Shutdown Success Stories

Uli Wienands
Senior Storage Ring Physicist, AUP

INJECTION EXTRACTION TIMING SYSTEM (IETS)

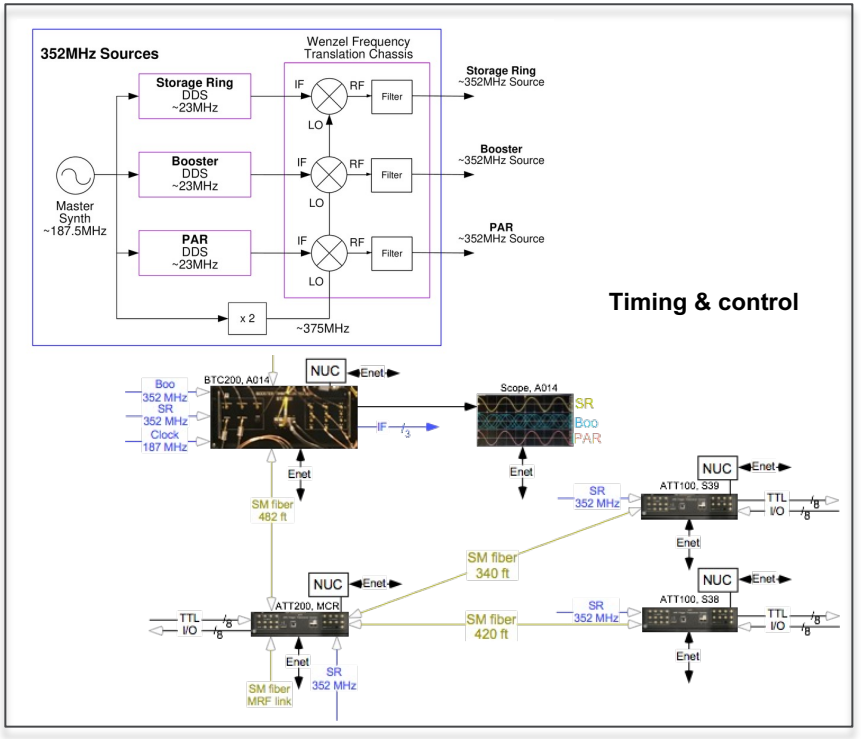
WHAT IT IS AND WHY THE UPGRADED APS NEEDS IT

- The upgraded APS storage ring is shorter by about 40 cm than the APS storage ring
  - Storage ring radiofrequency (rf) goes up to 352.055 MHZ (+122 kHz); Booster cannot follow that
- Choice: Shrink the Booster, or separate the rf frequencies
  - "Shrink" unattractive
- Synchronization problem solved with dynamic frequency control in the Booster:

varying bump:
target sr
buckets

static ramp:
optimize injection/extraction

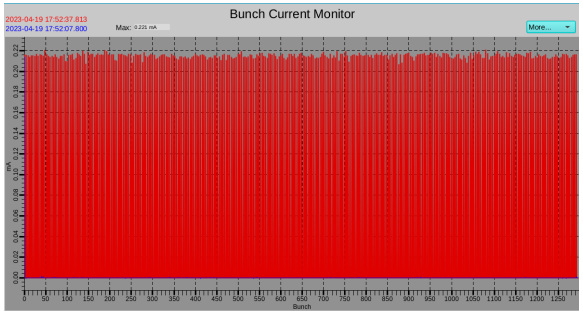
- Tight integration of rf and timing system
- Critical, "must-work" system



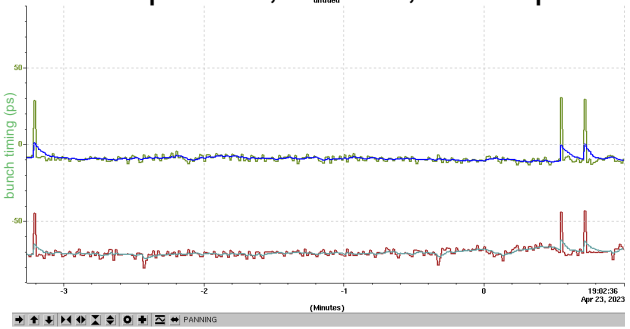
IETS STUDY WEEK: 17-24 APRIL 2023

- Demonstrated the synchronization works and beam goes into the correct SR bucket.
- Up to 10.5 nC in the Booster with IETS frequency variations
  - proper cavity detuning key
- Tested system at upgraded APS frequencies.
- Extremely tight rf phasing. Occasional (≈1%) bad shot with upgraded APS rf parameters is understood & fix is in progress.
- Supported owl-shift experiments

