# SCS Workshop
# PSI June 2-4, 2009

## International workshop on the Spectroscopy and Coherent Scattering Endstation and associated instrumentation at the European XFEL

**Gerhard Grübel and Jan Lüning**

**PSI, June 2 - 4, 2009**

HELMHOLTZ ASSOCIATION

DESY

# SCS Workshop – Working Group III

European XFEL

**Working Group III**
**"Imaging, Dynamics & Photon Correlation Spectroscopy Magnetic Systems"**

**Session V (15:00 – 16:30) : Experimental applications and instrumentation**
Moderator: G. Grübel

Scientific applications on Correlated Materials and Magnetism
- C. Schuessler-Langeheine
- M. Klaeui (to be confirmed)

Discussion on experimental end stations
- C. Gutt: End station for resonant elastic scattering

**Session VI (16:45 – 18:15) : Required and desired facility performance (1)**
Moderator: J. Lüning

Discussion on required and desired facility performance
- B. Schlotter: X-ray beam splitter & Co for X-ray pump/probe – x-ray probe

**Session VII (09:00 – 11:00) : Required and desired facility performance (2)**
Moderator: J. Lüning

Summary of first two sessions – G. Grübel

Continuation of discussion on required and desired facility performance



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**Topic:** **Imaging, Dynamics & Photon Correlation Spectroscopy**

**Issues:** **energy range**

**polarization**

**diagnostics**

**optics (mirrors, mono, delay-line)**

**detector**

**dac issues**

**station lay-out** **(sample environment, T, B, ….)**

**(optical) pump laser**

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| | |
|---|---|
| **Energy:** | 450 – 1650 eV |
| **Monochromator:** | dE/E = 1e-4 |
| **Focussing:** | beamsizes 5-10 microns for imaging ; 20-300 microns for XPCS |
| **Absorber:** | Gas absorber, solid state absorber in unfocussed beam |
| **Split and delay line:** | time separation 100 fs to nanoseconds. Capturing ultrafast demagnetization and thermalization processes via XPCS – or pump-probe type of experiments. |
| **Optical laser:** | 800 nm, 35-100 fs, fluence at least 100 mJ/cm2, focus down to 50 microns |
| **Jitter:** | 20 fs, ensure spatial and temporal overlap, collinear geometry pump-probe |
| **Detector:** | fast MHz detector for slow domain dynamics, small pixel detector (20 microns) for delay line mode measuring fast spin dynamics<br>moveable detector (x,y some cm, z some 10 cm)<br>allow for detector distance of up to 5m in SAXS mode |
| sample translation stage | (x,y,z, theta) precision 100 nm |
| **Heating:** | possibility to reach Curie temperatures above 1000 K |
| **Cooling:** | He-Cryostat |
| **Shot-to-shot diagnostics** | of intensity and wavefront (coherence)<br>alignment laser, alignment microscope<br>beamstop translation stage |

external magnetic and electrical fields at sample position
fast shutter for FEL and optical lasers

| | |
|---|---|
| **Software:** | all-in-one software to read out the detectors and make fast 'on-the-fly' standard coherence analysis of: speckle contrast, speckle sizes, speckle correlations, FTH and CDI-runs. |

# SCS Workshop – Working Group III

**energy range** 450 – 1650 eV

**Polarization** circular + linear

**Diagnostics** Shot-to-shot diagnostics of intensity and wavefront (coherence)

**Optics**

**(mirrors, mono, delay-line)**

dE/E = 1e-4
beamsizes 5-10 microns for imaging
20-300 microns for XPCS

delay-line (time separation 100 fs to nanoseconds
(capturing ultrafast demagnetization and thermalization processes via XPCS – or pump-probe type of experiments)

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**Detector**

fast MHz detector for slow domain dynamics, small pixel detector (20 microns) for delay line mode measuring fast spin dynamics

moveable detector (x,y some cm, z some 10 cm)
allow for detector distance of up to 5m in SAXS mode

**Dac issues**

all-in-one software to read out the detectors

make fast ‘on-the-fly’ standard coherence analysis of: speckle contrast, speckle sizes, speckle correlations, FTH and CDI-runs

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**station lay-out**

Gas absorber, solid state absorber in unfocussed beam

sample translation stage (x,y,z, theta) precision 100 nm

pump-laser (800 nm, 35-100 fs, fluence  at least 100 mJ/cm2, focus down to 50 microns, 20 fs, ensure spatial and temporal overlap, collinear geometry pump-probe)

possibility to reach Curie temperatures above 1000 K

He-Cryostat

alignment laser, alignment microscope, beamstop translation stage
external magnetic and electrical fields at sample position,
fast shutter for FEL and optical lasers

# The end