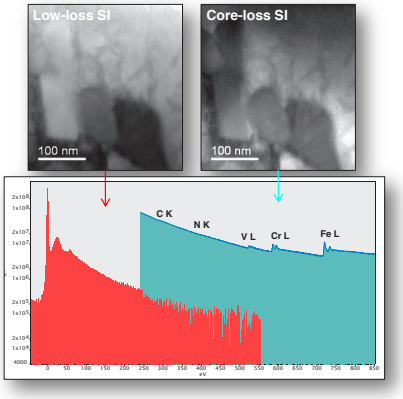
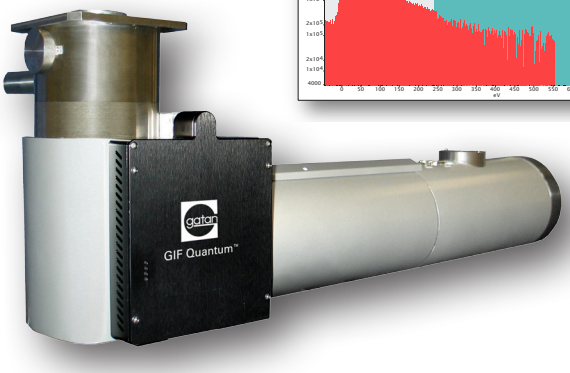
# GIF Quantum™

## Model 963 / 965 / 966

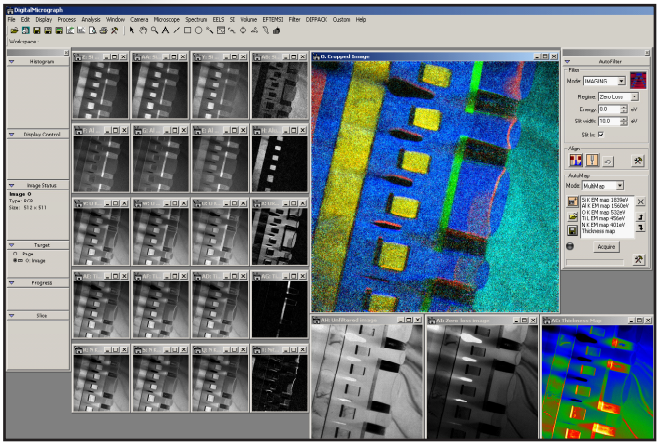
The GIF Quantum™ series represents Gatan's 4th and most advanced generation of post-column energy filters. Redesigned from the ground up, the GIF Quantum™ combines advanced dodecapole-based electron optics with a blazing fast CCD camera system to yield an imaging filter that defines the new state-of-the-art in the capture of both highly detailed EELS and EFTEM data sets with maximum throughput.




With the GIF Quantum™, there is no compromise between EFTEM and EELS performance. Gatan's patented sensor readout architecture (US Patents 5946033 & 7157720) allows the same CCD sensor to be used interchangeably as a full-frame high-quality imaging device, a high-speed live viewing device, and an ultra fast spectroscopy device. Aberration correction up to 5th order allows the use of a 1.8x larger 9 mm entrance aperture for EFTEM and a 2x larger 5 mm entrance aperture for energy loss spectroscopy at performance specifications superior to that of the GIF Tridiem.

The GIF Quantum™ comes in several models to optimally couple to the broad range of TEM configurations and applications available today. Whether you have a work-horse $LaB_6$ instrument for capturing elemental maps and contrast enhanced images day after day, an extreme brightness aberration corrected STEM for probing interfaces at the atomic level, or a monochromated system for observing energy transitions at the meV level, there is a GIF Quantum™ imaging filter to fit your needs and all those in between. Advanced options such as a 1 us electrostatic shutter, a 10x faster camera, a 2 keV fast spectrum offset module, and DualEELS™ hardware and software, allow each Quantum model to be tailored to the applications at hand.



| Features | Benefits |
|---|---|
| Electrostatic Shutter | Acquire images and spectra with unprecedented exposure control and dynamic range |
| 1000 spectra per second | High-speed, dose-efficient STEM EELS spectrum imaging for detail rich mapping |
| 9 mm entrance aperture | Large field-of-view energy filtered imaging, mapping and diffraction with narrow slit widths |
| 2.5 & 5 mm entrance apertures | Improved collection efficiency for aberration corrected STEM EELS |
| Dual-speed camera readout | Low-noise imaging and high-speed viewing from the same detector |
| 60 kV to 300 kV operation | Broad range of operating modes and configurations |
| 2000 eV EELS range | Capture a broader range of edges in a single spectrum for simplified quantification |
| DualEELS™ capability | Effortlessly measure precise energy shifts and apply advanced quantification routines for a new level of EELS analysis |
| Advanced auto tuning | Confidence your imaging filter is operating at peak performance |
| Dodecapole-based optics | Outstanding energy resolution and very low image distortions |

Please note: Not all GIF Quantum™ models support all features and specification. Please see the individual product datasheets for details. Specifications and features are subject to change.

Top: DualEELS™. Dual energy range EELS spectrum image data set of precipitates in steel. Data courtesy Prof. G. Kothleitner, FELMI, Graz University of Technology.
Bottom: Multi-Map. Automated multiple element mapping from a semiconductor device. 3-window maps from Si-K, Al-K, O-K, Ti-$L_{23}$ & N-K are automatically acquired together with a thickness map to form a complete data set.

## Comparison to GIF Tridiem

| | |
|---|---|
| 60 kV minimum operating voltage | 20 kV lower |
| 0.75% maximum image distortion | 2x lower |
| 2 keV fast spectrum offset | 2x larger |
| 2 keV spectroscopy field of view | 2x larger |
| 30 fps (512 x 512) preview | 6x faster |
| 5 mm aperture for routine EELS | 6¼x higher collection efficiency |
| 2.5 mm aperture for high resolution EELS | 6¼x higher collection efficiency |
| 1,000 spectra per second | 30x faster |
| 1 µs electrostatic shutter | 50,000x faster |

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## Ordering information

| Part Number | Description |
|---|---|
| 963 | GIF Quantum™SE |
| 965 | GIF Quantum™ER |
| 966 | GIF Quantum™ERS |

Please contact your Gatan sales representative for complete ordering information.

## GIF Quantum™ product line

| Feature | GIF Quantum™SE | GIF Quantum™ER | **GIF Quantum™ERS** |
|---|---|---|---|
| Energy resolution (eV FWHM) | 0.25 | 0.10 | 0.04 |
| Isochromaticity (eV P-P ) | 2.0 | 2.0 | 2.0 |
| Distortion (% max) | 1.5 | 0.75 | 0.75 |
| Chromatic dist. (% 50 eV) | 1.0 | 0.50 | 0.50 |
| Aperture size (mm) | 2.5 / 5 | 2.5 / 5 / 9 | 2.5 / 5 / 9 |
| Energy field-of-view (eV) | 2000 | 2000 | 2000 |
| Spectral rate (1/s) | 100 | 1000 | 1000 |
| Fast camera modes | Optional | Included | Included |
| 1 µs electrostatic shutter | Optional | Included | Included |
| Advanced BF/DF detector | Optional | Included | Included |

Note: Performance at 200 kV. Specifications are subject to change.



## Primary applications

- Materials research
- Failure analysis
- Catalyst research

we get it!

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ISO 9001 BUREAU VERITAS Certification

Certified Quality Management System

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