

SSRF Commissioning & Our Experience with Libera

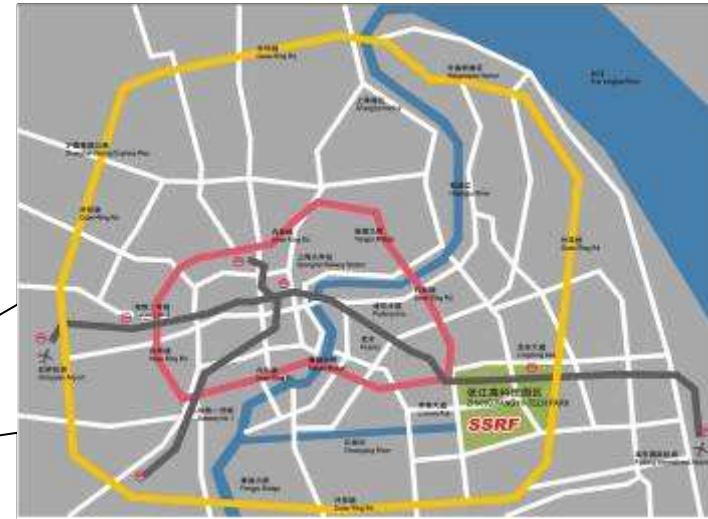
LENG Yongbin
BI Group, SSRF

2008-10-15

Outline

- **Introduction of SSRF**
- **Machine commissioning**
- **Libera based BPM system**
Installation
Libera application (performance)

Shanghai Synchrotron Radiation Facility

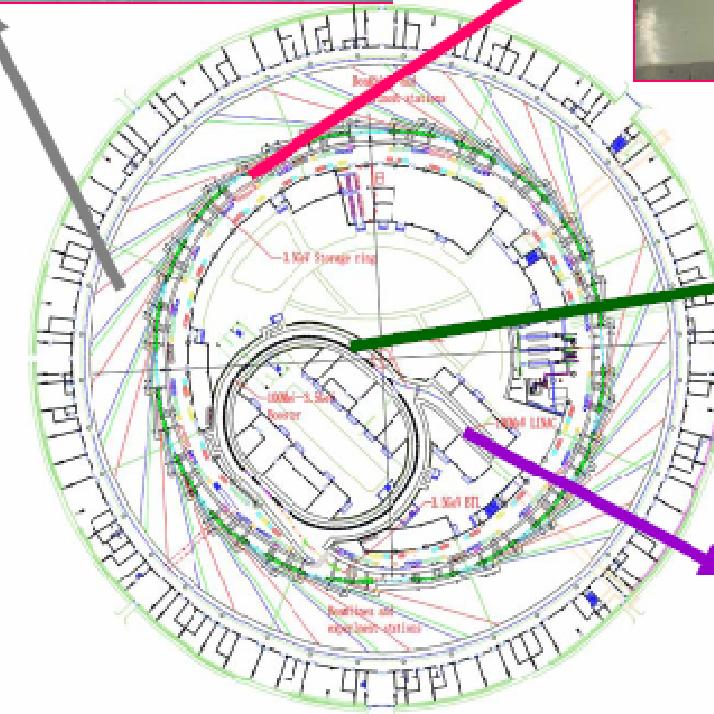


- Third generation light source
- Total budget is about 130 millions EURO
- Started @ 12/25/2004 and will be in operation @ 5/1/2009

SSRF complex



Storage Ring
3.5GeV, C=432m



Booster
3.5GeV, C=180m



Electron Linac
150MeV

Beam lines in the first stage

- Macromolecular Crystallography (In-Vac Und.)
- High-Resolution Diffraction
- X-ray Absorption Fine Structure Spectroscopy (W)
- Hard X-ray Micro-focus and Application (In-Vac Und)
- X-ray Imaging and Biomedical Application (W)
- X-ray Scattering
- Soft X-ray Microscopy (Und.)
- X-ray Interference Lithography – (SINAP)

