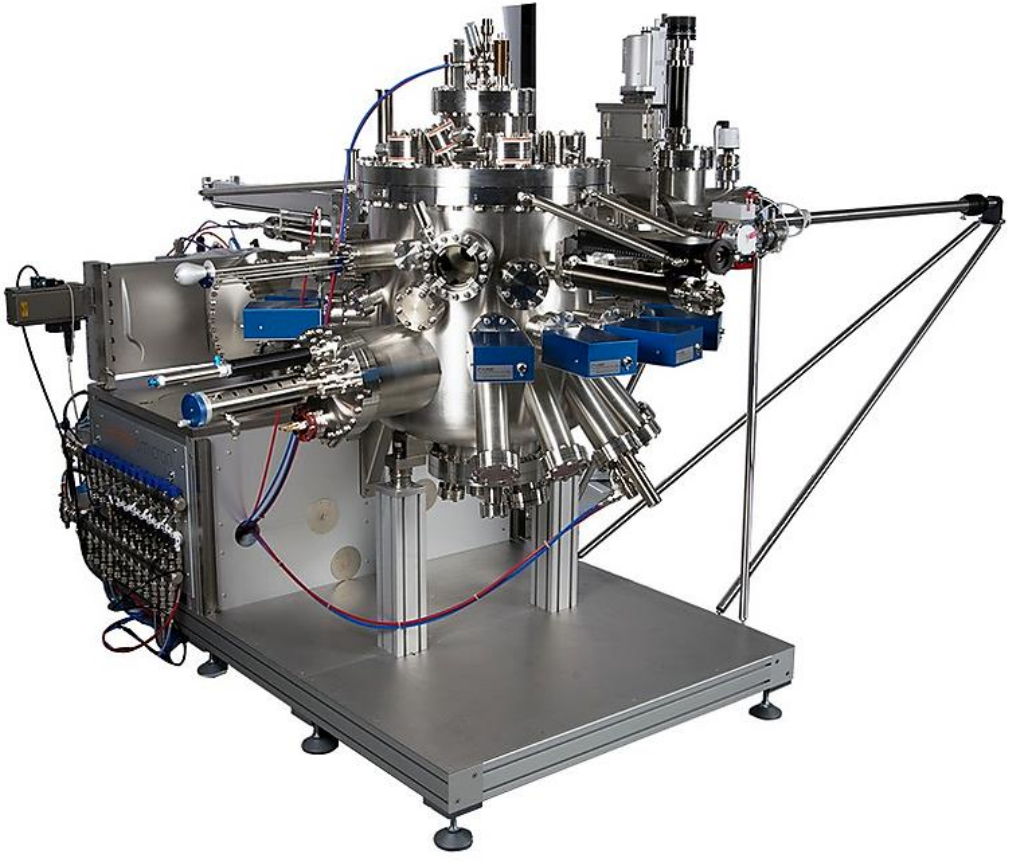
Dual EVO



Research Tools for Epitaxial Layer Growth of Complex Material Systems

- Explorative material research under UHV conditions
- Independent configurations for growth chambers
- Manual or automated transfer available
- In-situ growth monitoring
- Growth process control via advanced software

PRO 75/100 MBE



Research Tools for Epitaxial Layer Growth

- MBE system optimised for 4 inch wafer growth
- Large effusion cell capacity for increased up-time
- Flexible configurations, from topological insulators to semiconductors and metal oxides
- Growth process controlled by advanced software

XPS Lab

Versatile Electron Spectroscopy Platform

- Outstanding quantitative XPS performance
- Compact footprint with excellent accessibility
- User-friendly experiment control and data acquisition software
- Versatility configurable to meet individual demand
- Sub-system for Materials Innovation Platform (MIP)

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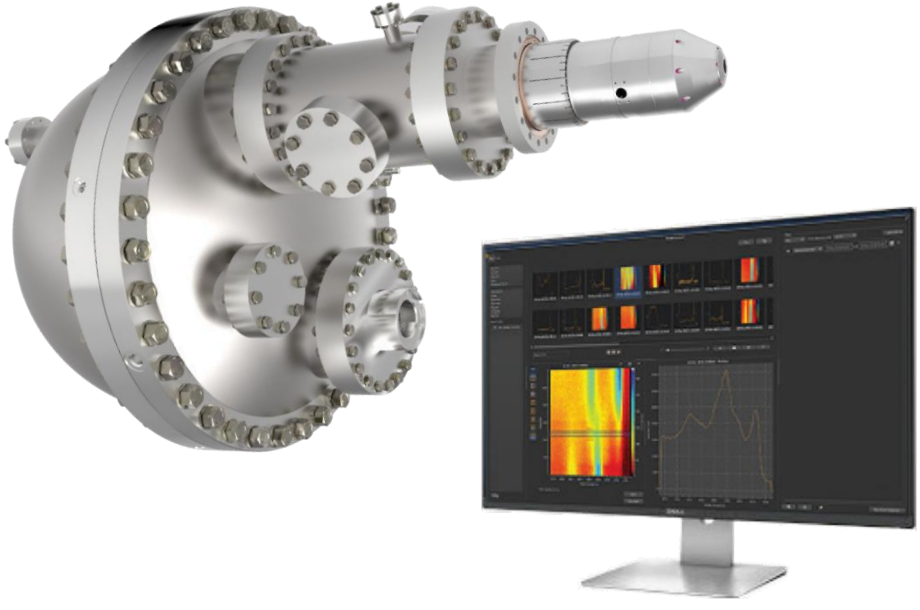
ASPECT & NEO



