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HHG BEAMLINES AND SPECTROMETERS

VUV
XUV
SXR

hpspectroscopy

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HHG source systems

Turn-key HHG source

- reliable and stable operation for weeks without realignment
- low maintenance effort, full focus on the experiment
- one-stop integrated system
- modular system design with excellent accessibility

Long-term stable gas targets

- durability with increased LIDT, constant gas flow for months
- accurate closed-loop positioning
- closed-loop gas flow controller
- quick exchange with solid and rotating targets

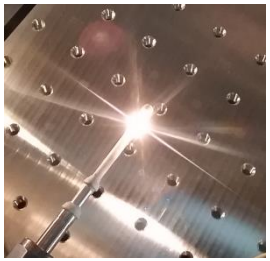
Vacuum skimmer

- reduced XUV re-absorption for higher signal strength
- 10^{-4} reduction in gas load

XUV spectral filters

- segmented foils for collinear pump/probe experiments
- improved heat dissipation for high-intensity beams and stable operation for months

Turn-key system for investigation of high-order harmonic generation in laser-produced plasmas. Flexible motorized target setup for rotating and flat solid targets and gas targets. Multiple beam access options for two-color pumping of plasma. Integrated frequency-doubling stage. Spectral filtering stage for high-intensity beams.



(1) Cross-drilled gas target allowing for long-term stable operation with constant gas flow. Convenient alignment with full beam due to high durability.
(2) Vacuum skimmer for reduced XUV re-absorption.

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In-line spectrometers

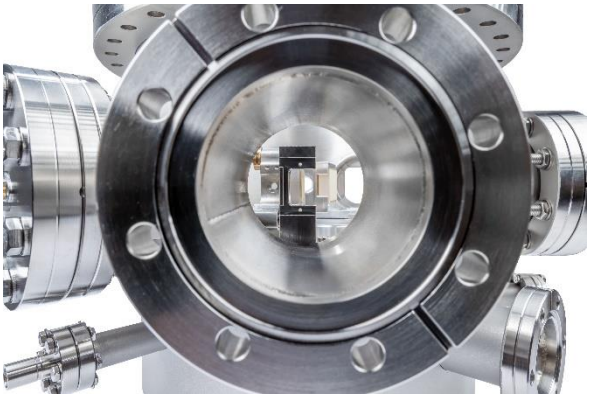
In-situ source characterization

- no-slit flat-field spectrometer with beam bypass
- no need for an alignment-sensitive narrow entrance slit
- ~20x more light collection than standard spectrometers, resulting in a proportional improvement of the signal-to-noise
- full automation for convenient control by software
- imaging spectroscopy option
- beam profiler option
- calibrated photodiode option
- wavefront sensor option

Customization

- every spectrometer is customized to exactly match the desired application, e.g.
- beamline integration
- auxiliary ports and view ports

Compact spectrometer for in-situ HHG source characterization in the water window. Direct imaging of the source without entrance slit for maximum efficiency and day-to-day robustness. Undistorted beam in bypass mode. UHV vacuum setup. Longitudinal dimension <0.5m. All settings controlled remotely by software.



Beam-like view into in-line spectrometer. Reliable switching between bypass and spectroscopy modes by closed-loop positioners.

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Experimental target setups

Turn-key reliability

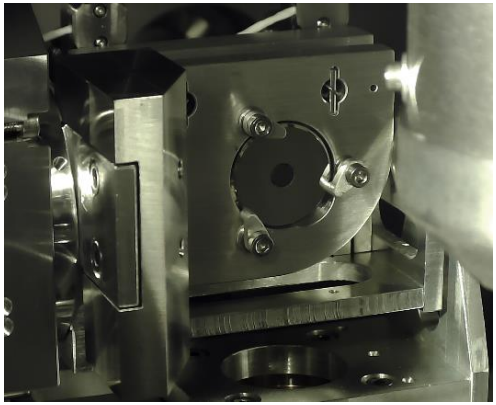
- vibration-decoupling UHV chamber design
- large variety of experimental configurations
- flexible integration of instrumentation – TOF, VMI, XPS, etc

XUV/VIS-IR beam recombination

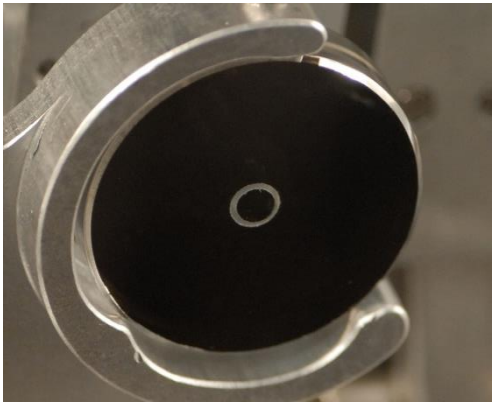
- double-mirror assembly for collinear geometry
- toroidal mirrors for non-collinear geometry

Customization

- thorough requirements review and a collaborative design process ensure highest performance of the target chamber



Double-mirror delay assembly XUV/VIS-IR for collinear beam refocusing. Temporal resolution of ±3as. 5 degrees of freedom. Spectral isolation of the cut-off region. Low wavefront distortion due to optically precise shaped segments



Double-mirror for pump-probe attosecond experiments. Tailored mirror coating for specific energy selection for reliable generation of isolated attosecond pulses.

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Specifications

Attosecond pulse wavelength	6-120nm / 10-200eV *	
Isolated attosecond pulse wavelength	6-16nm / 80-200eV *	
Flux fluctuations	<3% rms in 12 hours *	
Pointing fluctuations	<3urad rms in 12 hours *	
Operating pressure	$<10^{-9}$mbar ($<10^{-11}$mbar available)	
Positioning	manual or motorized closed-loop	
Customizable	fully customizable	
	60nm / 21eV	13.5nm / 90eV
Average power per harmonic	up to 400uW *	up to 0.9uW *
Photon flux per harmonic	up to 10^{14}ph/s *	up to $5 \cdot 10^{10}$ph/s *
Bandwidth of harmonics	$<10^{-2}$	$<5 \cdot 10^{-3}$
	* with suited driving laser	

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