

The SLS Optics Beamline – Performance Measurements and Status

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Actop workshop, Trieste, Oct 2008



Outline

- 1 Status
 - The Swiss Light Source SLS
 - Optics Beamline X05DA
- 2 Performance Measurements
 - Photon Flux
 - Higher Orders
 - Focus
 - Pink Beam
- 3 Hardware
 - Monochromator Assembly
 - Mirror Bender
- 4 Applications
- 5 Conclusions



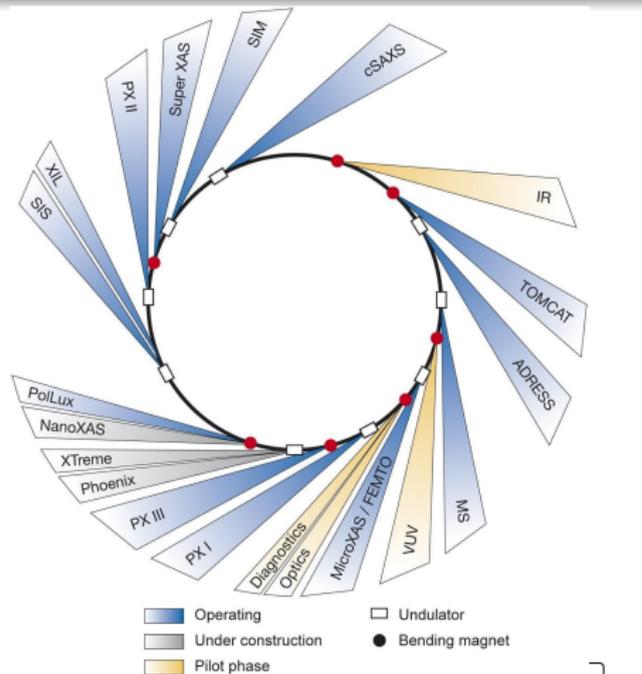
The SLS as Part of the PSI



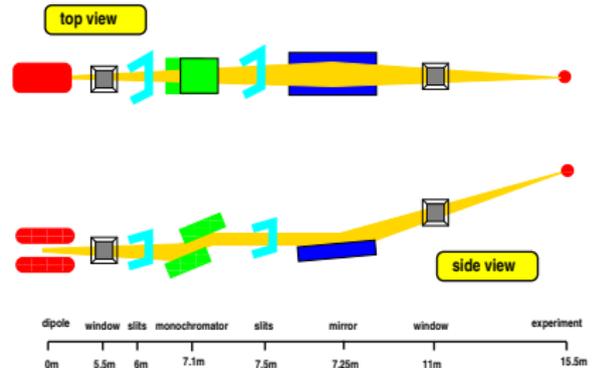
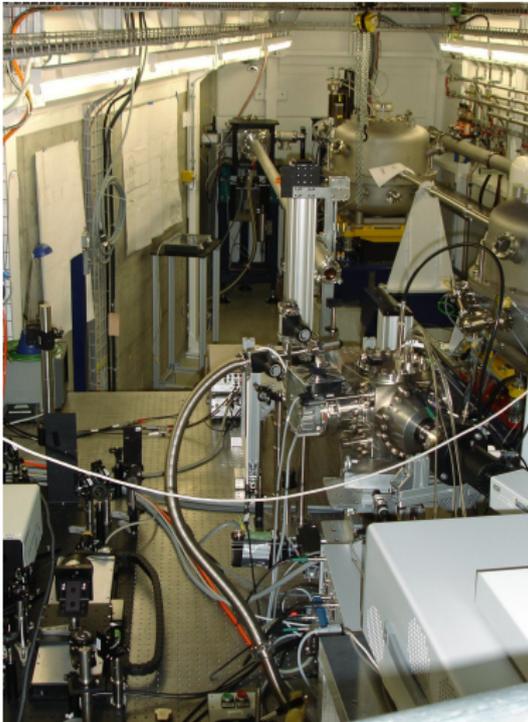
SLS Parameters