Analyser & Software for exceptional XPS performance

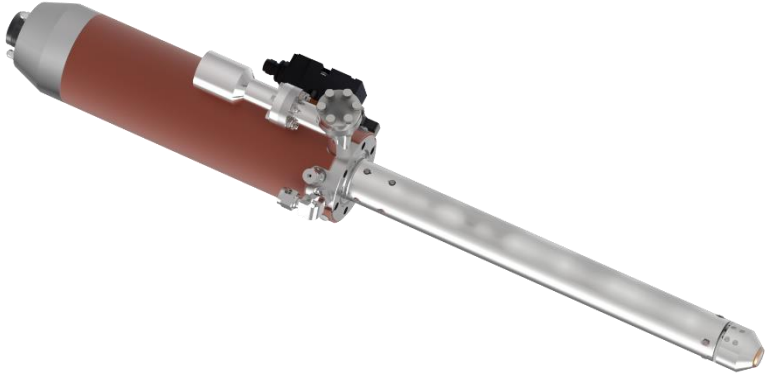
- Highest spectrometer sensitivity
- Multi-channel particle counting detector
- Energy range up to 3.5 keV
- Powerful data management
- Integrated auxiliary instrumentation
- Comprehensive XPS functionality

MECS monochromated X-ray source

Bright X-ray source for high intensity monochromated XPS

- High Energy Resolution XPS
- High Power & Focused Spot Mode
- Low Radiation Impact
- Easy mirror adjustment
- Dual anode version (MECS-DA)

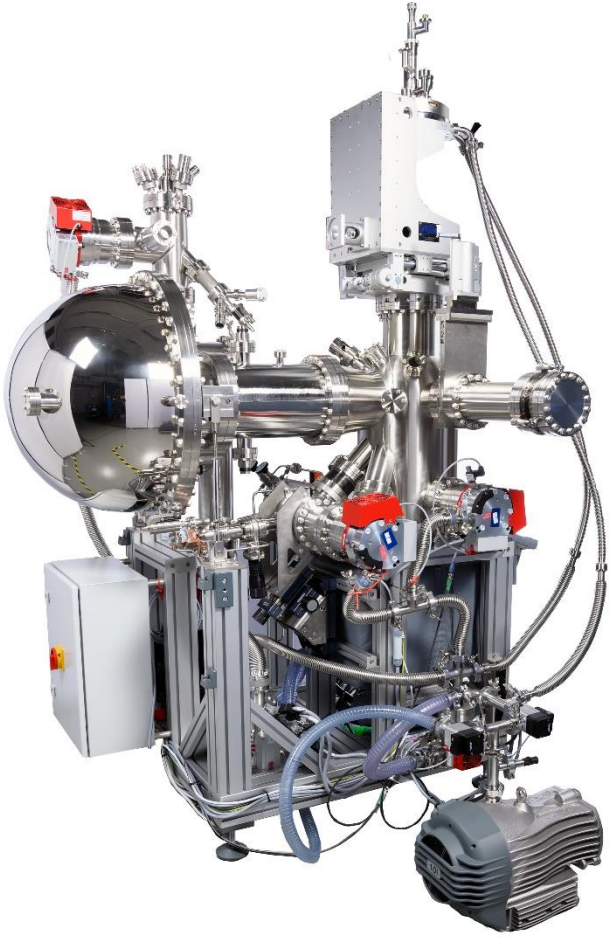
LAX dual-anode X-ray source



Dual-anode X-ray source Control Electronics and Software

- High Intensity XPS Measurements
- Large Area Illumination
- Two Excitation Energies
- Differential Pumping Option
- Water Cooled Front Cone

ARPES Lab



The Expert Solution for Angle Resolved Photoemission Spectroscopy

- Expert integration of best technologies
- DA30-L deflector technology for precise ARPES results
- Ease of use by interplay with system and measurement software
- High photon density VUV sources with small beam spots
- User-friendly adjustment of light-source and manipulator