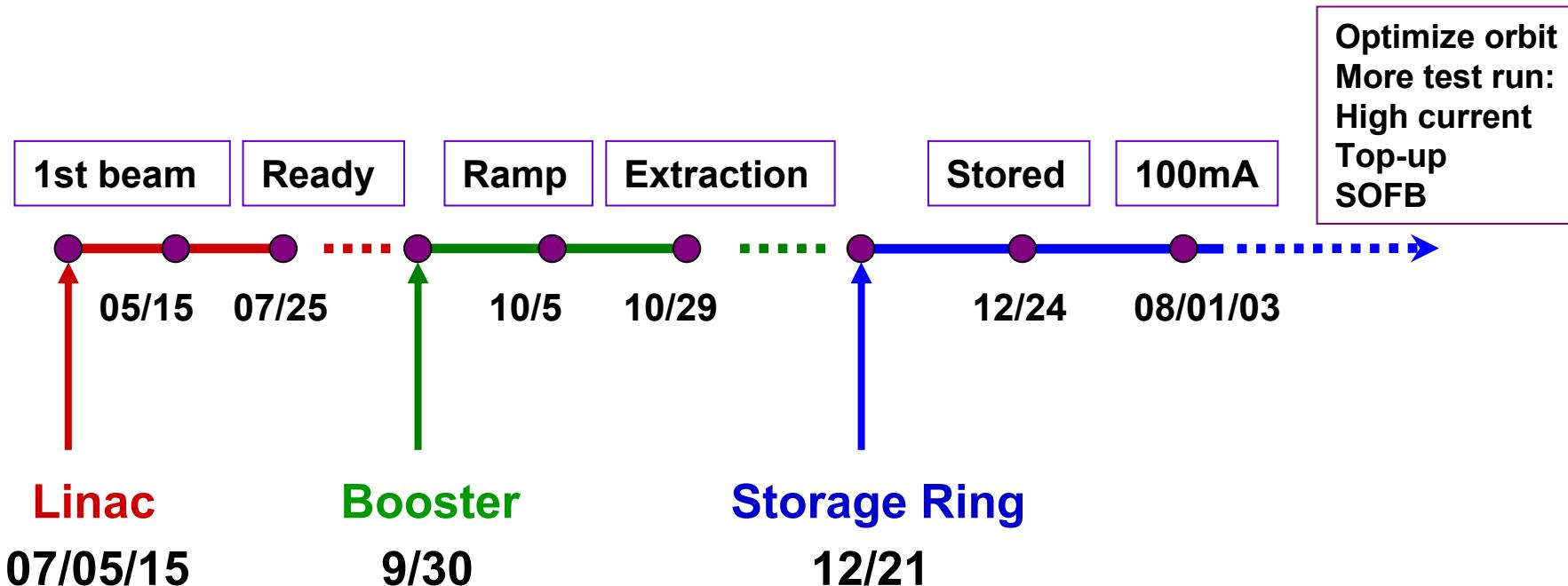
Brief parameters of the ring

	DBA	Low-emittance mode	Normal Mode
Energy	GeV	3.5	3.5
Circonference	m	432	432
Natural Emittance	nm· rad	3.9	11.2
Current: Multi-bunch (Single)	mA	200~300(5)	200~300(5)
Number of Cells		20/4	20/4
Straights: Length×Number	m	12×4、6.5×16	12×4、6.5×16
$\beta_x/\beta_y/\eta_x$ in middle of 12m straight	m	10.0/6.0/0.15	10.0/6.0/0.0*
$\beta_x/\beta_y/\eta_x$ in middle of 6.5m straight	m	3.6/2.5/0.10	3.6/2.5/0.0*
Betatron Tune Q_x/Q_y		22.22/11.32	22.22/11.32
Chromaticity ξ_x/ξ_y		-56/-19	-56/-19
RF Voltage	MV	4.0~6.0	4.0~6.0
Energy Loss Per Turn (Dipole only)	MeV	1.448	1.448
Max beam power	kW	~600	~600

Construction schedule

- Dec. 2004 ~ Dce. 2006: Building construction
- Jun. 2005 ~ Jun. 2008: Accelerator equipment and components manufacture and assembly
- Dec. 2005 ~Dec. 2008: Beamline construction and assembly
- May. 2007 ~ Jul. 2007: Linac commissioning
- Oct. 2007 ~ Dec. 2007: Booster commissioning
- Dec. 2007 ~ Sept. 2008: Storage ring commissioning
- Jun. 2008 ~ Mar. 2009: Beamline commissioning
- Apr. 2009: The SSRF operation begins

