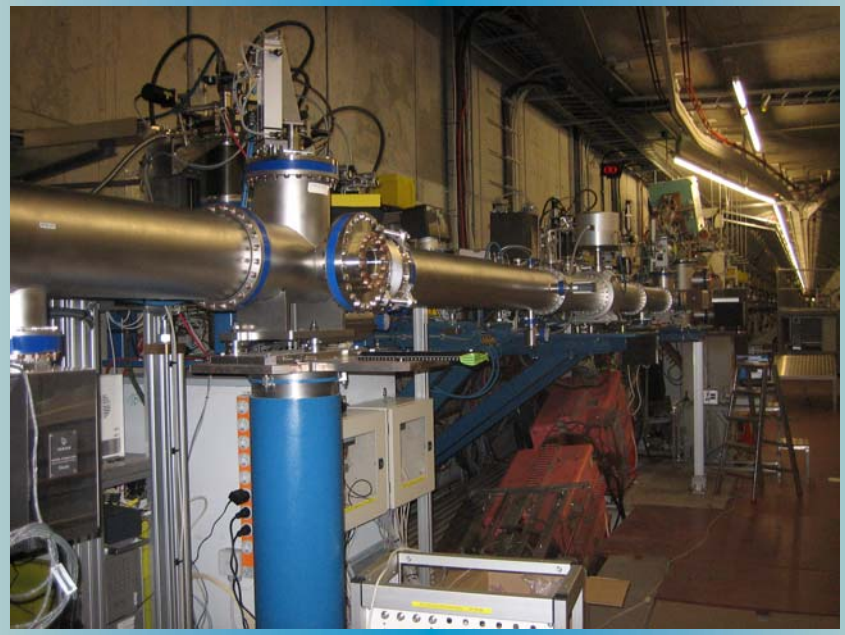
HELMHOLTZ GEMEINSCHAFT

DESY

(First) Photondiagnostic of the FIR Undulator



Michael.Gensch @ DESY.DE

Status

First results

Motivation

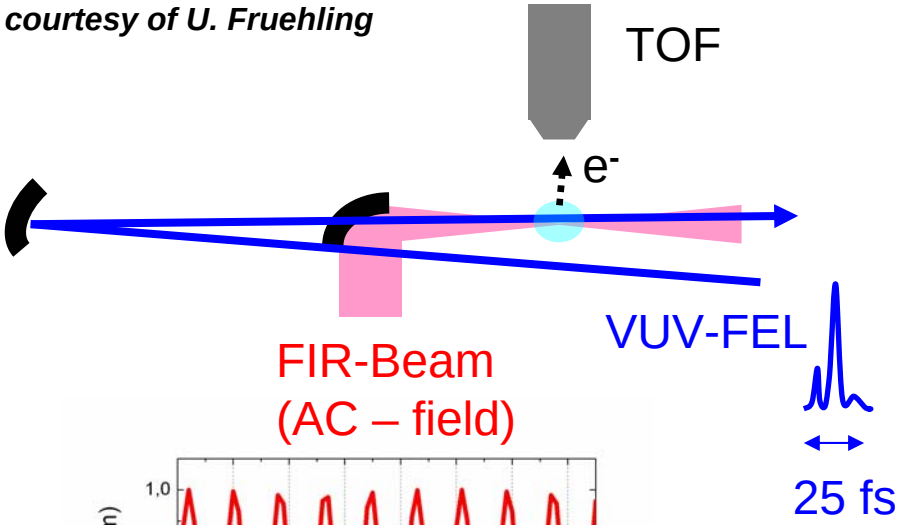
- **short term -> photondiagnostic for FIR/VUV pump probe beamline shifts needed**

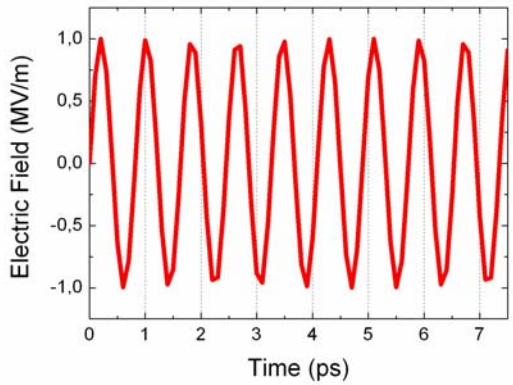
- medium term -> development of appropriate photondiagnostics for VUV/FIR pump probe experiments

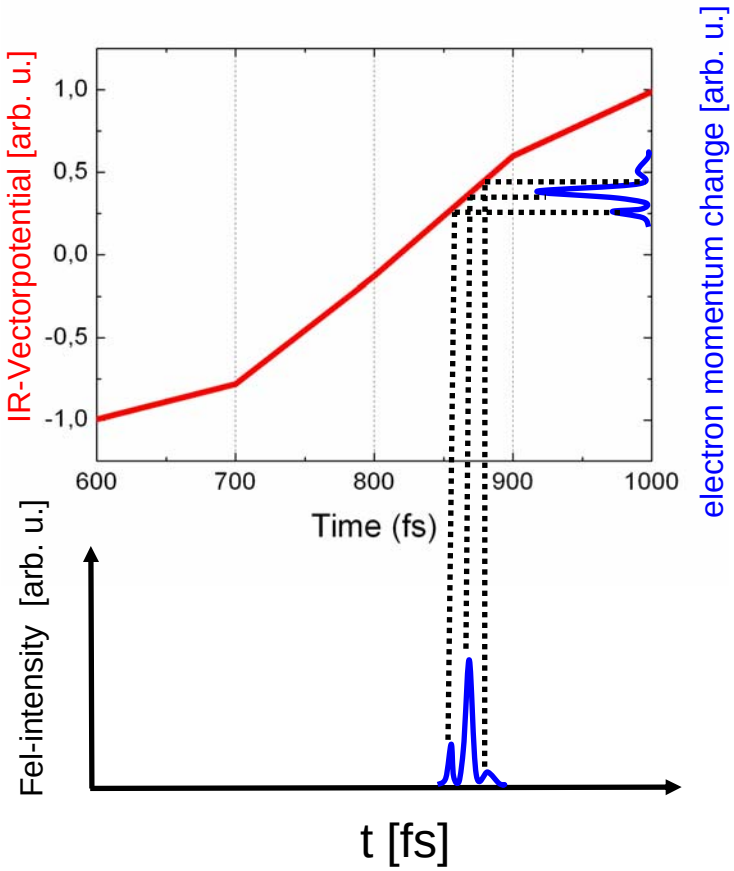
Short term motivation:

Pilot experiment: 2007/2008 (U HH/DESY)

courtesy of U. Fruehling







-> strong, monochromatic FIR pulse required !!