DA30-L

First Deflector Analyser Preserving Measurement Geometry

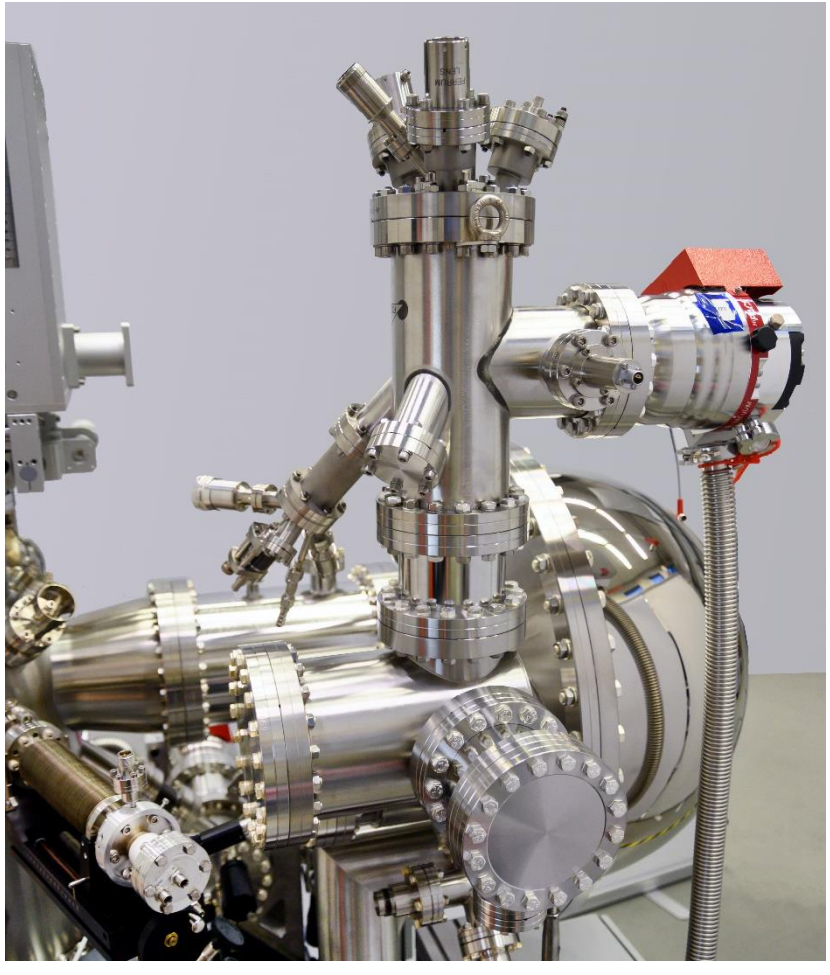
- 30° full cone acceptance
- Kinetic energy from: 3 eV
- Energy resolution: 1.8 meV
- Patented Electronic Deflection
  (WO2013/133739)
- Matrix element effects avoided

DA30-L-8000

Highest Performance at the Lowest Kinetic Energies

- 30° full cone acceptance
- Kinetic energy from: 0.5 eV
- Energy resolution: 1.0 meV
- Patented Electronic Deflection
  (WO2013/133739)
- Matrix element effects avoided

Ferrum VLEED



Resolving In- and Out-of-Plane Electron Spin with DA30-L

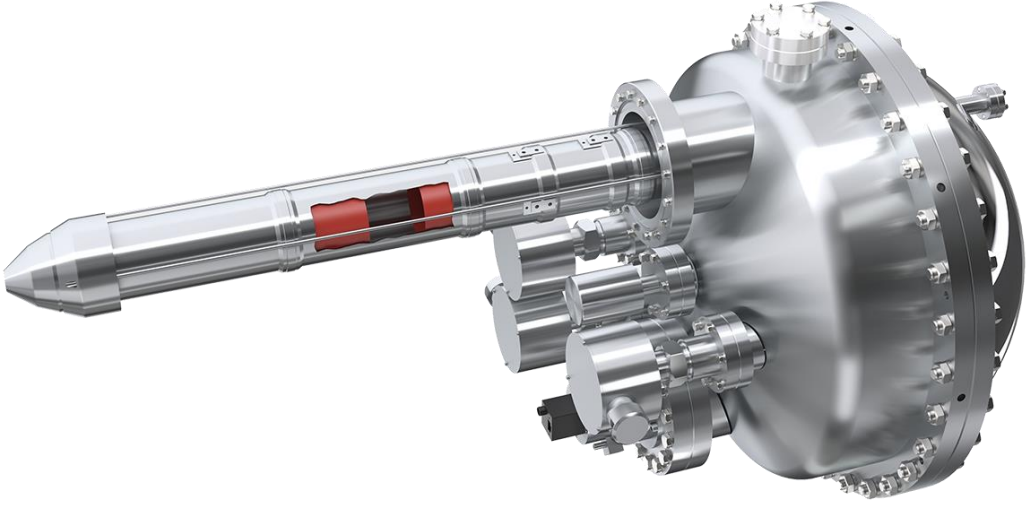
- Proven technology – DA30-L
- Non-magnetic transfer system
- Orthogonal detectors
- Easy VLEED target preparation
- Market leading Sherman function and reflectivity

ARTOF-2

Time of Flight ARPES Analyser for Maximum Transmission

- Parallel full cone detection
- Slit free lens design
- 250 times higher transmission
- Angular modes: ±7°, ± 15°
- Rec. rep.-rate: 1-3 MHz