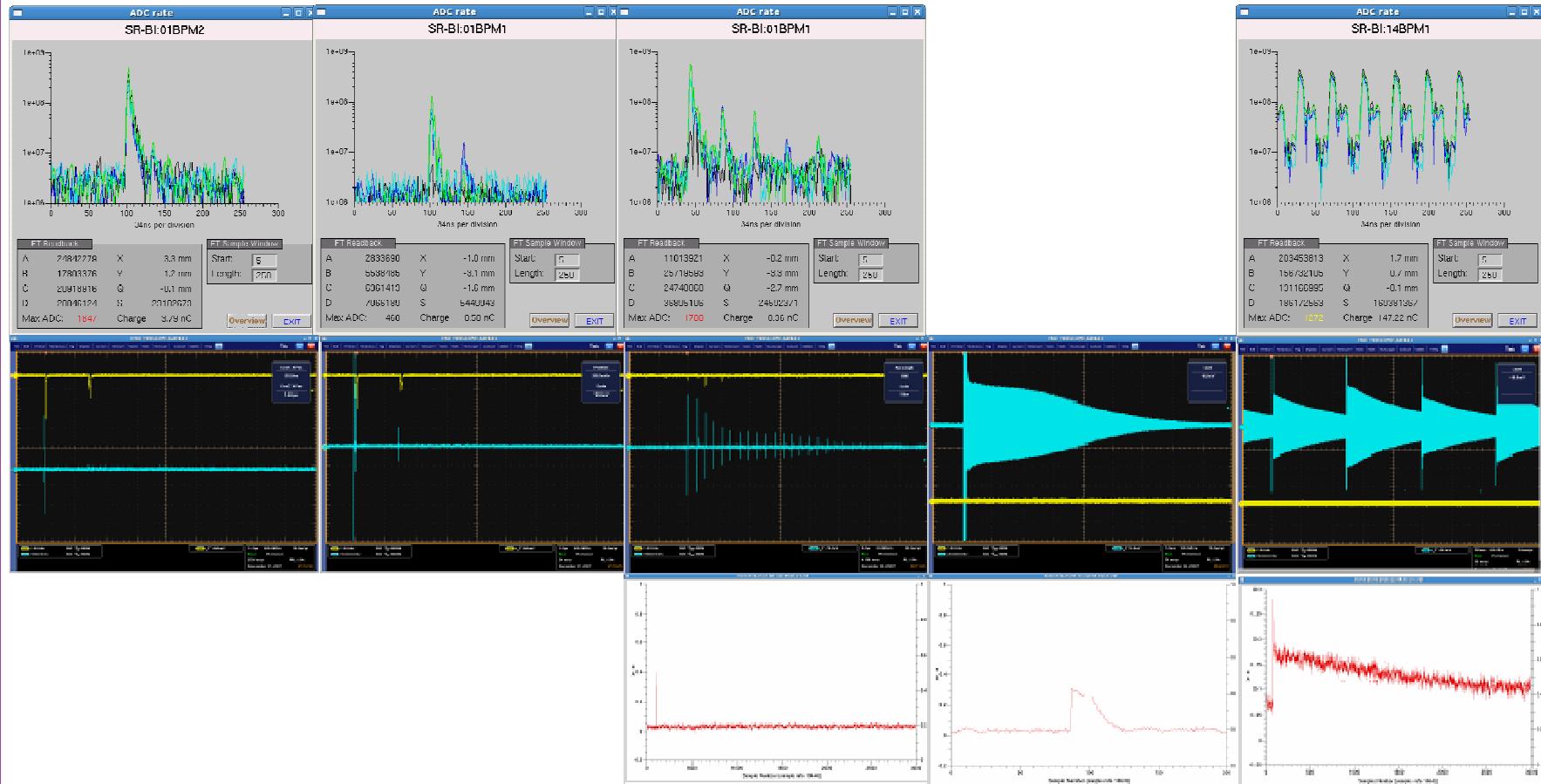
Milestone of SSRF commissioning



Almost no machine shut down due to LINAC or Booster failure

Ring commissioning

Ring commissioning: stage I



Injected beam