Parameter:

- circumference: 288 m
- electron energy: 2.4 GeV
- typical current: (400 ± 0.5) mA
- 9 straights for ID's, 9 ID-BL's in operation, 2 in construction
- about 24 BM-BL's possible, 8 in operation, 1 in construction
- fs slicing facility at X05L



The Optics Beamline X05DA



- photon energy: 5.5 ... 22.5 keV (with mono)
- different modes:
monochromatic, pink beam,
focused, unfocused

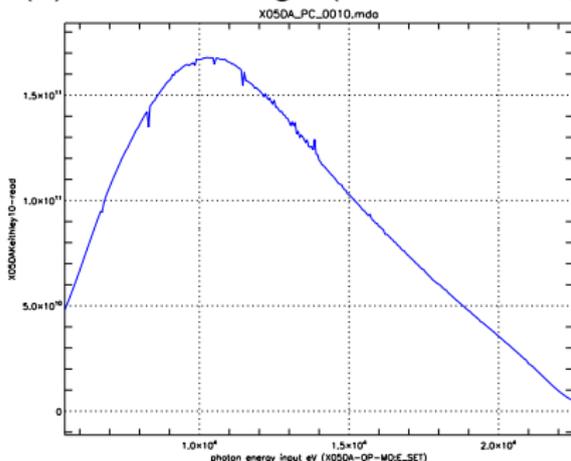


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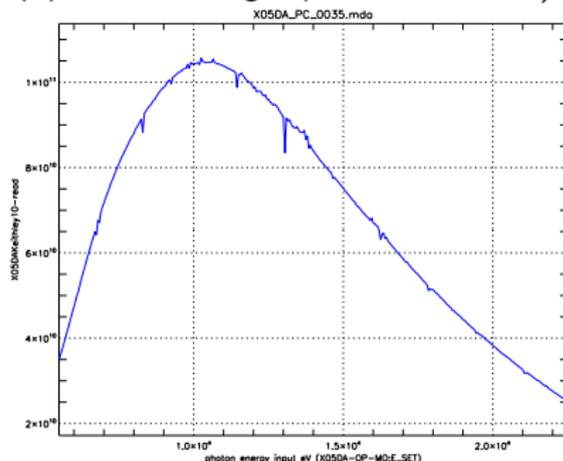


Monochromatic Photon Flux

(1) with focusing - (max: $1.7 \cdot 10^{11}$)



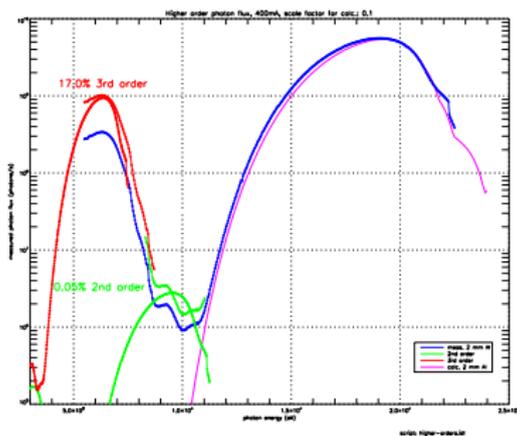
(2) no focusing - (max: $1.1 \cdot 10^{11}$)



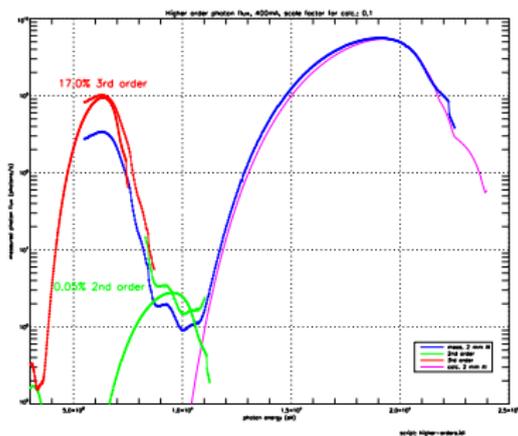
photon flux in photons/s, $E/\Delta E \approx 3000$, uncalibrated AXUV100
 photo diode: area 1 cm^2 , hor. acceptance 1 mrad (1) and 0.6 mrad
 (2).