Motivation

- short term -> photondiagnostic for FIR/VUV pump probe beamline shifts needed

- **medium term -> development of appropriate photondiagnostics for VUV/FIR pump probe experiments**

Medium term motivation:

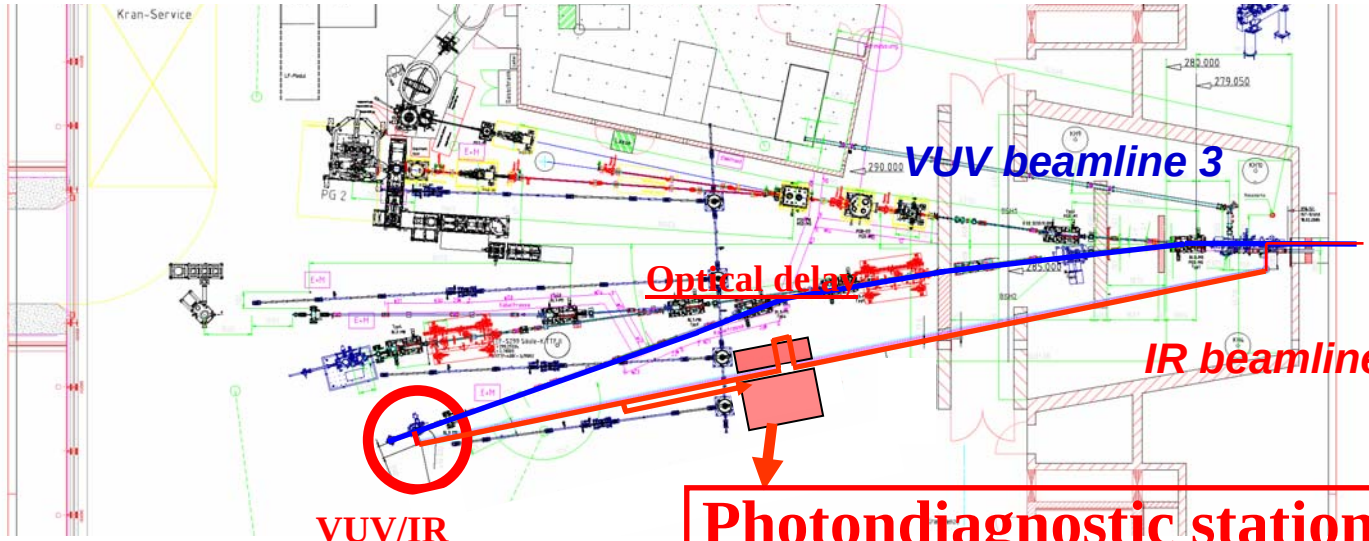
Photon diagnostics foruser facility for VUV/IR pump probe experiments

foreseen photondiagnostic:

- **Single shot spectrometer**
- **Single shot E/O, spatial decoding**
- **Single shot beam profile**
- **IR - FIR Powermeter**

} *ONLINE!?*

(currently under development by HASYLAB in collaboration with external groups: BESSY, FELBE, DLR, PTB and hopefully DESY-FLA)



VUV/IR

pump-probe experimental station

Photondiagnostic station:

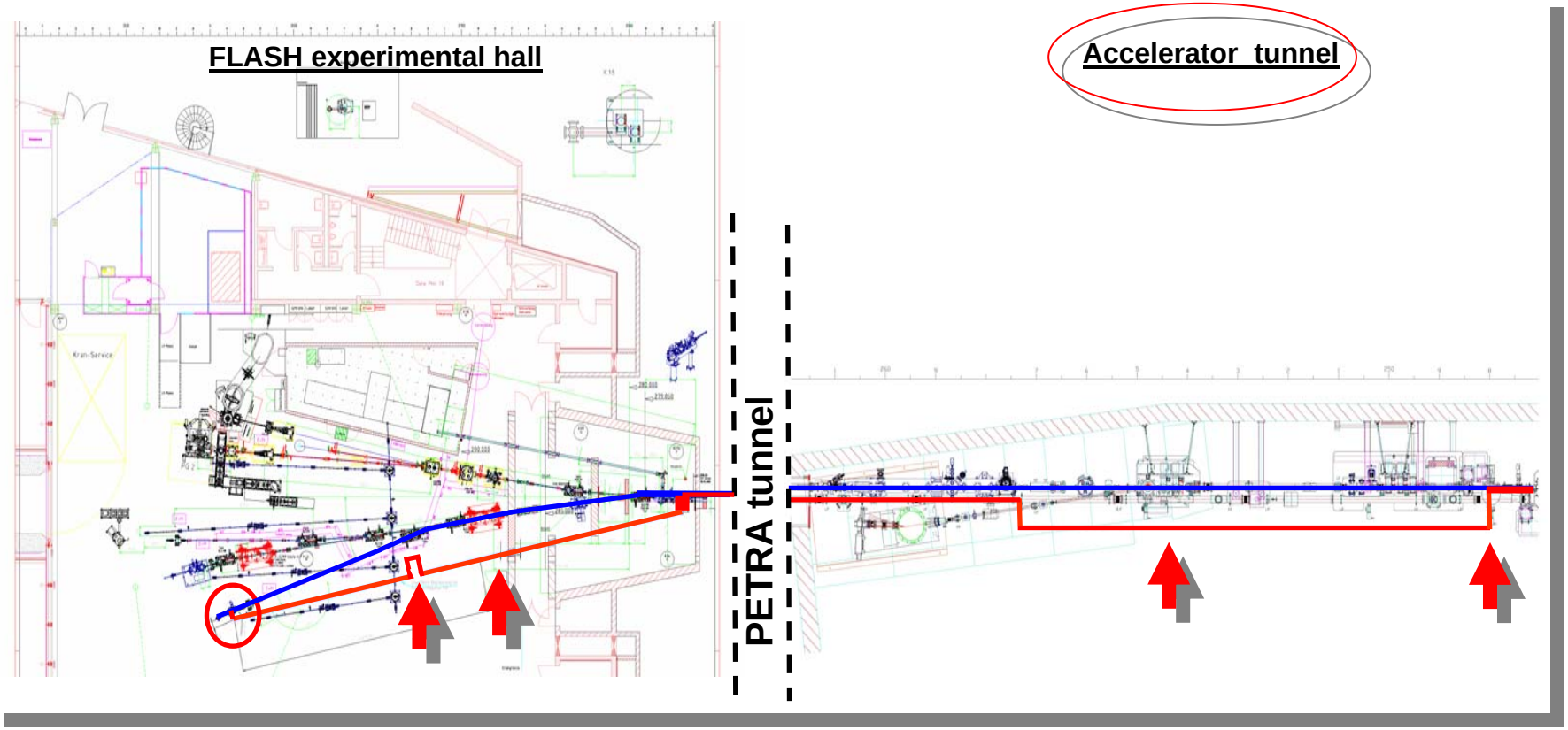
-> same image as in experiment!

