Update on FLASH user infrastructure:

Changes in the experimental Hall

Rolf Treusch

DESY - FS
PG1 endstation: Raman spectrometer

PG1-Beamline

Laser upgrade

Autocorrelator

BL3: mirror (20μm focus) + new diff. pumping stage (both after shutdown)

FIR-Beamline

VLS Online-Spectrometer

GMD BPM
• FIR beamline and experimental stations
• VLS Online-Spectrometer
• Beam position monitor in GMD
• Optical laser upgrade
• PG1 beamline + endstation (DESY / Uni HH)
• Autocorrelators:  1. Univ. HH
   2. BESSY / Univ. Münster
• Focusing mirror (20μm) option at BL3
• new alignment lasers for individual beamlines,
  modification of photon beam monitor screens,
  motorization + new filter foils for harmonic suppression (BL2),
  …
FIR beamline and exp. stations

where the FIR beamline will start + Diagnostic ports 1 and 2

Cardanian holder for SPK1

FIR beamline installation in accelerator tunnel started in KW 19 (as planned)

Cardanian holders for SPK2/3

SPK1

Stone for SPK1/2

Column for SPK1

M.Gensch et al.
Photodiagnostics:
Spectral content, Intensity, timestructure and timing, …

**Spectral content**
- Scanning dispersive spectrometer
  (collab. with FLA/AG Rossbach/FZ Rossendorf)
  Martin Puplett Spectrometer
  (collab. with U. Schade/BESSY)
- Single shot dispersive spectrometer
  (collab. with H. Delshemi, B. Schmidt/FLA; W. Seidel/FZ Rossendorf)

**Timestructure/Timing:**
- Direct measurement with Hot Electron Bolometer
  (collab. with H.W. Hübers/DLR)
- Single shot E/O measurements (spatial and/or spectral decoding)
  (collab. S. Duesterer, A. Azima + FLA)

**Polarization/Beamprofile**
- Single shot Polarimeter
  (collab. with BESSY/FZ Rossendorf)

**Intensity**
- Scanning intensity monitor
  (collab. with AG Rossbach)

**VUV/FIR spatial and temporal overlapp**
- THz streak camera
  (collab. with AG Drescher)

*courtesy of M. Gensch*
Photodiagnostics:
Spectral content, Intensity, timestructure and timing, …

THz streak camera for timestructure determination of FLASH

courtesy of M. Drescher

courtesy of M. Gensch
VLS Online-Spectrometer

- use grating as mirror
- reflect only some percent into 1st order and about 80% in 0th order towards experiment
- main challenge: line detector readout at 1 MHz
VLS Online-Spectrometer

presently assembly in the cleanroom

M. Kuhlmann et al.
Moved the device by 0.5 mm
Optical Laser Upgrade

Presently: 800nm, 120 fs, up to 30μJ, with pulse pattern of FLASH

Adding second laser system: 800nm, 100fs, 25mJ, 5/10Hz (one pulse per FLASH pulse train)

new laser table stacked on top of original laser... ... with Hidra laser mounted

S.Düsterer, H.Redlin et al.
PG1 beamline

Exit slit chamber
PG1 endstation

Laser Hutch

FEL through PG1

Raman Spectrometer

M. Rübhausen, Univ. HH et al.
• project of Univ. HH together with DESY/HASYLAB
• granite and concrete supports are put in place right now
• spectrometer will come end of the year after final ex-situ alignment and tests
Autocorrelator (Univ. HH)

delay scan range :  20 ps

time resolution :  \leq 10 \text{ fs}

W.Wurth, A.Föhlisch et al.
Autocorrelator (BESSY, Univ. Münster)

delay scan range: 20 ps

time resolution: \(< 1\) fs

presently tested with pulsed optical lasers

R.Mitzner (Univ. Münster) et al.
• BL3 will become alternative to heavily overbooked BL2
• mirror chamber with ellipsoidal mirror identical to the one at BL2 for 20μm focus will be installed
• modified differential pumping chamber behind mirror chamber and connecting to experiment will allow to use both, either focused or unfocused beam, depending on experimental needs
Summary

a damn’ lot of work …

… but exciting times!