DA20 & DA20 TR



Compact XPS/UPS/ARPES Analyser with Patented Deflection

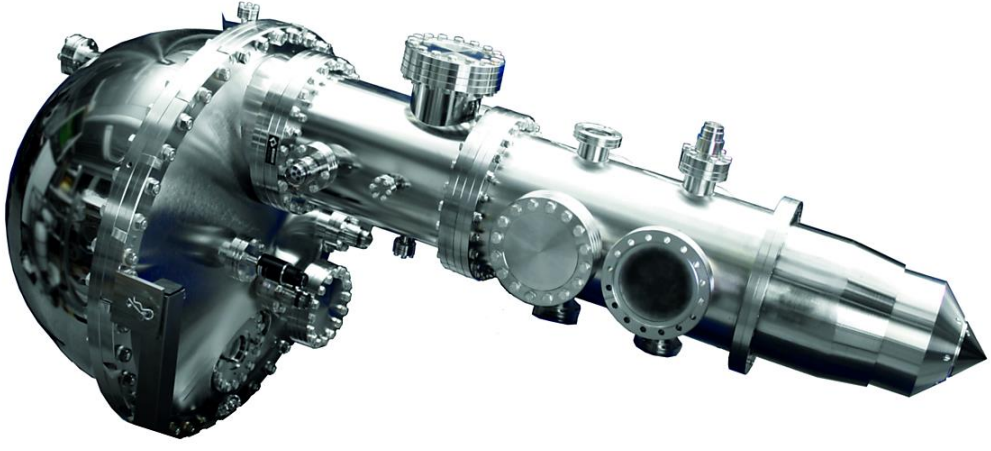
- 20° full cone acceptance
- Energy resolution: 3 meV
- Energy window: up to 12 % of E_p
- Patented Electronic Deflection
  (WO2013/133739)
- Matrix element effects avoided

EW4000

Outstanding Electron Analyser for HAXPES Measurements

- 60° wide angular mode
- Intensity optimised transmission mode
- Angle resolved kinetic energy range up to 10,000 eV
- Real time image correction

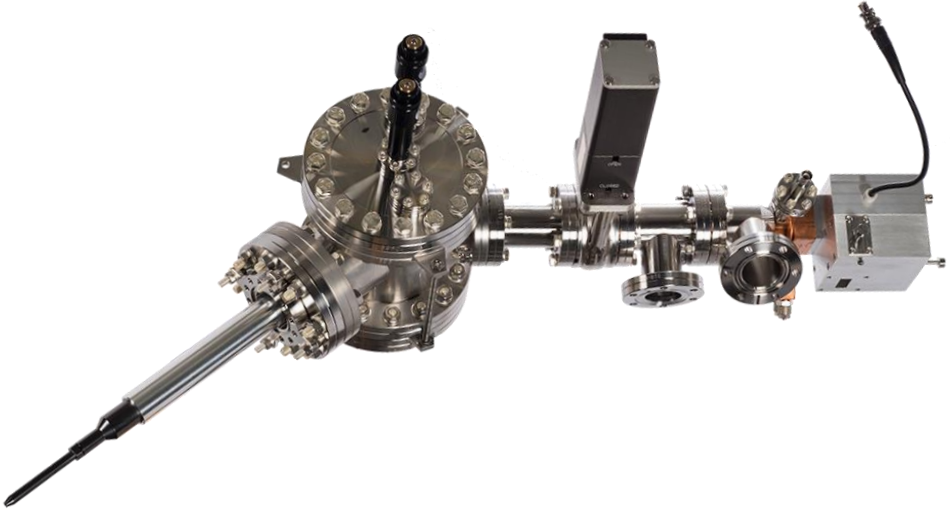
HiPP-3



Outstanding Imaging XPS at Ambient Conditions

- Imaging XPS < 15 µm resolution
- Swift Acceleration Mode for unprecedented transmission
- Efficient differential pumping
- Interchangeable and customized front cones
- Angular resolved range: 18°

VUV5k



High intensity UV source for ARPES

- High intensity source
- Toroidal monochromator
- FWHM ≈ 1 meV
- Retractable
- Low maintenance (ECR based)

MCES150

HREELS: Measuring Phonon Dispersion

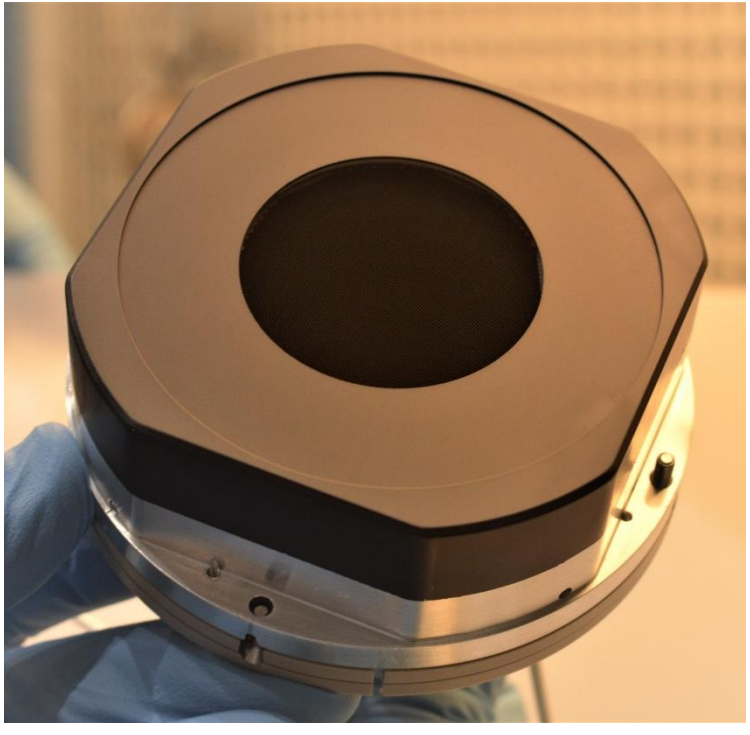
- Narrow energy distribution
- Combined with ARPES analyser
- Massive parallel detection
- Software optimised source
- Optimised spot size

