

H + P SPECTROSCOPY SCIENTIFIC INSTRUMENTATION

maxLIGHT

Innovative VUV / XUV / SXR spectrometers

Our maxLIGHT spectrograph features aberration-corrected flat-field wavelength coverage from 1nm to 200nm. Wide-band spectral measurements are possible by three gratings covering 1-20nm, 5-80nm, and 40-200nm. The spectrometer can be used without entrance slit to maximize light collection for a range of source distances.

Its modular design is able to match different experimental geometries and configurations. It features an integrated slit holder and filter insertion unit, as well as a motorized grating positioning.



Direct imaging of the source

- images the source directly onto the detector, does not require a narrow entrance aperture
- ~20 times more light collection than standard versions, resulting in a signal-to-noise figure improved by the same 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 disturbances and misalignment due to omission of entrance slit
- no moving parts
- absolute grating position monitoring for maintaining grating alignment
- can be bolted directly to a vacuum chamber, capable of carrying its own weight

Special solutions

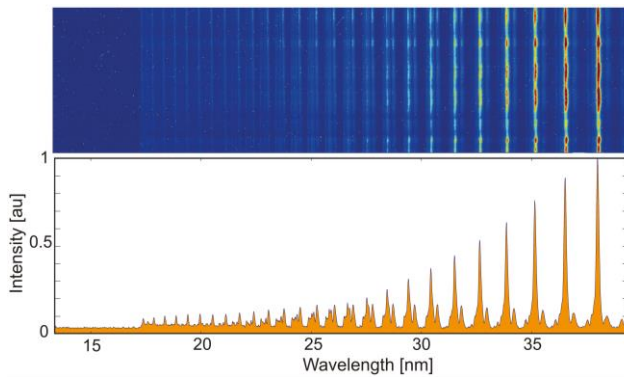
- non-magnetic instruments
- special housing geometries, in-chamber solutions
- EMP-protection
- special mounting situations
- UHV configurations
- etc

Customization

- every spectrometer 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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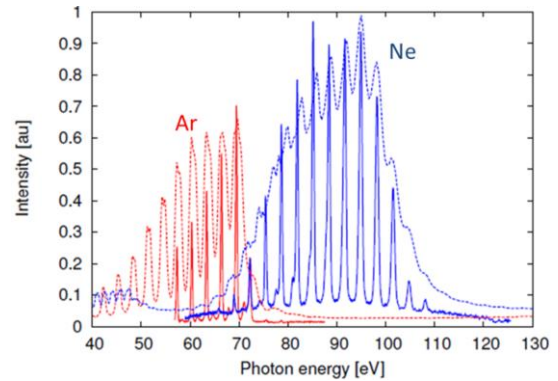
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Sample measurement demonstrating the resolving power of the XUV spectrometer. The shown high harmonic spectrum is generated by the interaction of a single femtosecond laser pulse with a solid target and subsequent spectral filtering. The substructure inherent to the generation process is clearly resolved by the XUV spectrometer.

Top panel: raw image as recorded by the x-ray CCD camera. Bottom panel: harmonic spectrum obtained by column binning.

(*Plasma Phys. Control. Fusion* 53 (2011) 124021)



Sample measurement demonstrating the improved signal strength.

With the same signal strength, the resolution of the H+P instrument (solid lines) is significantly higher compared with a standard spectrometer (dotted lines). An equivalent resolution with the standard approach would require a narrow slit setting and thus a significant degradation in signal strength. The proprietary H+P approach without an entrance slit delivers high resolution and signal strength at the same time.

(data courtesy of Prof. C. Hauri, Paul Scherrer Inst.)

Characteristics

Flat-field grazing-incidence spectrograph
 Proprietary slit-less design for high efficiency
 Flexible choice of detectors: x-ray CCD or MCP/fiber
 Operating pressure $< 10^{-6}$ mbar
 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

maxLIGHT maxLIGHT plus

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	SXR grating		XUV grating			VUV grating	
Wavelength [nm]	1 - 20		5 - 80			40 - 200	
Operation mode	slit-less		slit-less			slit-less	
Source distance [m]	flexible		flexible			flexible	
Wavelength [nm]	1 - 10	3 - 20	5 - 40	10 - 60	25 - 80	40 - 120	100 - 200
Flat-field 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

* Other configurations (spectral range, slit operation, high-resolution, etc) available upon request.

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