

maxLIGHT

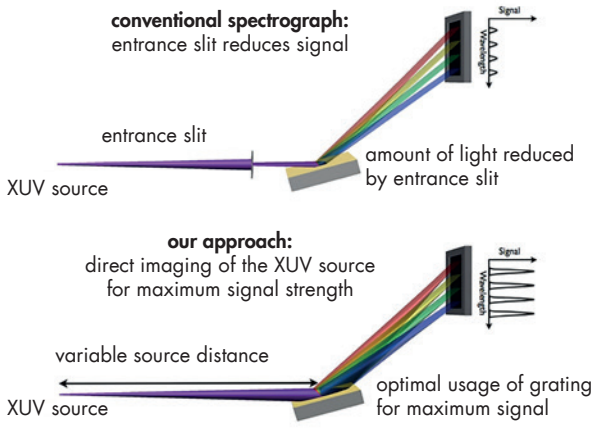
Innovative VUV / XUV / SXR spectrographs



XUV vacuum spectrograph for 5 - 80 nm (mounting flange in red)

Applications

- Higher harmonic generation (HHG) radiation
- High intensity laser-matter interaction
- Undulator and free-electron laser (FEL) radiation
- Plasma research
- Characterization of line-emission sources
- Fusion research

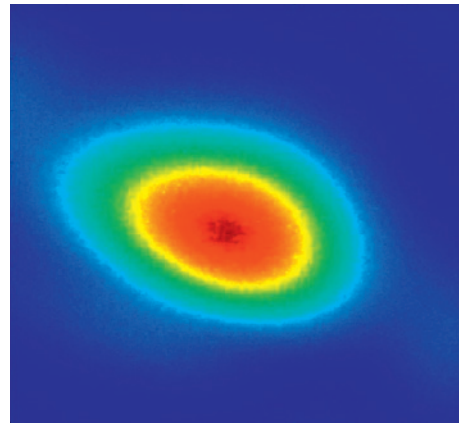


Our maxLIGHT spectrograph features aberration-corrected flat-field wavelength coverage from 1 nm to 200 nm. Among the different models of the LIGHT series it is the most flexible and versatile instrument. Wide-band spectral measurements are possible by three interchangeable gratings covering 1-20 nm, 5-80 nm, and 40-200 nm. The spectrograph can be used without entrance slit to maximize light collection for a range of source distances. Its modular design matches different experimental geometries and configurations. It features an integrated slit holder and filter insertion unit, as well as a motorized grating positioning.

Beam profiler

A beam profiler is available as an option for the maxLIGHT plus. Automated and quick switching between spectrograph and profiler modes allows for routine verification of beam profiles.

The beam profiler reduces the spectral bandwidth of the SXR and XUV gratings slightly.



Beam profile generated with maxLIGHT plus

Direct imaging of the source

- The source is directly imaged onto the detector, without needing a narrow entrance aperture
- Approx. 20 times more light collection than standard instruments, improving the signal-to-noise ratio
- In some experiments, this improved signal strength is the crucial step for realizing a measurement at all.

Rugged and robust design

- Compact design, small footprint
- Inherently insensitive against environmental disturbance and misalignment thanks to omission of entrance slit
- No moving parts
- Monitoring of grating position to maintain alignment
- Can be bolted directly to a vacuum chamber
- Capable of carrying its own weight

Special solutions

- Non-magnetic instruments
- Special housing geometries, in-chamber solutions
- EMP protection
- Special mounting situations
- UHV configurations
- etc

Customization

- Every spectrograph is customized to exactly match the desired application, e. g.:
- Interfacing to experimental chambers
 - Adaption of the source distance
 - Integration of customer-supplied detectors
 - User-defined filter mounts

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Innovative VUV / XUV / SXR spectrographs

	maxLIGHT	maxLIGHT plus
Flatfield grazing-incidence spectrograph	•	•
Proprietary slit-less design for high efficiency	•	•
Flexible choice of detectors: open-front CCD or MCP detector	•	•
Operating pressure <math><10^{-6}</math> mbar (10 ⁸ mbar with UHV detector)	•	•
Oil-free pump system for stand-alone vacuum operation optionally available	•	•
Customizable according to user requirements	•	•
Grating blaze for additional efficiency increase		•
Motorized closed-loop 3D grating positioning		•
Manual 1D grating positioning	•	
Filter insertion unit		•
Vacuum gate valve		•
Beam profiler		optional

Technical properties	
Aperture (F/#)	Depending on source distance and optimized for highest throughput
Grating type	Aberration-corrected flat-field
Optical layout	Grazing-incidence
Mechanical interface	ISO F100, other interfaces on request
Communication	USB 2.0
Slit	Selection of slits (20-2000 μm width)
Filter	Holder for thin metal filter foils
Stray light rejection	Zero-order shield

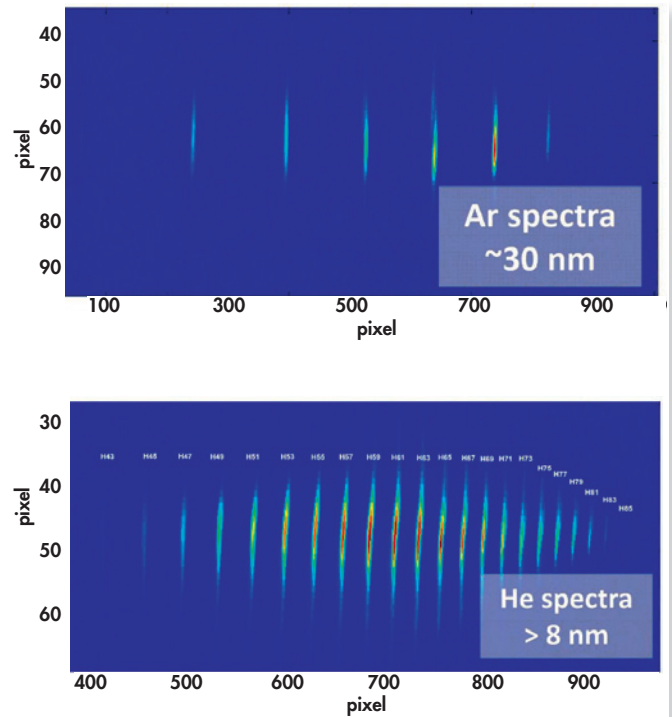
Dimensions and weight	
Approximate volume outline	65 x 20 x 20 [L x W x H, in cm] including detector
Approximate weight	25 kg

Spectral performance

Spectrograph	SXR grating		XUV grating			VUV grating	
Wavelength [nm]	1 (2*) – 20		5 (7*) – 80			40 – 200	
Operation mode	slit-less		slit-less			slit-less	
Source distance	flexible		flexible			flexible	
Wavelength [nm]	1 (2*) – 10	3 – 20	5 (7*) – 40	10 – 60	25 – 80	40 – 120	100 – 200
Flatfield size [mm]	35	45	60	55	50	75	70
Dispersion [nm/mm]	0.2 – 0.35	0.3 – 0.4	0.5 – 0.65	0.7 – 1.1	0.9 – 1.3	0.9 – 1.3	1.2 – 1.6
Resolution [nm]	< 0.015	< 0.017	< 0.028	< 0.045	< 0.05	< 0.05	< 0.07

* Spectral bandpass with optional beam profiler

Measurement examples



Higher harmonic generation in a gas target 8 – 60 nm from 70 mJ, 50 fs laser pulses