UV-X 11 eV Laser

Ultra-high resolution ARPES

- 11 eV turnkey laser system for ARPES Lab
- Rep. rate optimised for DA30-L and ARTOF-2
- Pulse Bandwidth: < 0.1 meV
- Variable flux and polarisation

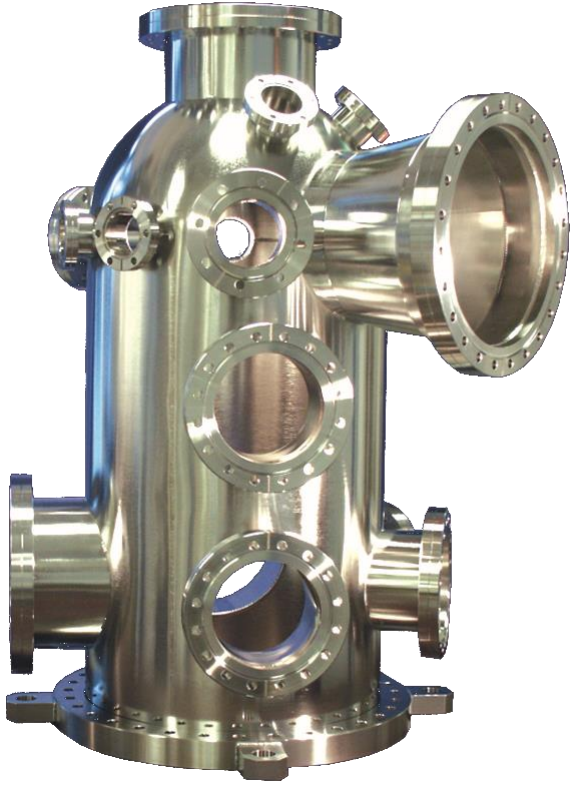
DLD Detector



When absolute time of signals is of essence

- 2D cross delay-line type
- Internal TDC resolution: 27 ps
- Max count rate: < 4 MHz
- Spatial resolution: < 100 µm
- Fits R3000, DA30-L, DA20

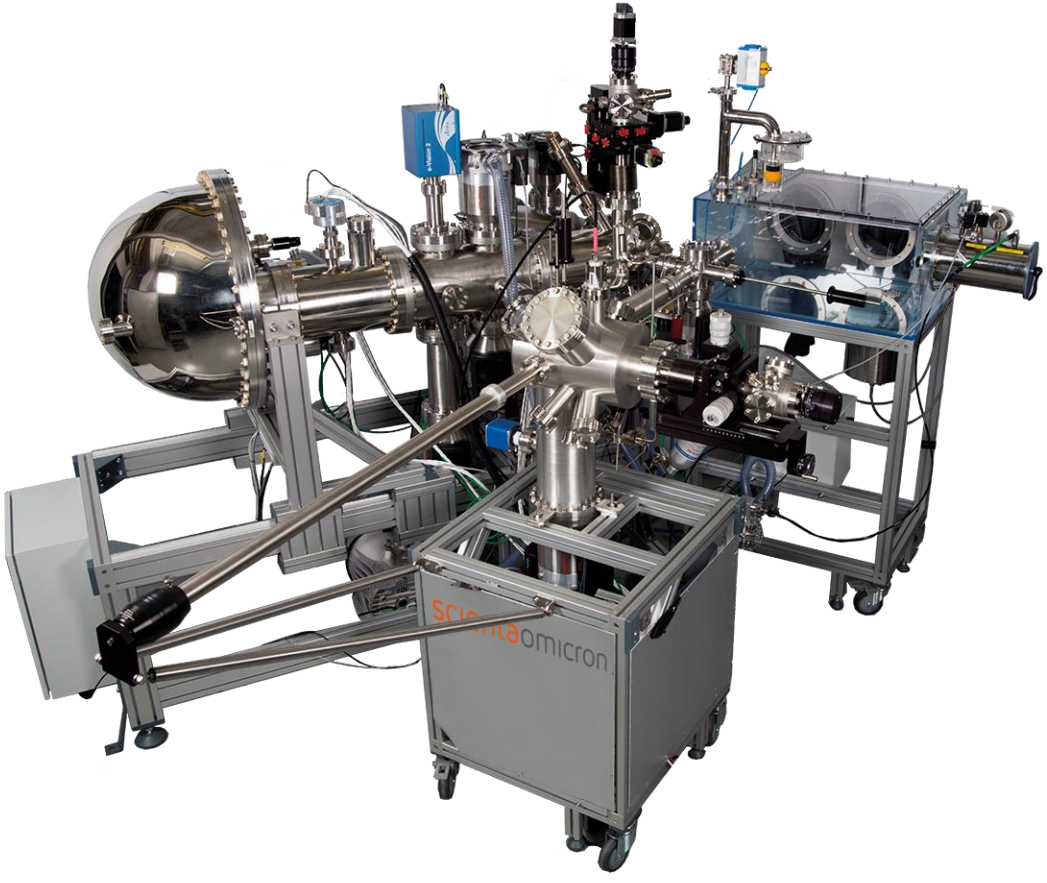
Configurable Analytical Chambers



Ensure ARPES Analyser low Energy Performance

- Excellent magnetic shielding
- Bellshaped top
- Cylindrical body (Ø ≈ 300 mm)
- Configurable ports
- Other designs possible