Status

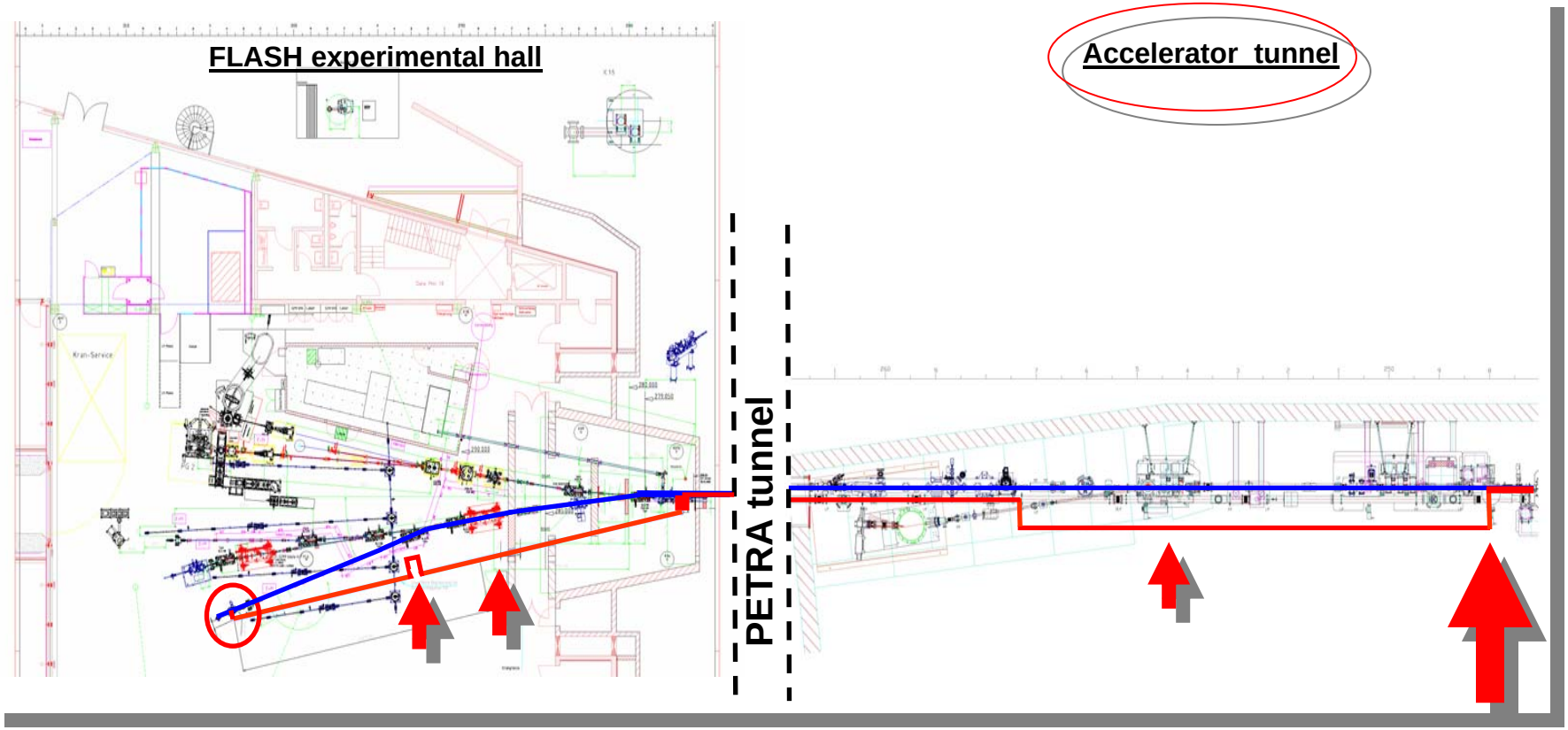
First results

Status

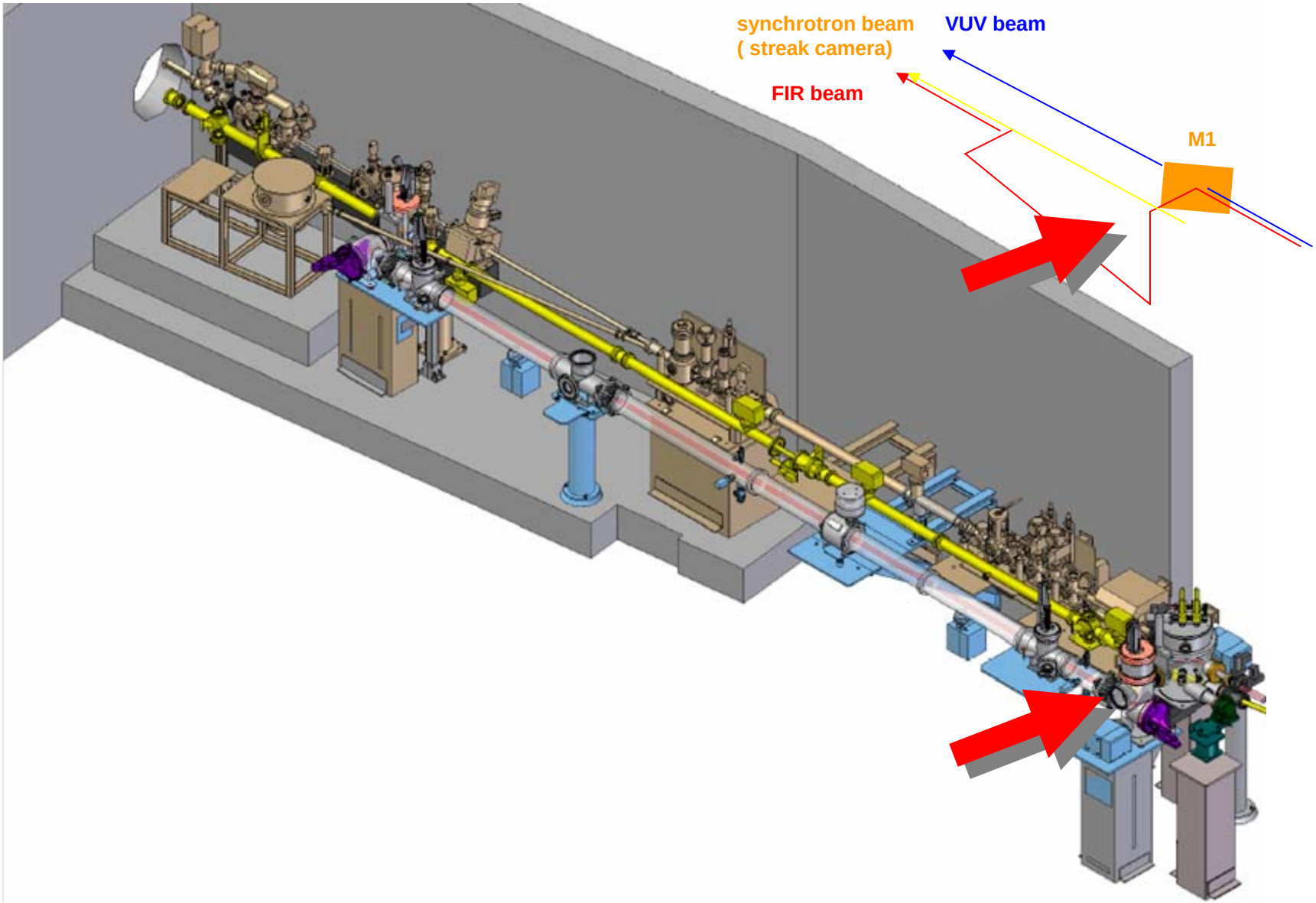
for limited time 4 Diagnostic ports (DP´s)



