

# **Status of NFPS MX**

# **Beamlines at SSRF**

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**National Facility for Protein Science in Shanghai  
/Shanghai Synchrotron Radiation Facility**

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# Shanghai Synchrotron Radiation Facility

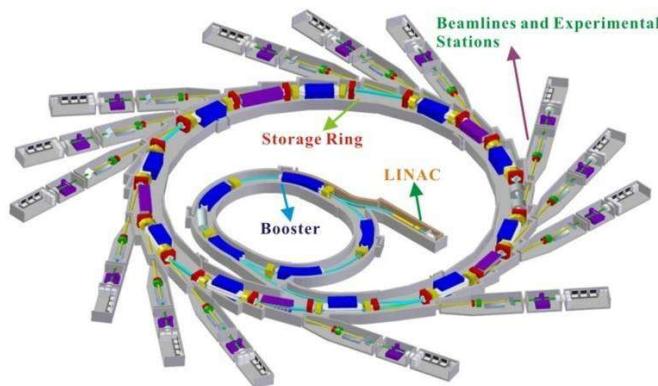
## SSRF Ring Parameters

Electron Energy: 3.5 GeV

Electron Current: 300 mA

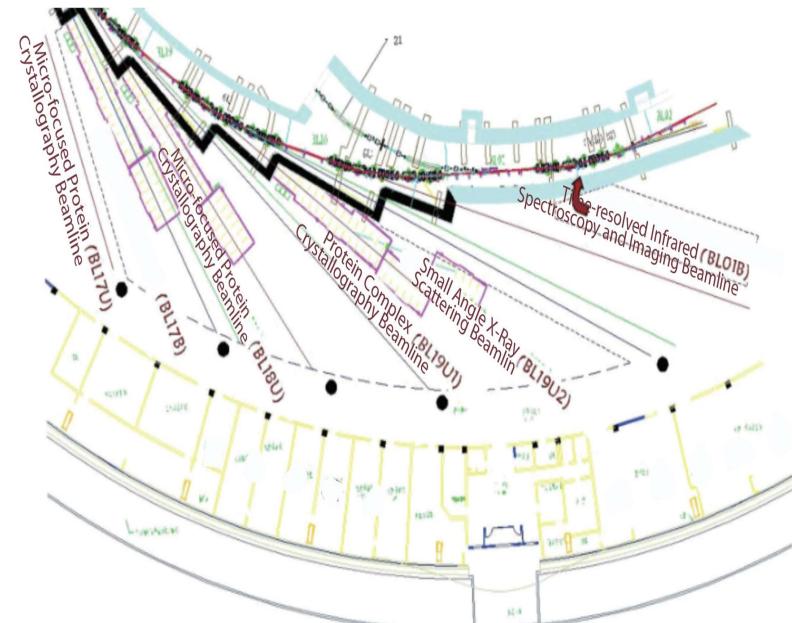
Circumference: 432 m

Straight sections: 20

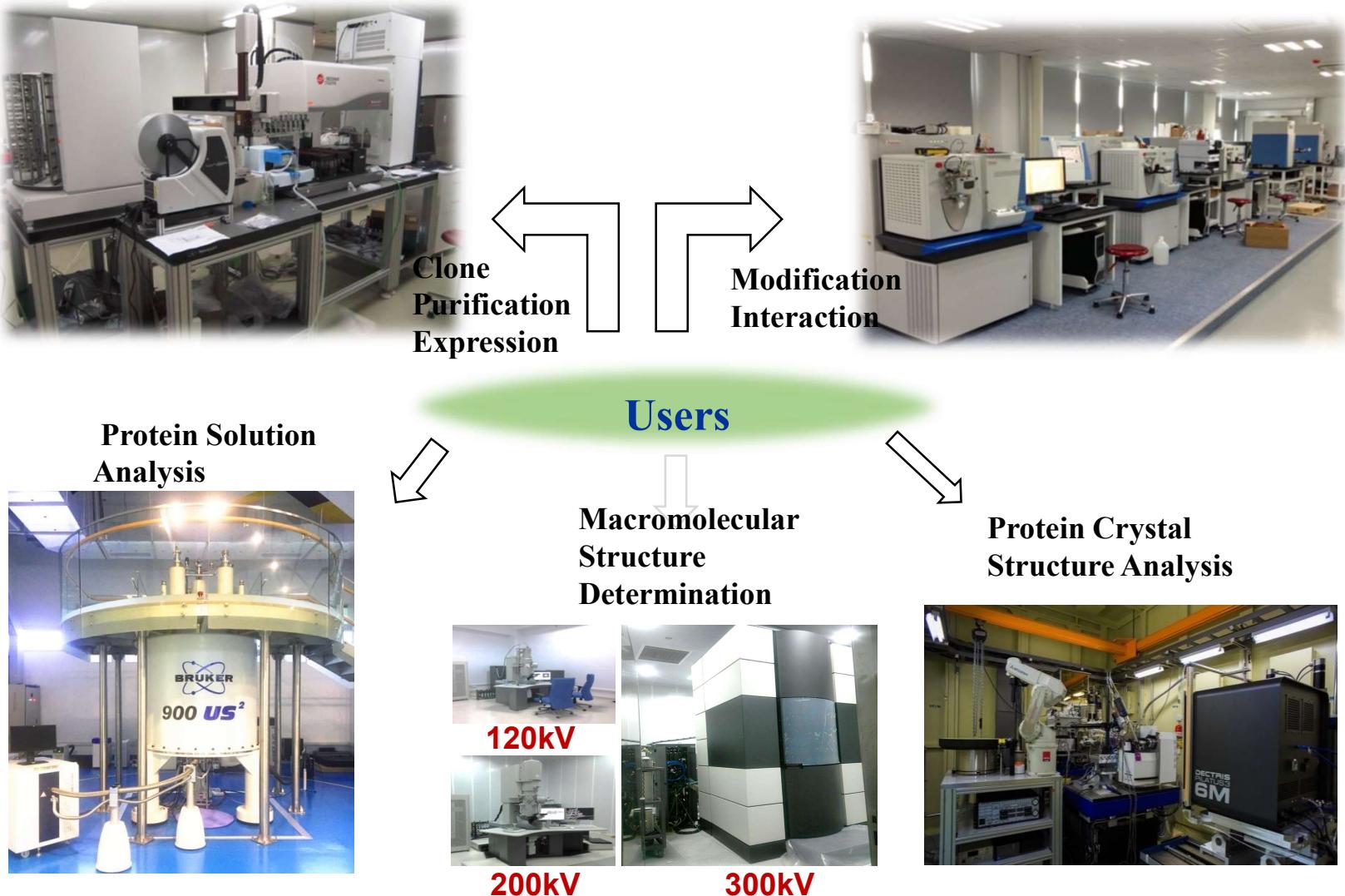


# National Facility for Protein Science . Shanghai

- NFPS passed the National Acceptance Review, and formally opened to the users in July 2015.