Higher Orders and Focus



Higher Orders and Focus



X05DA focus @ 12 keV

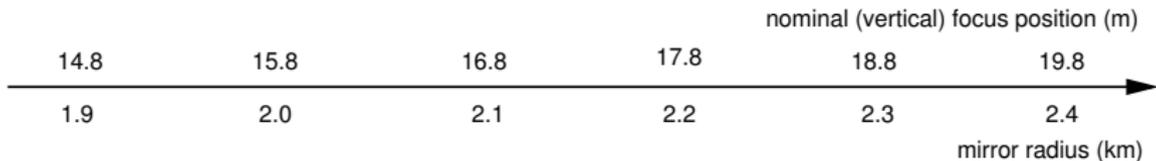
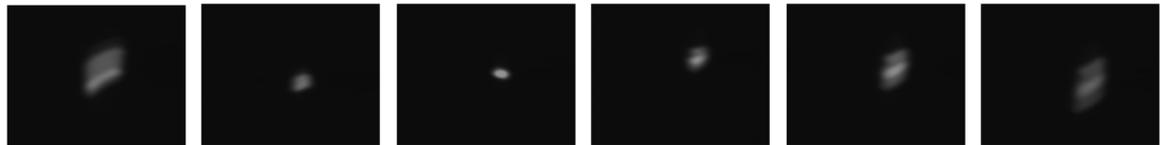
100 μ m

FWHM= (70v x 140h) μ m

Dynamic Focusing with Mirror Bender (1)

X05DA dynamic focusing

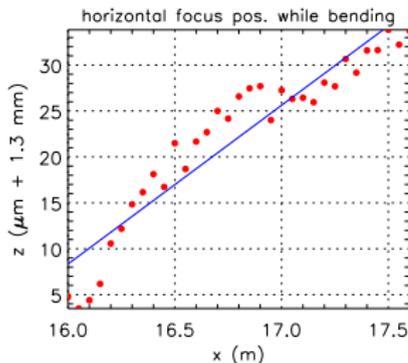
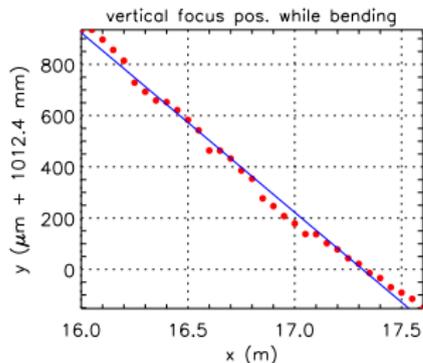
images @ 16.5 m, 12 keV



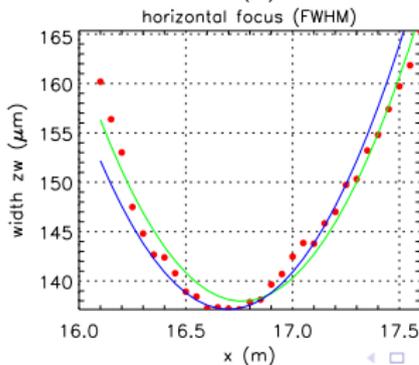
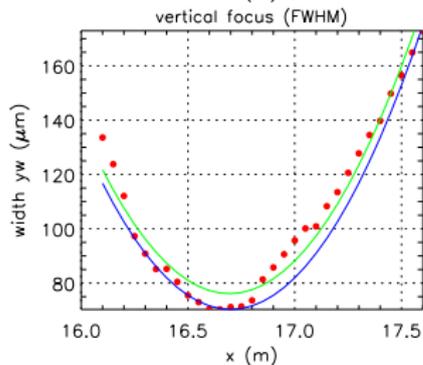
file: fsv.fig