HiPP Lab



Advanced Ambient Pressure Measurements Made Easy

- Measuring XPS up to 25 mbar sample pressure
- Imaging and Angular modes
- 20 µm spatial resolution
- Easy to extend functionality with other modules
- Robust and easy to use

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Bar XPS

For Studies of Industrially Relevant Catalytic Reactions

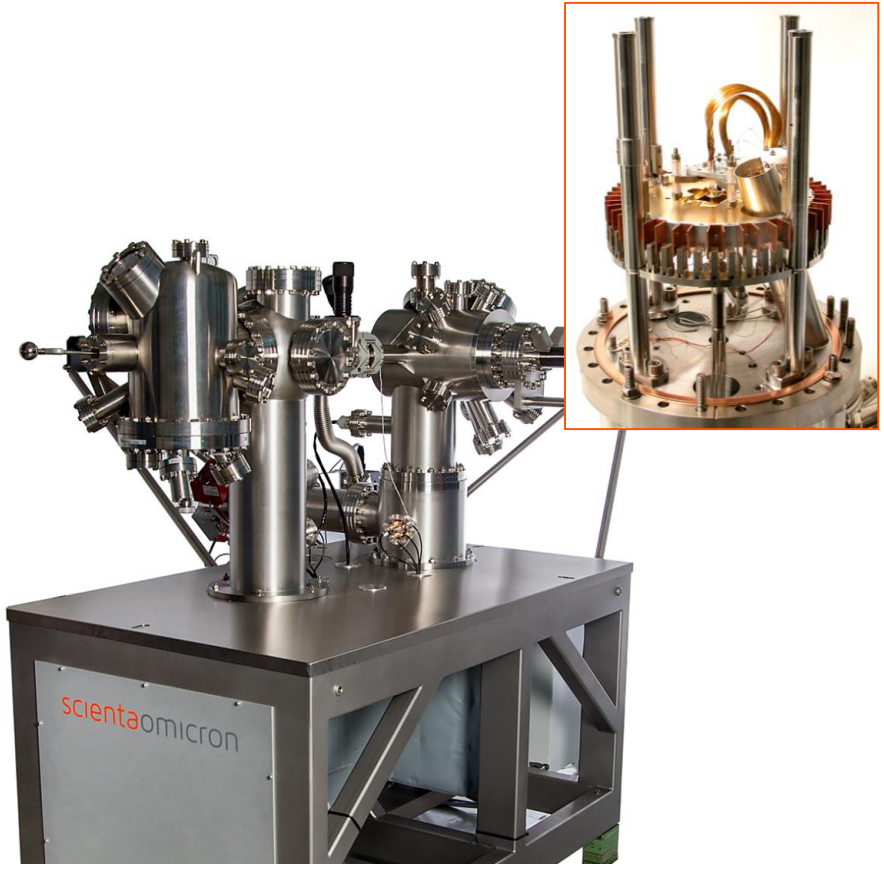
- Measuring XPS exceeding 1 bar sample pressure
- Study catalytic reactions at relevant pressures
- Possibility of operando studies

LT SPM LAB

Ultimate SPM Performance below 5 K

- Leading QPlus® AFM technology
- Outstanding spectroscopy resolution
- 3D movable lens for optical experiments (TERS)
- Record proven platform since 1996 with more than 200 devices installed