Dec. 21, 18:20

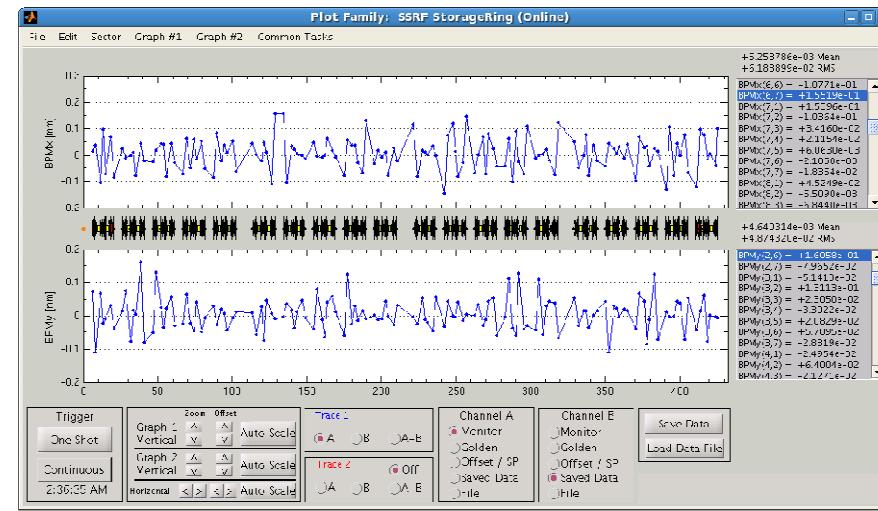
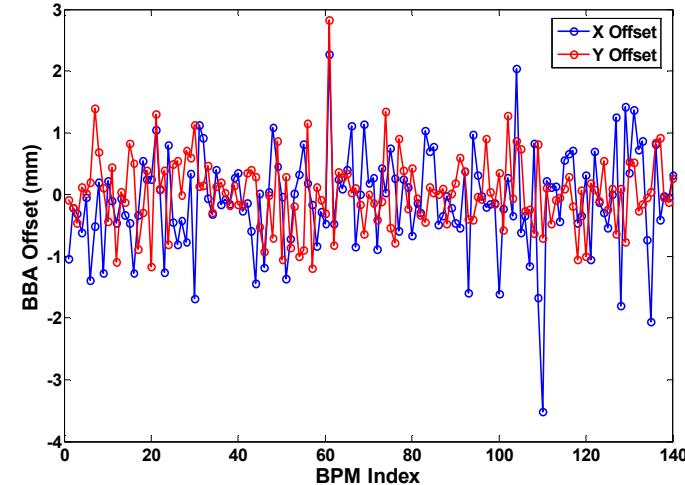
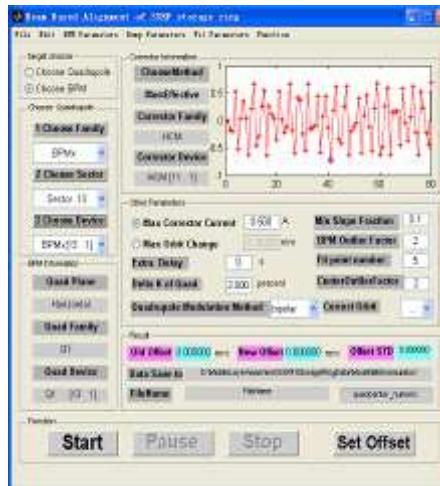
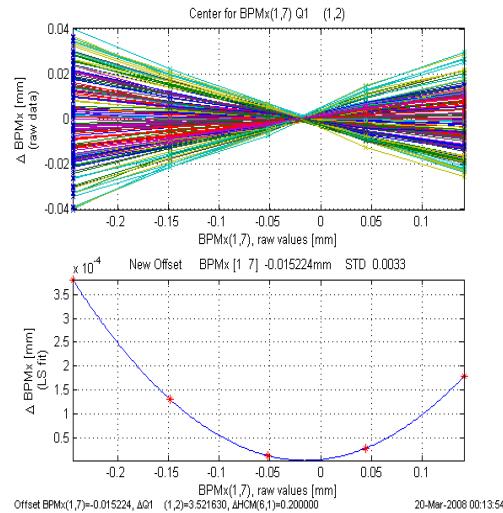
First turn
Dec. 21, 21:08