for limited time 4 Diagnostic ports (DP´s)
presently only 1 available



(Photon) diagnostic port 1



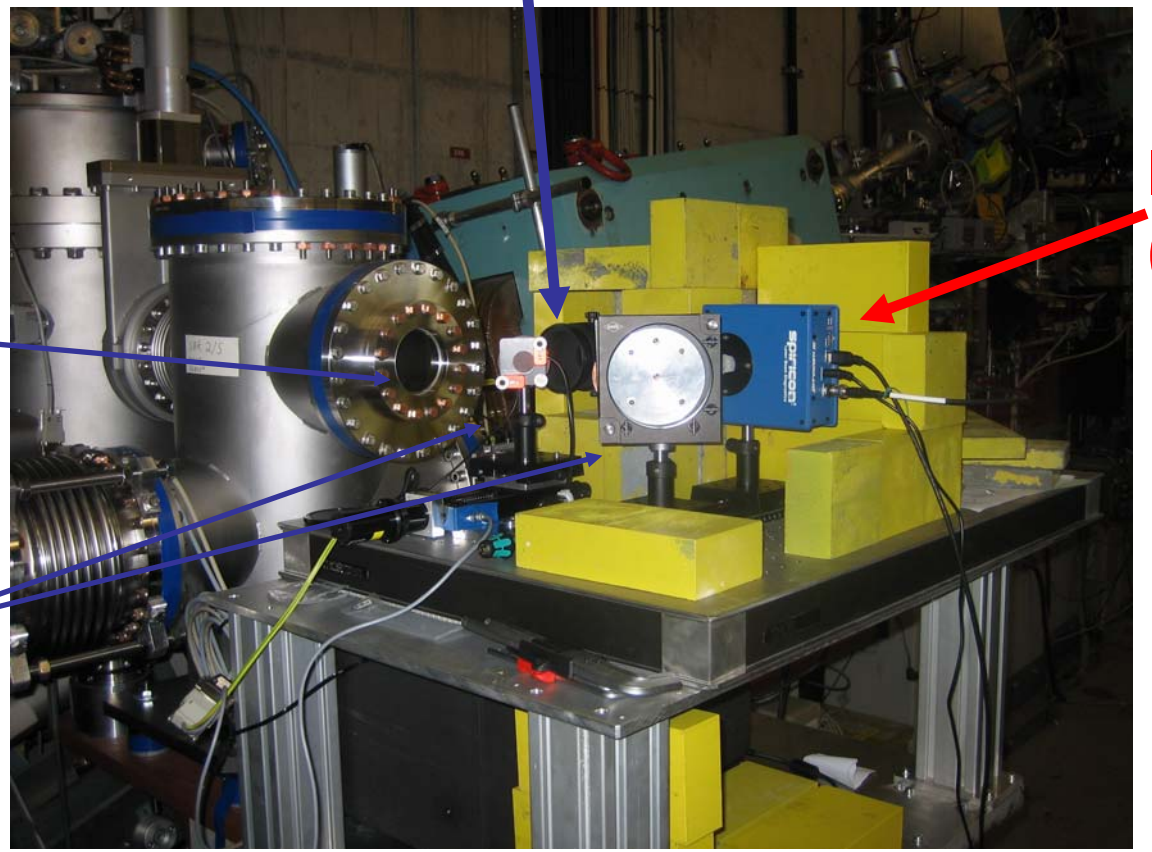
(Photon) diagnostic port 1

ICCD (300 – 800 nm)

