

R3000 Electron Spectrometer

A Compact and Powerful Analysis Tool

Scienta Omicron spectrometers have always opened new possibilities in electron spectroscopy. The Scienta Omicron R3000, designed to combine minimum size and maximum performance, is no exception.

The Scienta Omicron spectrometers have always pushed the boundaries of what is possible within electron spectroscopy. These state of the art instruments have for example revolutionised the angular resolved photoemission experiments (ARPES) used to investigate superconductivity. This was achieved by inventing a spectrometer capable of measuring kinetic energy and momentum of photoelectrons simultaneously.¹⁾ The high quality and reliability of the Scienta Omicron spectrometers are most clearly seen by the impressive number of publications in high ranked scientific journals.²⁾

provide for reliable and accurate measurements. The Scienta Omicron R3000 can be operated in Quick Mode, where a spectrum can be recorded within seconds by taking a snap shot of the detector image, covering 12% of the pass energy. The high count rate of the Scienta Omicron R3000 is accomplished by combining a large acceptance angle, an analyser radius of 135 mm and an MCP detector as large as the one in our 200 mm analysers. At the same time the outer dimensions of the spectrometer are small, for easy fit to an existing vacuum system. This is accomplished by using a mu-metal vacuum vessel.

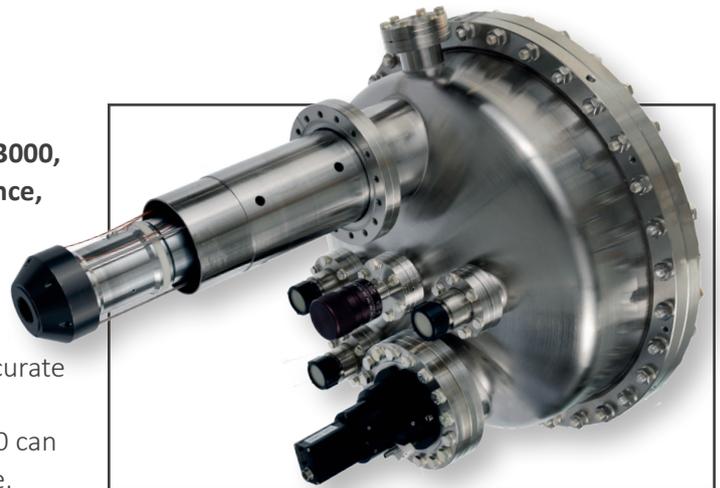


Fig. 1: From the Electron Spectrometer pioneers: the DA30-L angle resolved electron spectrometer

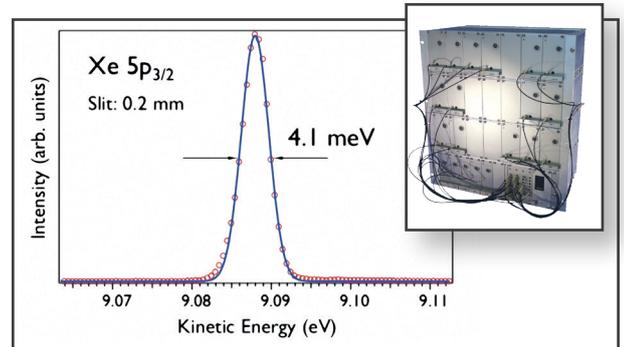


Fig 1. Xe $5p_{3/2}$ measured at 2 eV pass using a 0.2 mm entrance slit. The experimental width was 4.1 meV, which gives an instrument resolution of 2.4 meV. Excitation source: Scienta Omicron UV source, He α .

Highly Flexible Analysis Tool

The Scienta Omicron R3000 is optimised for quick PES measurements and band mapping. It features a modern FireWire CCD camera detection system for high data transfer speed and easy upgrade. The high voltage electronics is designed for ultrahigh stability, to

R3000 for XPS/UPS:

- New design, high throughput lens
- Optimised transmission for high intensity in UPS, XPS or synchrotron mode
- Real time detector monitor
- Fast & easy experiment optimisation
- Reliable and reproducible

R3000 for ARPES:

- Fast band mapping
- New & improved field calculations for optimal electron optics performance
- Lens acceptance angle $\pm 15^\circ$, angular resolved range $\pm 10^\circ$
- Variable dispersion

Technical Data

Property	Specification
Energy resolving power	> 1000 (1350 theoretical)
Angular acceptance	$\pm 15^\circ$ (transmission mode)
Angular range	0.5 - 20 \times EP
Lateral resolution	300 μm
Vacuum tank	μ -metal
Magnetic shielding	5 mm μ -metal
Pressure	< 2x10 ⁻¹⁰ mbar
Baking temperature	150 $^\circ\text{C}$
Working distance	45 mm
Lens clearance	35 $^\circ$
Mounting flange	NW 100 CF
Slits	6
Circular holes	Not required with CCD
Detector type	MCP/CCD camera
Detector interface	\varnothing 40 mm MCP
Energy channels	> 500 simultaneous
Angular channels	> 400 simultaneous
Energy window	12% of pass energy
Scanned mode	Yes
Quick mode	Yes
FAT mode	Yes
Intensity deflectors	Yes, x, y
ISS	Option
Analyser pump port	Option

High Voltage Electronics

Property	Specification
Temperature stability	< 2 ppm/ $^\circ\text{C}$ (R-version) (typical 0.5 ppm/ $^\circ\text{C}$)
Noise (AV at analyser)	< 1 ppm + < 500 μV (typical 0.5 ppm + < 200 μV)
Drift	< 20 ppm/year (typical 10 ppm/year)
Electric isolation	6 kV
Min. step size HV100	1.6 mV
Min. step size DAC	200 μV
DAC Bits	16
Modular	Yes
Communication	USB

Fig 1. Xe 5p_{3/2} measured at 2 eV pass using a 0.2 mm entrance slit. The experimental width was 4.1 meV, which gives an instrument resolution of 2.4 meV. Excitation source: Scienta Omicron UV source, Helix.

Models

Specifications common to all models are found in the column to the left. Model specific features are listed below:

R3000 XPS/UPS/ARPES

Energy resolution	3.0 meV
Angular modes	$\pm 10^\circ, \pm 7.5^\circ, \pm 5^\circ, \pm 3^\circ$
Angular resolution	0.1 $^\circ$ for 0.1 mm emission spot
Kinetic energy range	0.5 - 1500 eV
Pass Energy	2 - 200 eV

R3000 XPS/UPS

Energy resolution	3.0 meV
Angular modes	$\pm 10^\circ, \pm 5^\circ$
Kinetic energy range	0.5 - 1500 eV
Pass Energy	2 - 200 eV

R3000 UPS

Energy resolution	3.0 meV
Angular modes	$\pm 10^\circ, \pm 5^\circ$
Kinetic energy range	0.5 - 100 eV
Pass Energy	2 - 20 eV

R3000 XPS

Energy resolution	20 meV
Angular modes	$\pm 10^\circ$
Kinetic energy range	10 - 1500 eV
Pass Energy	20 - 200 eV

R3000 XPS HP

Energy resolution	20 meV
Kinetic energy range	10 - 1500 eV
Pass Energy	20 - 200 eV
HP front aperture*	Yes

* HP denotes High Pressure. The spectrometer can be used for standard XPS measurements but is prepared for efficient differential pumping on the lens and hemisphere to allow ambient pressure measurements up to 1 mbar. In high pressure mode the use of a front aperture is necessary.

How to contact us for further info:

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