APS, 324 fill, 72 mA total



APS-U params, > 4 min, bunch phase



IETS rack, A014

IETS Team: T.Fors, T.Berenc; D.Paskvan, S.Farrell, S.Xu, E.Chandler, F. Lenkszus, T.Madden, N.Sereno, A.Brill, J.Calvey

Shutdown Success Stories

Ken Belcher
Safety Interlock Group Leader, AES

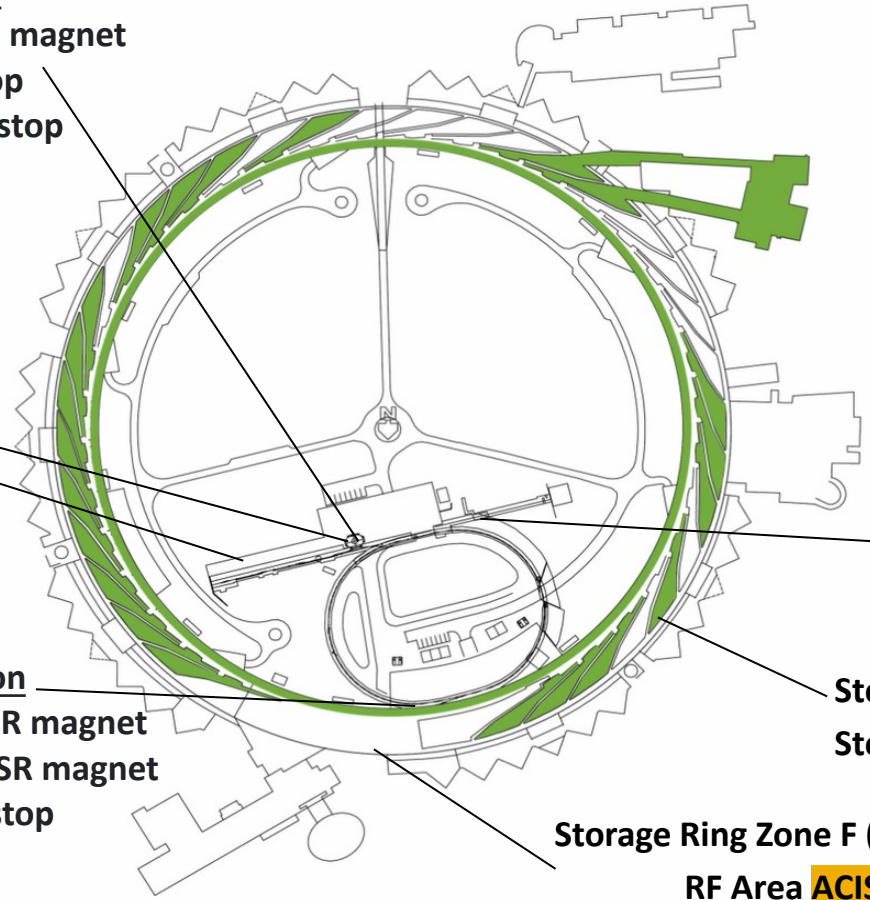
THE FIVE ACCESS CONTROL INTERLOCK SYSTEM (ACIS) LOCATIONS

LET Partition

LtP:B1= Linac-to-PAR magnet

LtL = Linac-to-LEA stop

PtB=PAR-to-Booster stop



- 19 - 19” racks
- 61 - enclosure panels
- 180 - drawings
- 14 - specification documents
- 16 - procedure documents
- 4 – PLC programs
- 7 – Operator Touchscreens