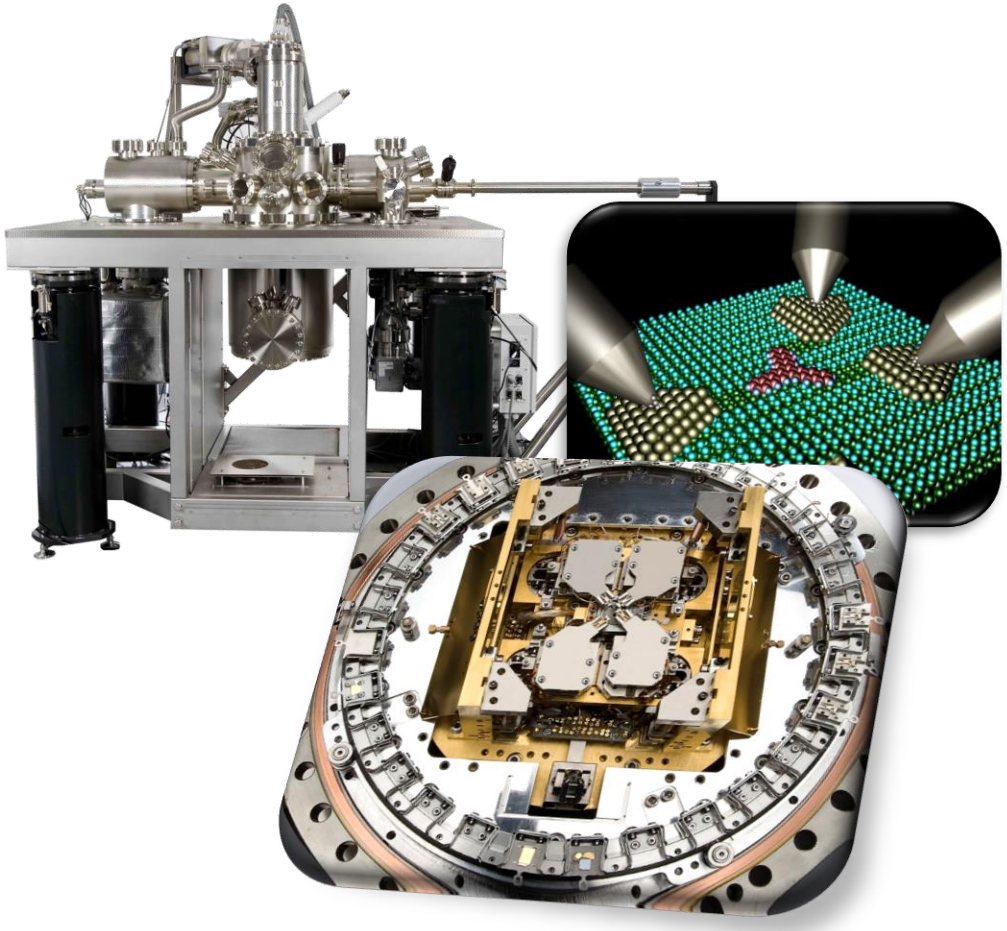
VT AFM/STM LAB



Outstanding SPM Performance in a Compact Lab Environment

- Compact system solution for high stability SPM work
- Variable Temperature operation from 30 K to 600 K
- True pA STM and dI/dV Spectroscopy
- Beam Deflection and QPlus® AFM
- In-situ Evaporation

LT NANOPROBE



Transport Measurements at the Atomic Scale

- Four independent atomic resolution SPMs
- Extremely low thermal drift at T < 5 K
- SEM imaging for rapid tip navigation
- STM spectroscopy and atom manipulation
- QPlus® nc-AFM

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TRIBUS SPM

Compact XPS/UPS/ARPES Analyser with Patented Deflection

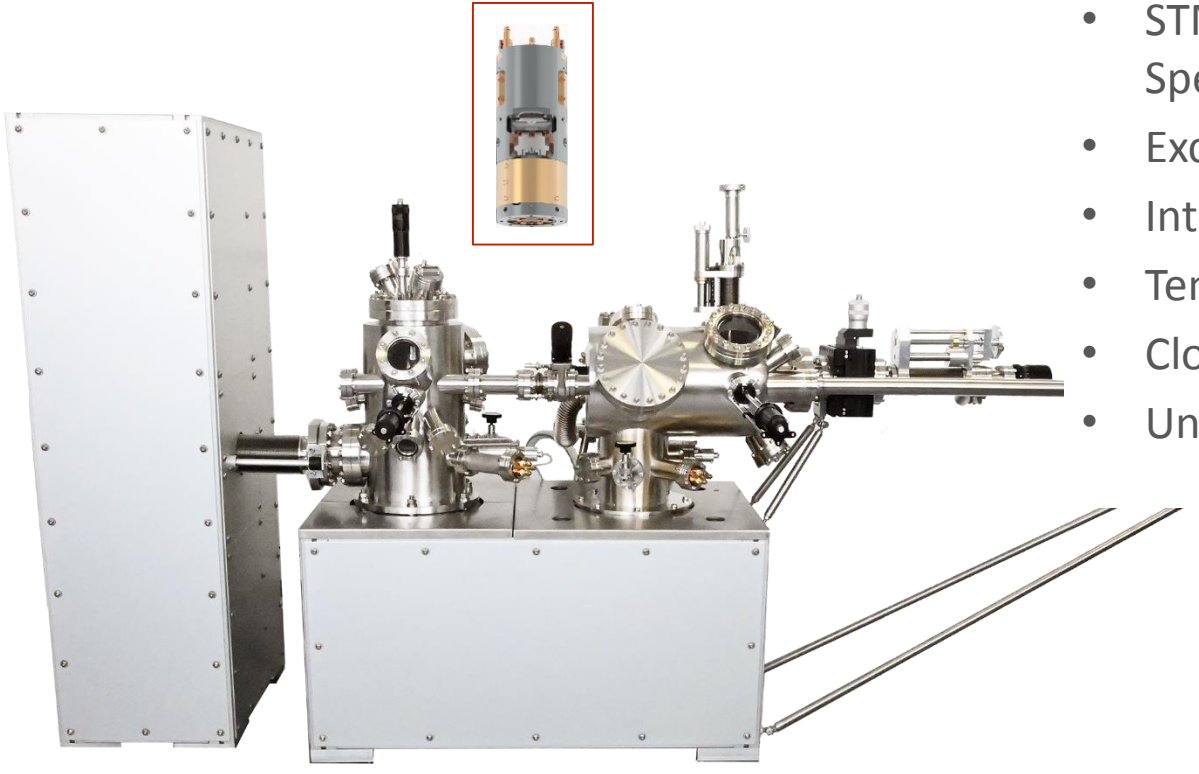
- STM, AFM & Spectroscopy
- Excellent Stability
- Orthogonal 3D Coarse Motion
- Independent Tip & Sample Exchange
- Easy Handling
- Non-magnetic Design

VT STREAM SPM

9K Flow Cryostat UHV SPM

- STM, QPlus® AFM & Spectroscopy
- 3D Coarse Motion
- Temperature: < 10 K to 420 K
- Flow Cryostat for LN_2 & LHe
- Cold Sample and Tip