IR camera
(1 – 1000 μm)

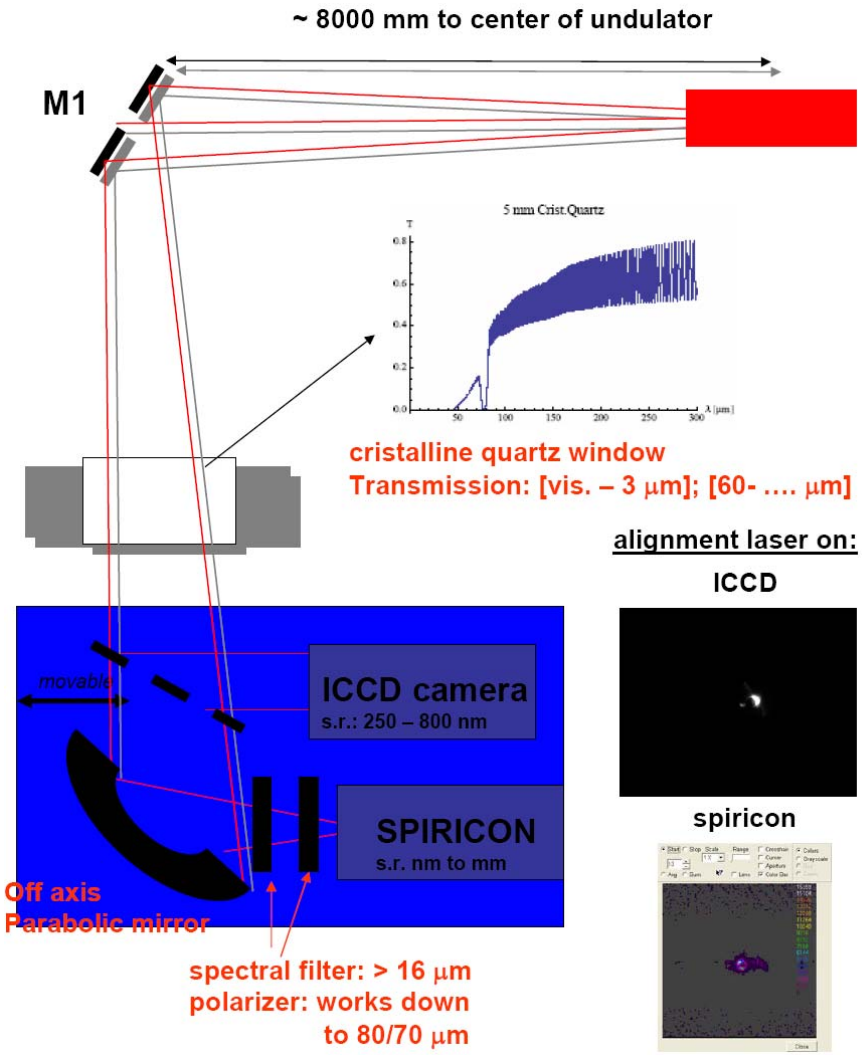
viewport

mirrors



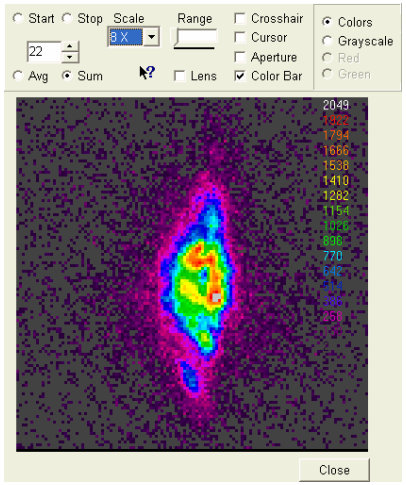
photon diagnostic station DP1: looking on M1 →

(Photon) diagnostic port 1



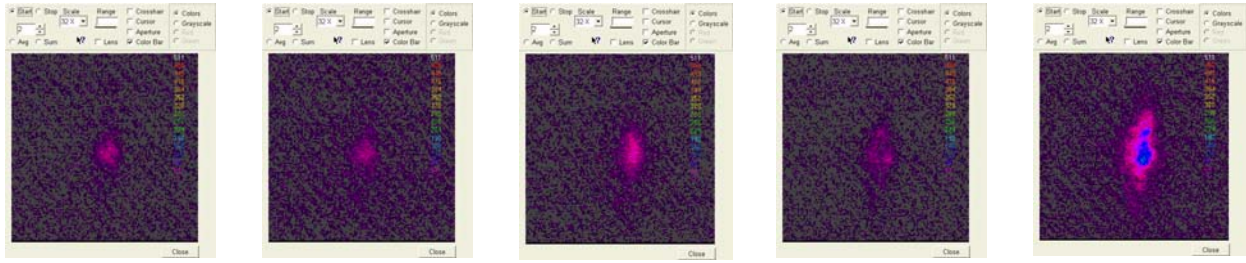
(very first) photon diagnostic 21.09.2007