Dynamic Focusing with Mirror Bender (2)



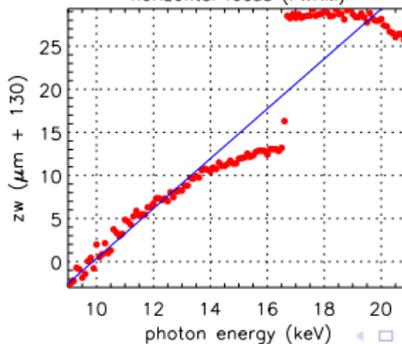
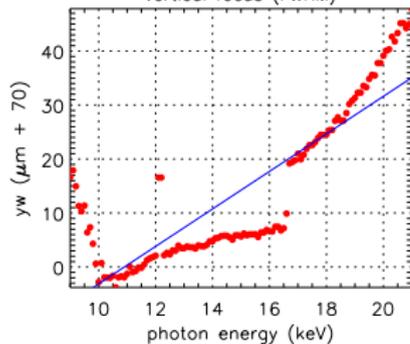
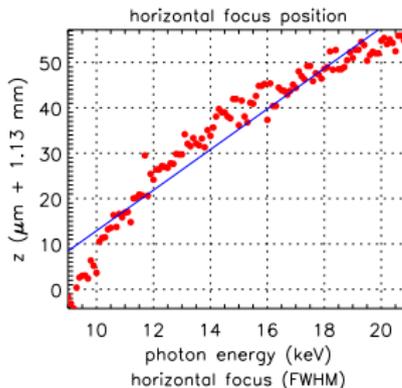
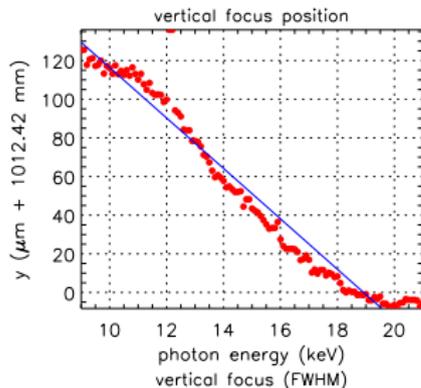
position



width



Focus Stability during Energy Scan



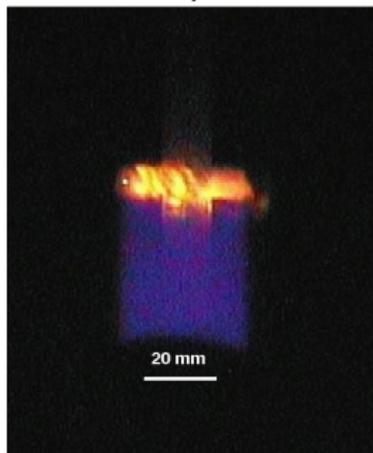
position

width



Pink Beam

unfocused pink beam



focused pink beam

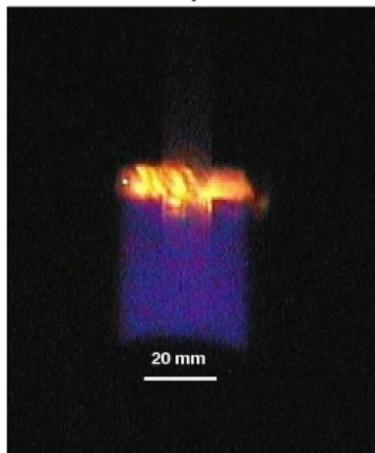
100 μm Kapton window melts within a few
s, estimated power density: 1.6 kW/mm²