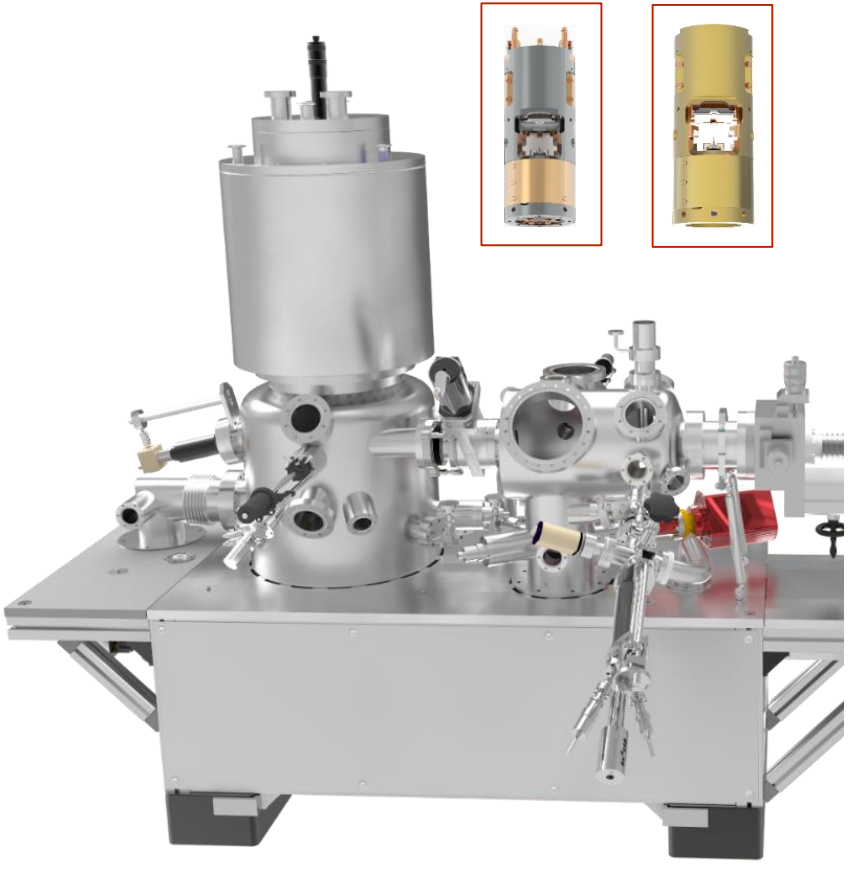
INFINITY SPM LAB



9K SPM with no LHe Consumption

- STM, QPlus® AFM & Spectroscopy
- Excellent SPM stability
- Integrated TRIBUS Head
- Temperature: <10 K to 420 K
- Closed Cycle Cooling
- Unlimited Measurement Time

POLAR SPM LAB



Low Temperatures & High Magnetic Fields

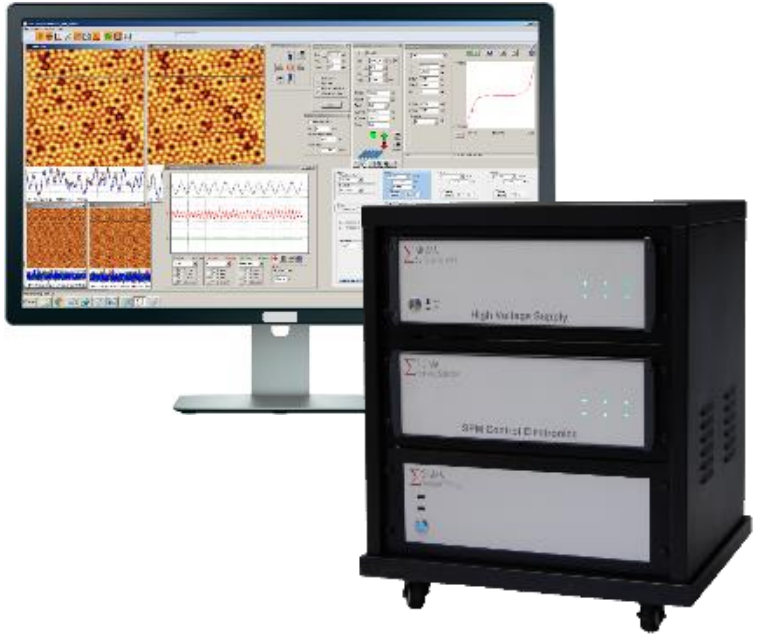
- STM, QPlus® AFM & Spectroscopy
- Integrated TRIBUS Head
- Helium Hold Time: >200 h
- Minimum Temperature: <5 K
- Superconducting Magnet for B_Z= ±5T
- Optical Access

MATRIX SPM Controller

Premium SPM Control Electronics and Software

- New high-performance AFM PLL for advanced QPlus® AFM
- TipGuard and PLL Guide
- Fast operating QPlus® AFM at low- and room-temperatures
- Integrated Lock-In
- QSpeed AFM mode
- New compact design

SXM SPM Controller



Powerful and Cost-Effective SPM Control Electronics and Software

- 24 Bit A/D & D/A Converters
- Fast 22 Bit D/A Converter for Z
- Integrated Lock-in Amplifiers
- Integrated PLL for NC AFM
- Easy Access to all Signals
- Measurement & Data Analysis Software included