IR camera



dependence on undulator current

0 A → *435 A*

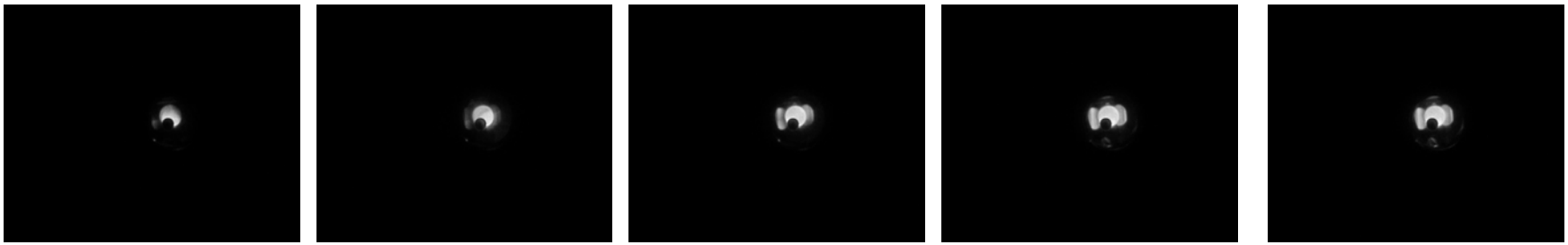


18/09/2007 - first images of the source with IR camera + filter, spectral range: $\lambda > 60$ μm

ICCD

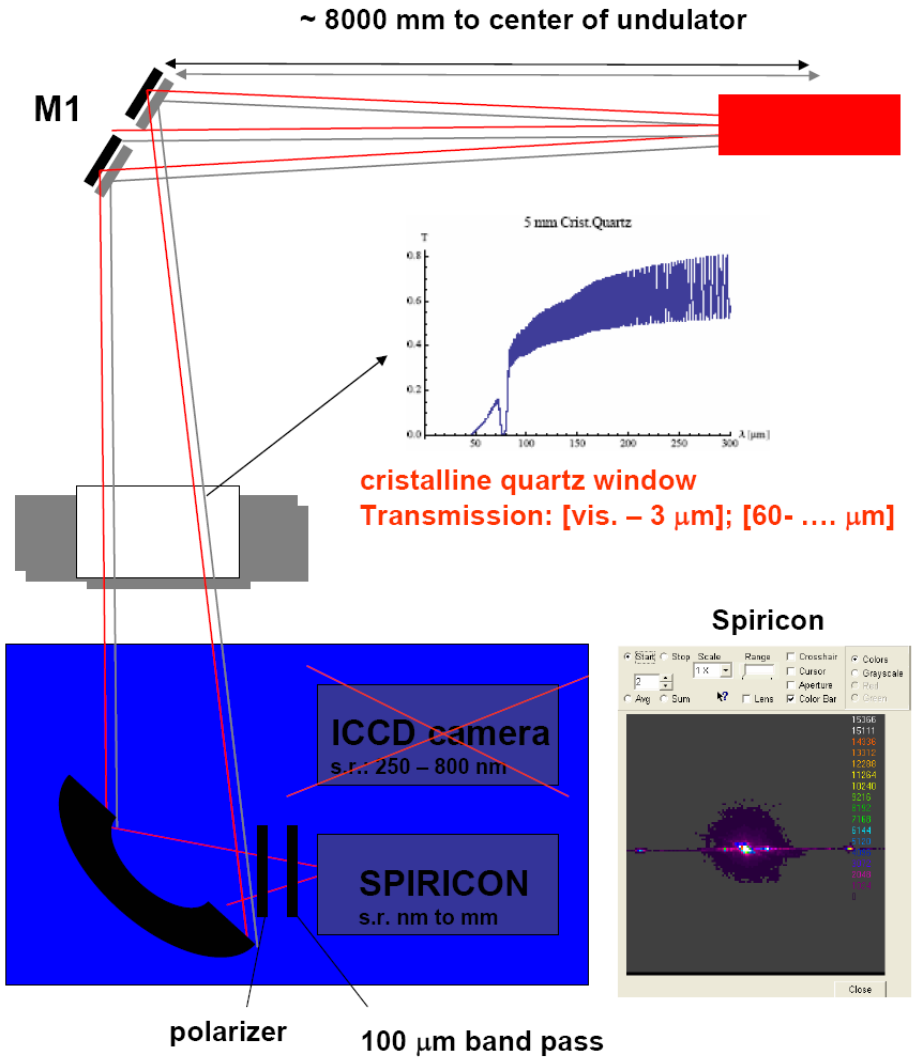
dependence on undulator current

0 A → *100 A*



18/09/2007 – images with ICCD camera looking on first mirror, spectral range: 300 nm – 800 nm

(Photon) diagnostic port 1: 26.10./29.10. 2007

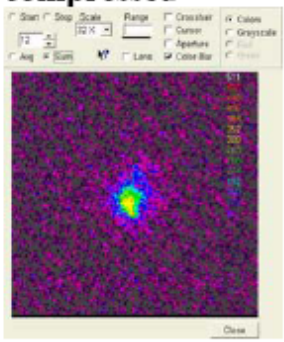


photon diagnostic 26.10.2007

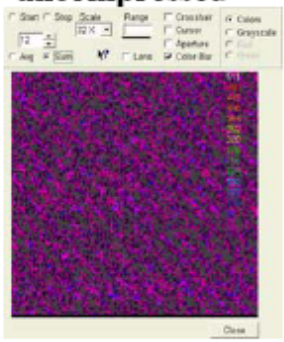
Effect of compression:

0A, 15 bunches, reversed corrector coils, pyro = 120 mV, no filter!