Linac/PAR ACIS

Partition

BB:BM1= Booster-to-LEA magnet

BB:BM2= Booster-to-LEA magnet

BTL = Booster-to-LEA stop

HET Partition

BtS:BX =Booster-to-SR magnet

BtS:AB = Booster-to-SR magnet

BtS = Booster-to-SR stop

Storage ring Zone A-E (S01-S34)

Storage Ring ACIS

Storage Ring Zone F (S35-S40)

RF Area ACIS

ACIS UPGRADE PROGRESS

Three teams: Linac/Booster, MCR/Bldg 420, Storage Ring

- All removal complete
- Installation progress
  - Linac (70%)
  - Booster (0%)
  - MCR (90%)
  - 420 (5%)
  - SR (13%)
- Linac/PAR & Booster beam before APS-U ARR will reduce ARR scope
- Zone F validations complete for Zone F RF conditioning
- Zone A-E validations complete for APS-U commissioning

Original MCR ACIS

New MCR ACIS

Shutdown Success Stories

Ju Wang
Power Systems Group Leader, ASD

ASD POWER SYSTEMS GROUP

Members of PS Group

- We are responsible for all the magnet power supplies in the APS accelerators. We provide
  - Operations support, > 99% power systems availability for last 22 years
  - Power supply repair, maintenance and upgrade
  - New power supply systems for new requirement
- For the APS-U project we provide
  - 2,400+ power supplies
  - 406 power supply controllers

APS-U power supply components are ready for installation.

POWER SUPPLY LOTO, AIR-GAP, HARVEST AND REMOVAL

Thanks to the enthusiastic and hard-working PSG techs, we accomplished a lot more than scheduled for the first two weeks.

- Held daily pre-job and post job briefings to go thru safety issues/concerns, discussed individual job assignment, and updated work status
- LOTO'd and air-gapped more than 1400 power supplies
- Harvested more than 54 power supplies and many other components
- Tagged additional 1500+ items to keep
- Prepped 200 power supply cabinets for removal contractors
- **Everything done safely!**

Lesson learned – we can accomplish a lot safely when we follow the plan and the procedures to the detail.


PSG personnel going thru LOTO process in MCR

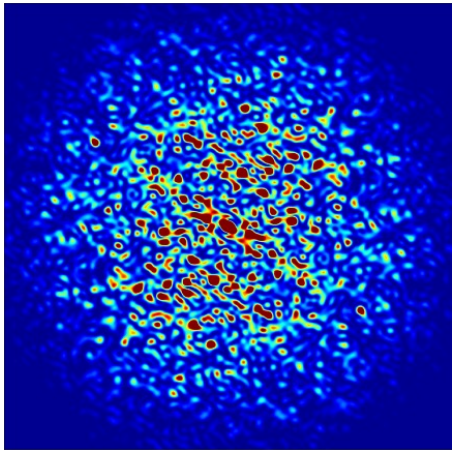

First emptied power supply cabinet

Shutdown Success Stories

Suresh Narayanan
Physicist and Group Leader, XSD

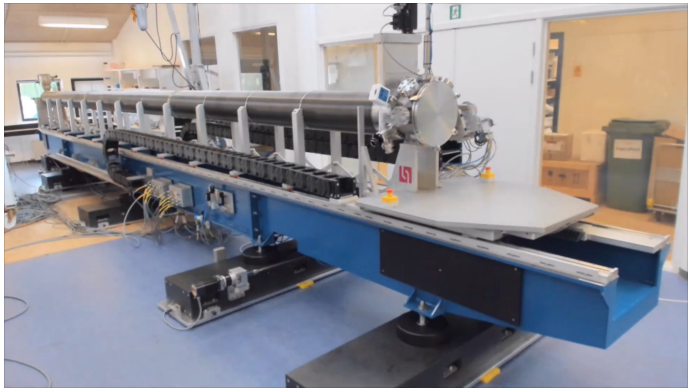
FEATURE BEAMLINE: X-RAY PHOTON CORRELATION SPECTROSCOPY (XPCS)

- Beamline optimized for coherence to probe dynamics in soft and hard condensed matter – dedicated small-angle and wide-angle scattering instruments
- Applications in a wide range of materials such as gels, emulsions, foams, batteries and ferroelectrics