measurement with
thermopile sensor: 10.6 W
for 1 mrad FE opening



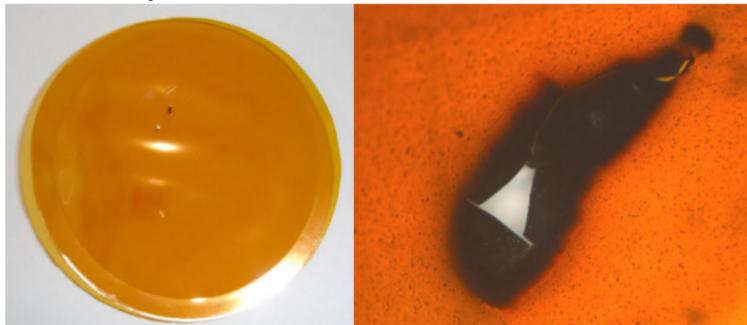
Pink Beam

unfocused pink beam



measurement with
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focused pink beam

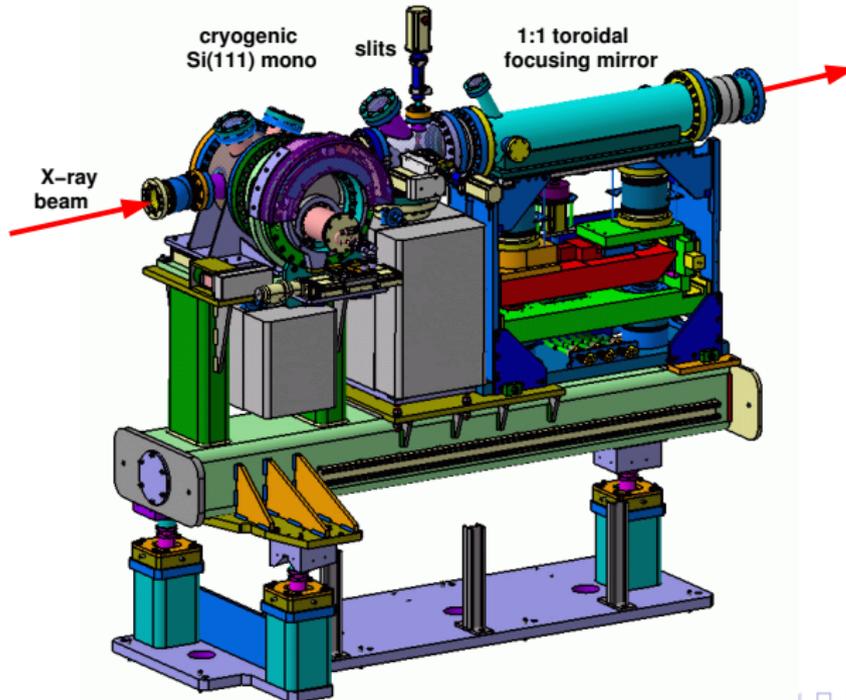


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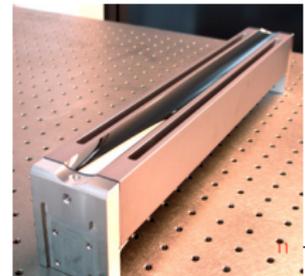
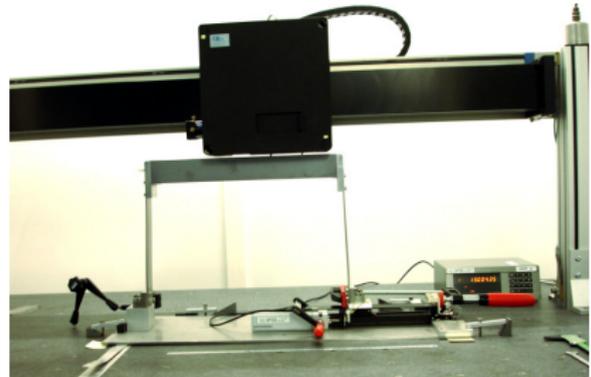
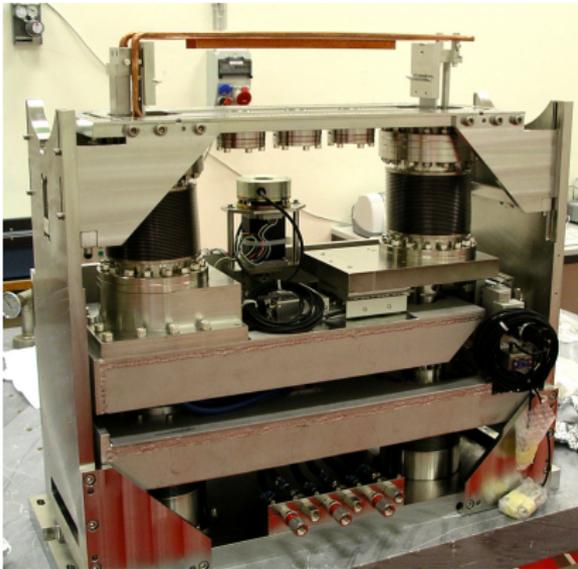
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Monochromator Assembly



Mirror Bender

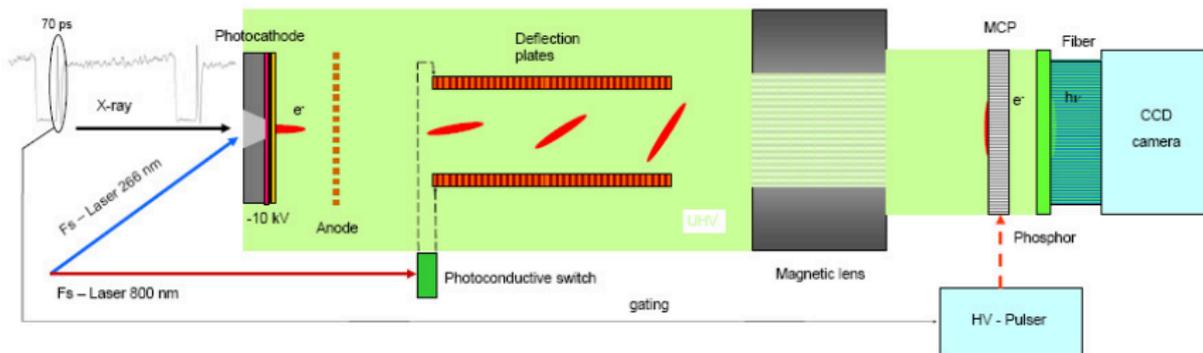


► Glueing Tests