compressed



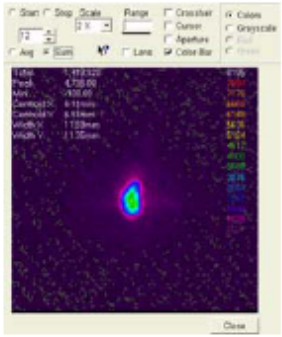
uncompressed



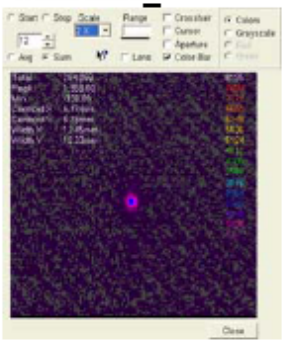
Effect of filter

386A = 100 μm, 15 bunches, pyro = 120 mV, nom. settings of corrector coils

without filter



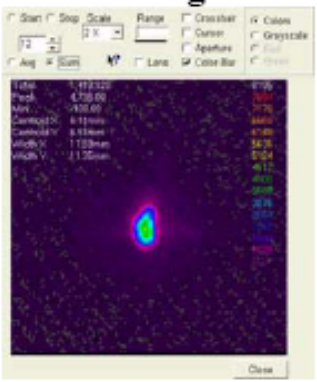
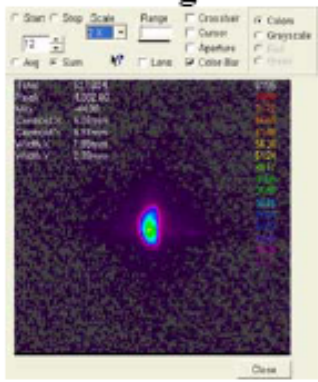
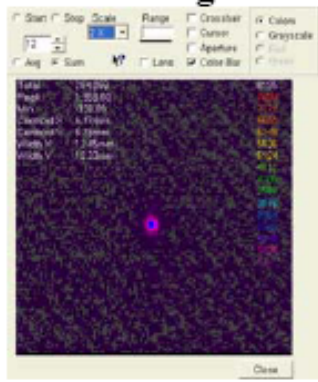
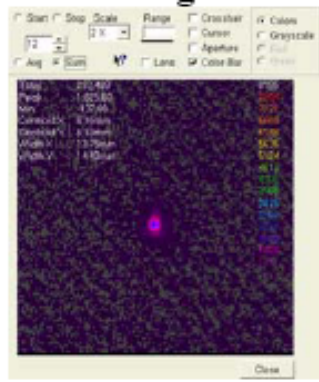
with filter



photon diagnostic 26.10.2007

Effect of corrector coils?!

386A = 100 μm, 15 bunches, pyro = 120 mV

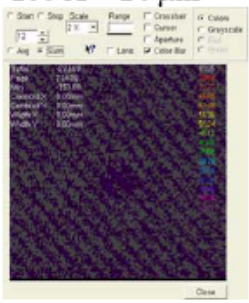
	without filter		with filter	
	nom. settings	rev. settings	nom. settings	rev. settings
				
peak intensity: (a.u.)	4736	4882	1958	1825

photon diagnostic 26.10.2007

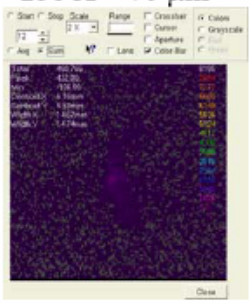
Wavelength dependence of response, undulator was tuned over filter band pass:
15 bunches, rev. settings of correctorcoils, pyro = 120 mV