XPCS 8-ID – FEATURE BEAMLINE

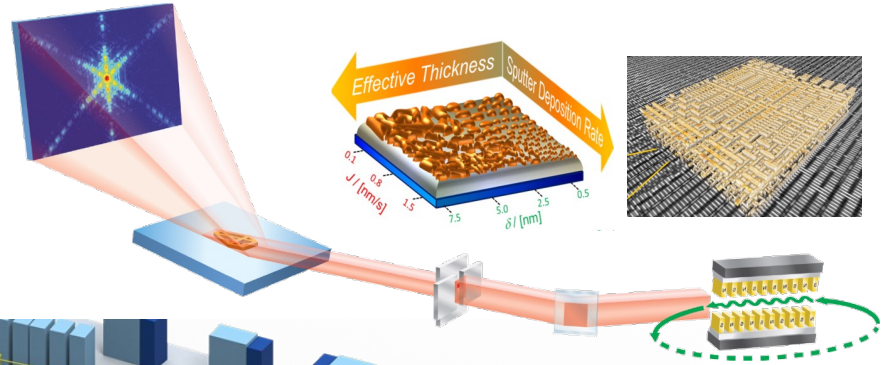
- X-ray Photon Correlation Spectroscopy - dynamics in hard and soft condensed matter
- APS-U installation status review (Completed)
- Installation of network infrastructure in June ’23
- Installation of beamline components from July ’23 – Dec. ’23
  - On schedule

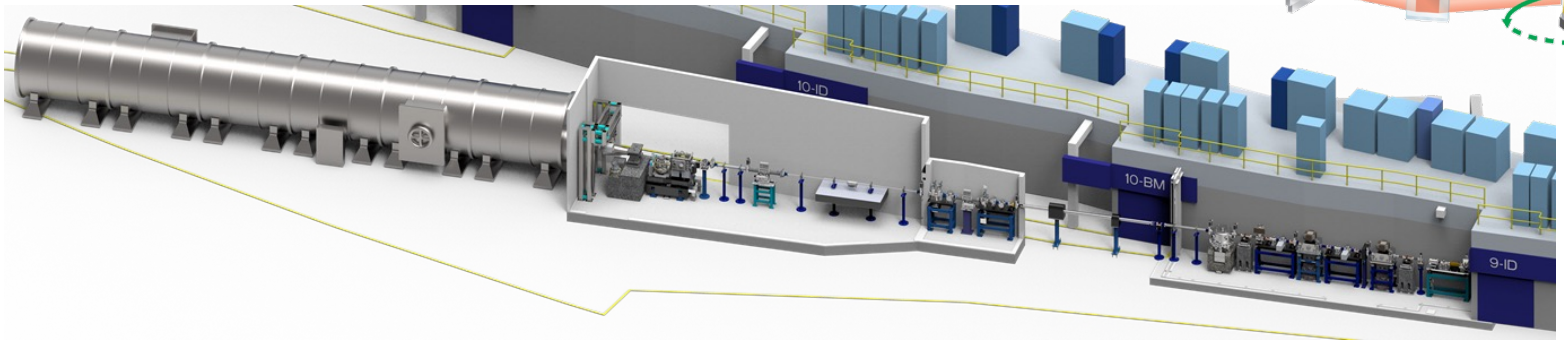


FEATURE BEAMLINE: COHERENT SURFACE SCATTERING IMAGING (CSSI)

- Combines *grazing-incidence x-ray scattering* with *coherent x-ray diffractive imaging*
- Lensless coherent imaging and metrology for low-dimensional, mesoscale, heterogeneous systems in 3D at surfaces and interfaces

Self-assembly on mesoscopic scales
Thin film and quantum dots
Surface/film nanopatterning and nanoelectronics





CSSI 9-ID – FEATURE BEAMLINE

- Coherent Surface Scattering Imaging with nanometer resolution in 3D
- “Grand Tube” vacuum flight path/radiation enclosure with motion for detectors (EIGER 16M)
- Installation of beamline components from Aug. ’23 – Jan. ’24
  - On schedule