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An ultrafast streak camera for the detection of hard x-ray synchrotron radiation



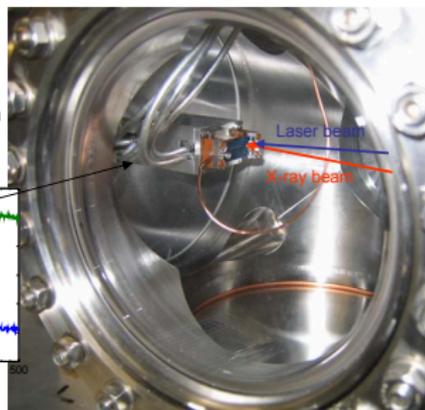
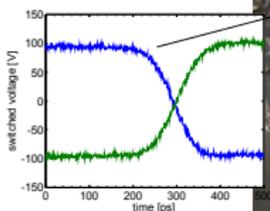
Idea:

Converting time into space

Goals:

- Synchrotron compatibility
- Hard x-ray detection
- Temporal resolution ≤ 2 ps

Voltage ramp pulse from photoconductive switch



courtesy Maik Kaiser Sep 2008

► Details

Conclusions

- very flexible beamline, reliable operation, good performance, very economic realization
- offers fast beam access for instrumentation developments and detector calibration
- possibility to exploit the beamline for at wavelength metrology and optics characterization is foreseen