Scan 1 at 680 MeV electron energy

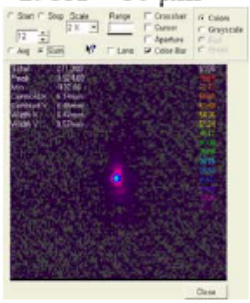
100 A = 14 µm



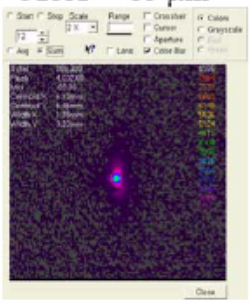
256 A = 70 µm



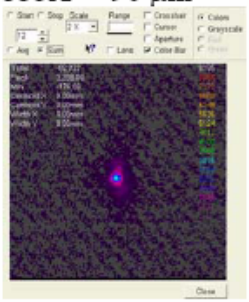
293A = 80 µm



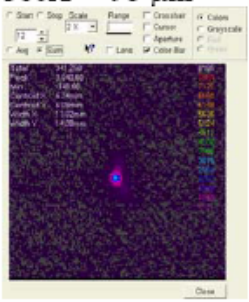
313A = 85 µm



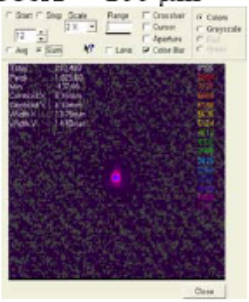
335A = 90 µm



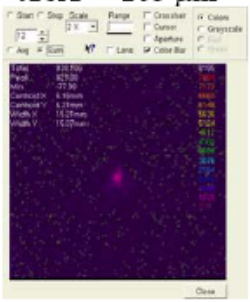
360A = 95 µm



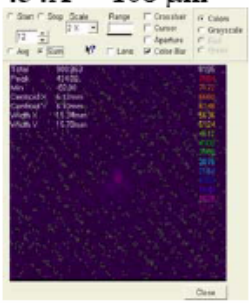
386A = 100 µm



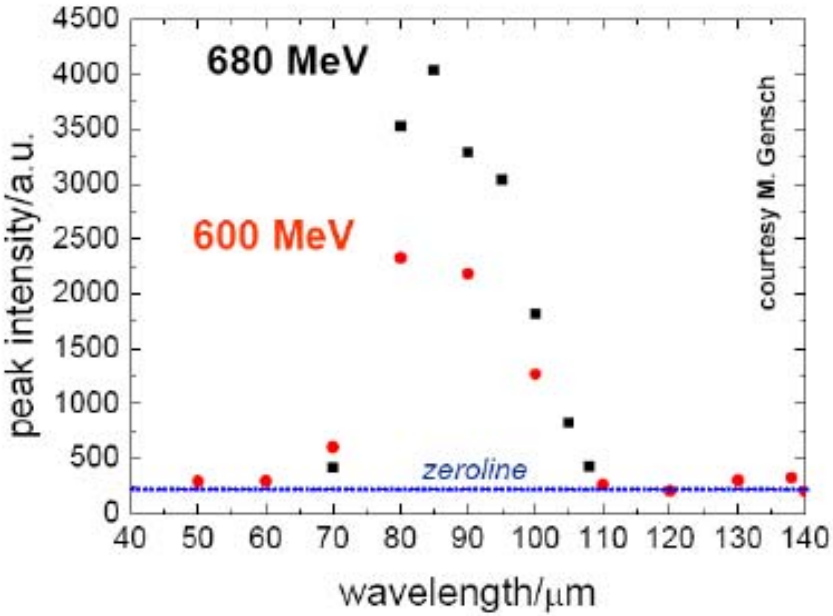
416A = 105 µm



434A = 108 µm



photon diagnostic 26.10.2007

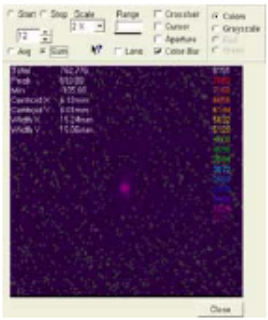


photon diagnostic 26.10.2007

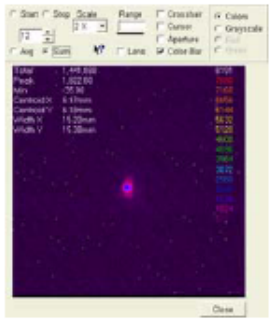
Dependence on pyrosignal/phase

I = 386 A -> λ = 100 μm, 15 bunches, rev. settings for corrector coils

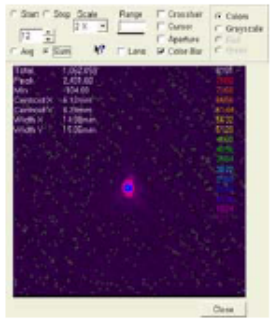
80 mV



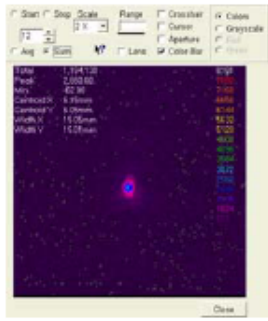
120 mV



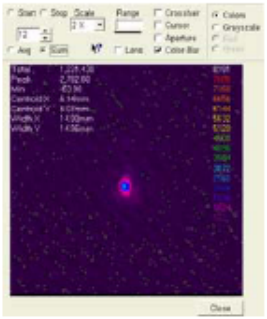
160 mV



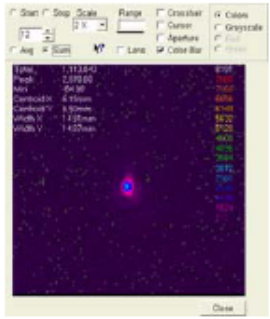
200 mV

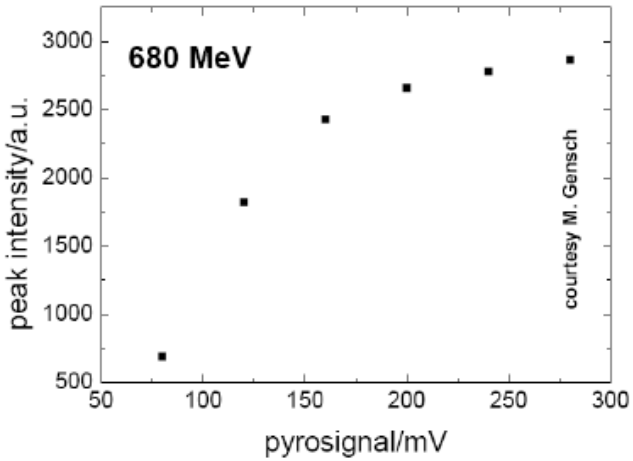


240 mV



280 mV





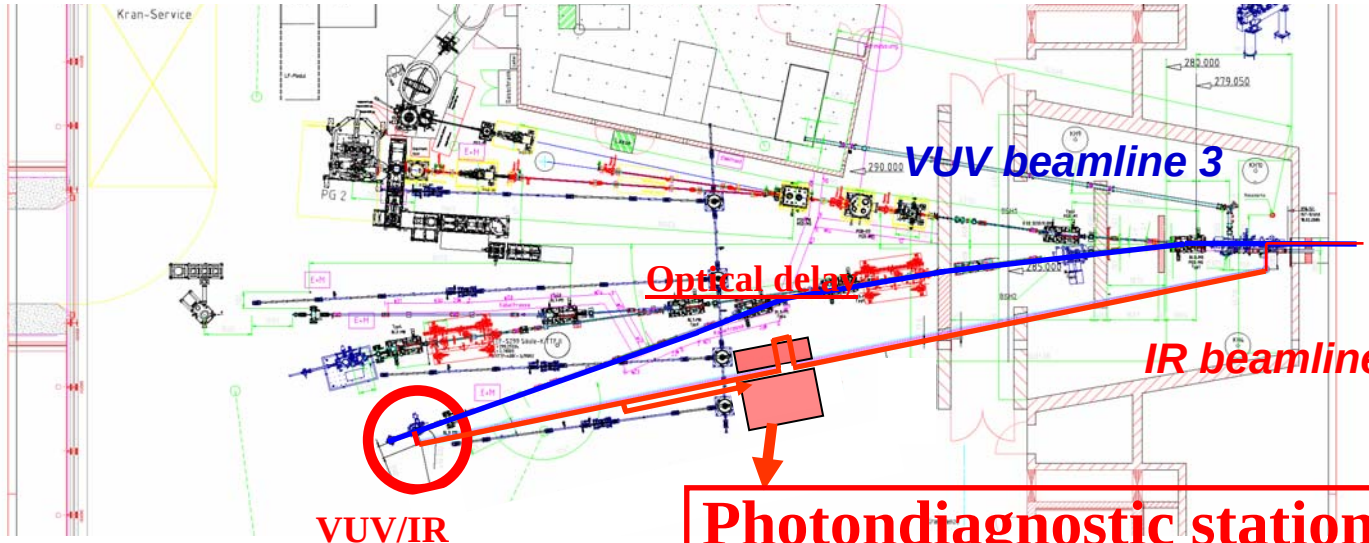
Outlook 2009: user facility for VUV/IR pump probe experiments

foreseen photondiagnostic:

- **Single shot spectrometer**
- **Single shot E/O, spatial decoding**
- **Single shot beam profile**
- **IR - FIR Powermeter**

} *ONLINE!?*

(currently under development in collaboration with external groups: BESSY, FELBE, DLR, PTB and DESY-FLA)



VUV/IR

pump-probe experimental station

Photondiagnostic station:

-> same image as in experiment!

Thank you for your attention