Multi turns
Dec. 21, 21:18

5ms
Dec. 23, 20:00

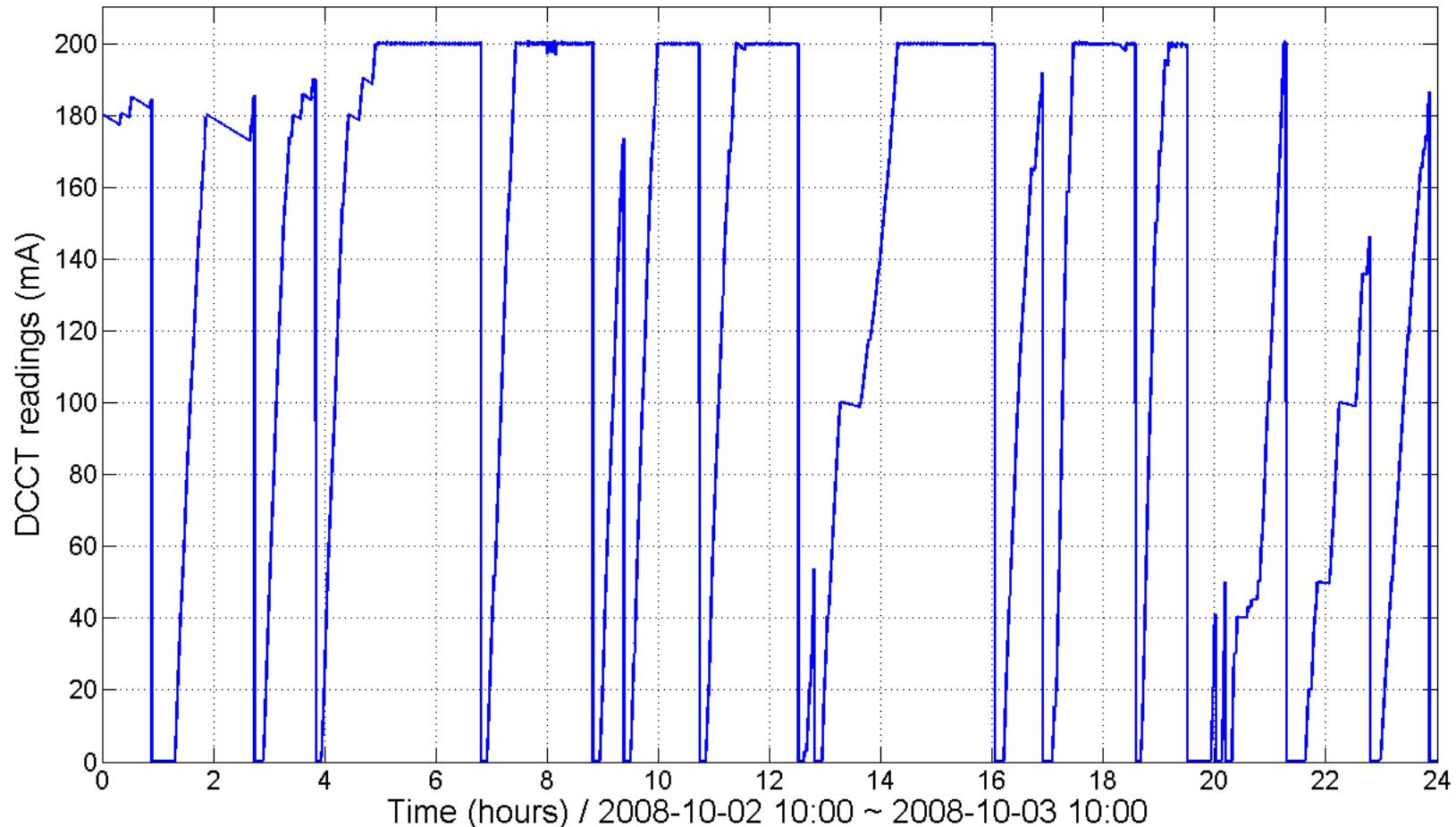
Stored beam
Dec. 24, 06:55

Ring commissioning: stage II



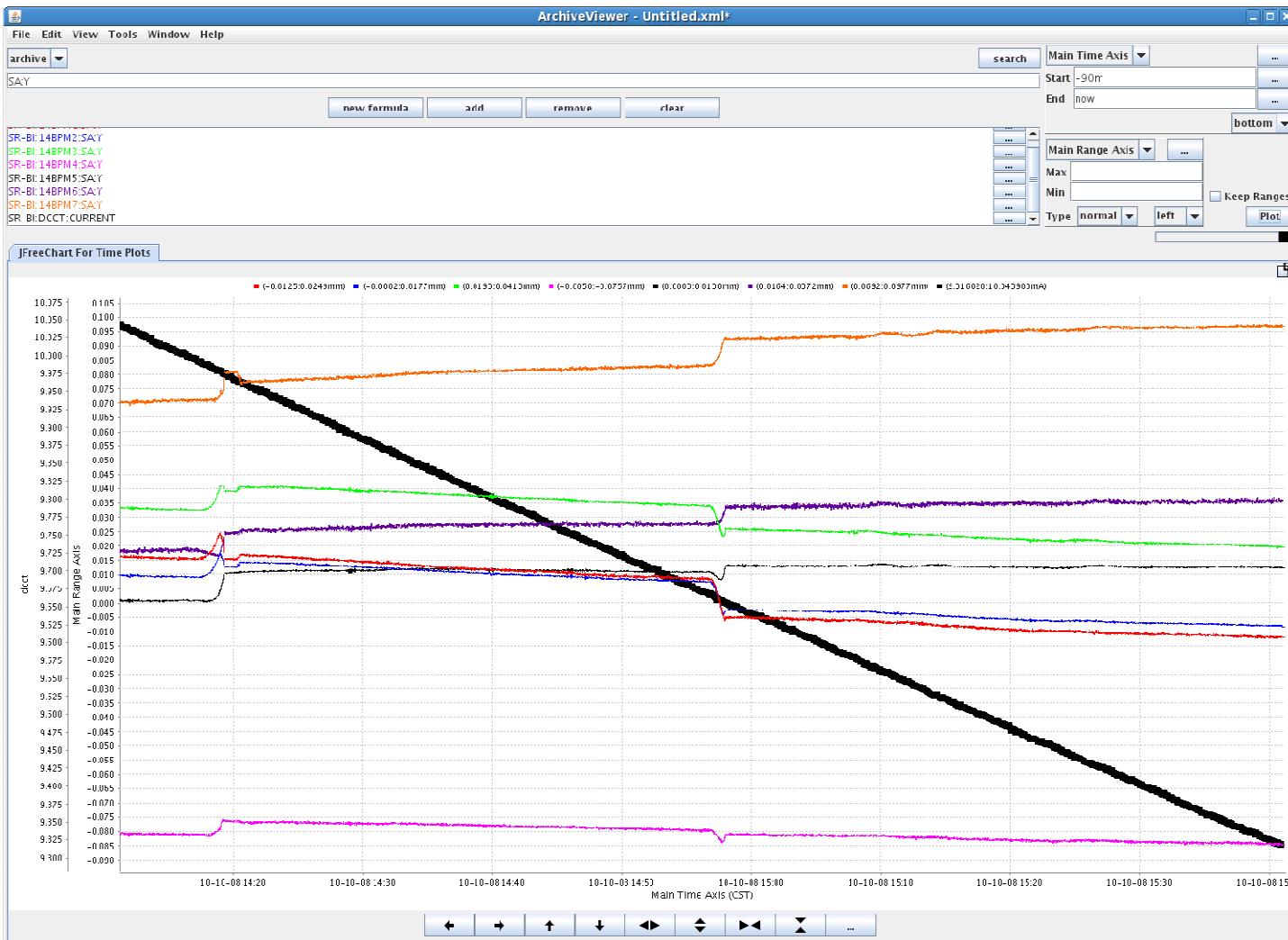
Ring commissioning: stage III

Top-up test running @ 3.5GeV, 200mA with SC cavity



SC cavity commissioning

Ring commissioning: stage III



Insertion Devices commissioning (W13 & W14)



中国科学院上海应用物理研究所

Shanghai Institute of Applied Physics, Chinese Academy of Sciences

Libera based BPM system