H+P SPECTROSCOPY
SCIENTIFIC INSTRUMENTATION

maxLIGHT pro

Innovative VUV / XUV / SXR spectrometers with integrated beam profiler

Our maxLIGHT pro offers the high-performance spectrometer functionality of the maxLIGHT combined with a straightforward beam profiler. Automated and quick switching between spectrograph and profiler modes allows for routine verification of beam properties.
The 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	Rugged and robust design
▪ images the source directly onto the detector, does not require a narrow entrance aperture ▪ ~20 times more light collection and signal-to-noise than standard versions ▪ in some experiments, this improved signal strength is the crucial step for realizing a measurement at all	▪ 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
Special solutions	**Customization**

▪ non-magnetic instruments
▪ special housing and mounting geometries
▪ EMP-protection
▪ UHV configurations
▪ etc
	▪ every spectrometer is customized to exactly match the desired application, e. g.:
	  ▪ interfacing to experimental chambers
	  ▪ adaption of the source distance
	  ▪ user-defined filter mounts

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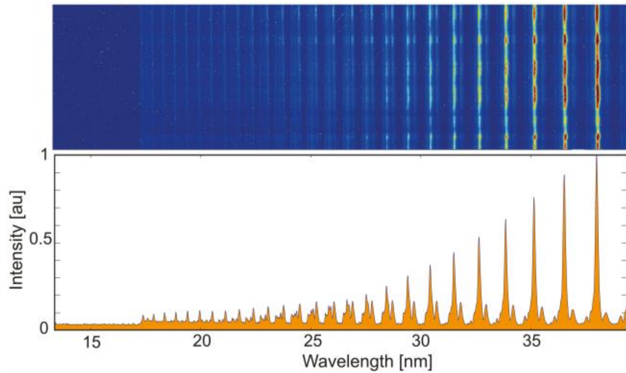
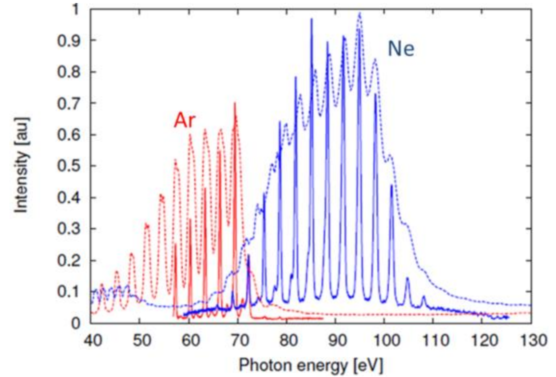


Sample measurement demonstrating the resolving power of the XUV spectrometer.
The shown high harmonic spectrum is generated by the interaction of a single femtosecond laser pulse with a solid target and subsequent spectral filtering. The substructure inherent to the generation process is clearly resolved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

	maxLIGHT	maxLIGHT plus	maxLIGHT pro
Flat-field grazing-incidence spectrograph	●	●	●
Integrated beam profiler			●
Proprietary slit-less design for high efficiency	●	●	●
Flexible choice of detectors: x-ray CCD or MCP/CCD	●	●	●
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		●	●

	SXR grating		XUV grating			VUV grating	
Wavelength [nm]	2 - 20		7 - 80			40 - 200	
Operation mode	slit-less		slit-less			slit-less	
Source distance [m]	flexible		flexible			flexible	
Wavelength [nm]	2 - 10	3 - 20	7 - 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.