Acknowledgment

- SLS optics group
 - Sibylle Spielmann
 - Andreas Jaggi
 - Veit Schönherr (now Jenoptik)
- Advanced Light Source
 - Howard Padmore
 - Alastair McDowell
 - Keith Franck
- PSI engineering
 - Sasa Zelenika (now Univ. Rijeka)
 - Hansueli Walther
 - Charles Zumbach
 - Heinrich Blumer
- SLS controls
 - Werner Portmann

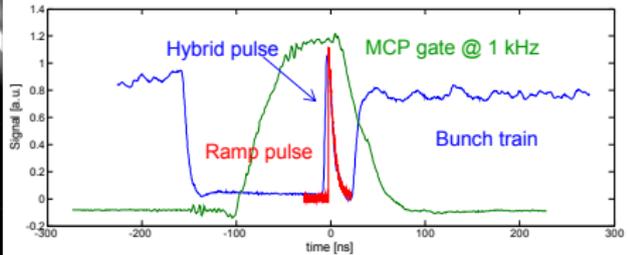
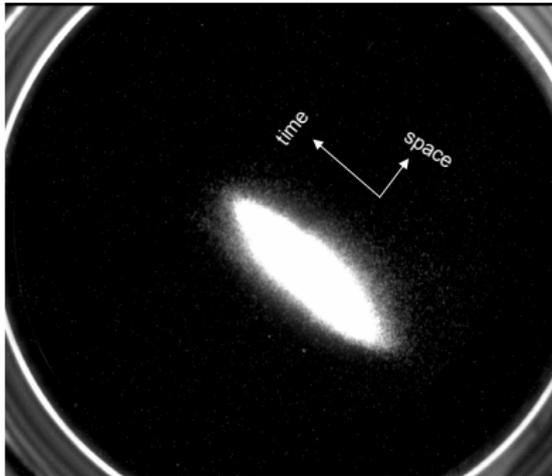


The End

I thank you for your attention!



Streaked hybrid pulse



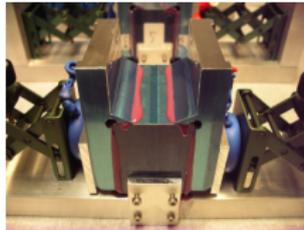
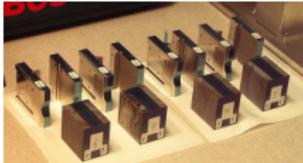
*Static X-ray pulse
on CCD through
streak camera*

- *Streaked hard x-ray pulse (100 ps) at 12 keV with gated MCP technology (100 ns gate @ 1 kHz)*
- *The estimated time resolution of the apparatus at this stage is about 2ps.*

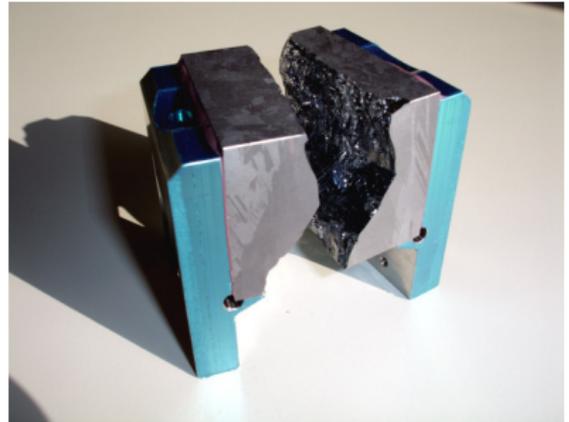
Learning the Bonding Technology and Tests

topics:

surface treatment
handling etc.



tension test



silicon breaks at $F > 20000$ N
(area: 60×50 mm)

[Return](#)