- NFPS is composed of 9 technology systems with state-of-the-art instruments in its Haik Road Campus and 5 Beamlines within the Shanghai Synchrotron Radiation Facility.



# Integrative Research at NFPS



# NFPS-MX Beamline Overview

- There are three protein crystallography beamlines to meet various requirements of structural determination for different types of crystals.
- Protein micro-crystallography beamline for small crystals.
- Protein complex crystallography beamline for crystals with big unit cell parameters.
- High-throughput crystallography beamline for high throughput screening.

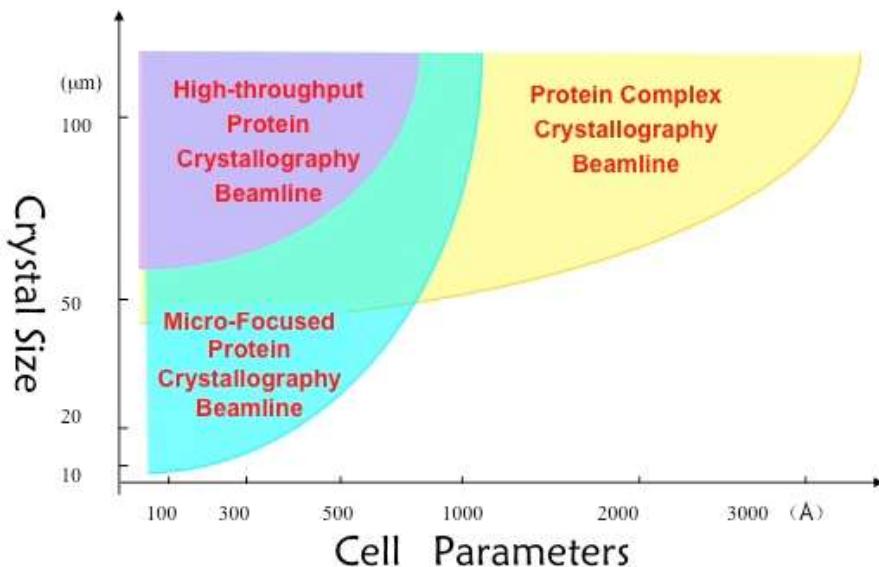


Table 1. Parameters of the Crystallography Beamlines

Beamline	Micro-focused Protein Crystallography Beamline	Protein Complex Crystallography Beamline	High-throughput Protein Crystallography Beamline
Energy Range	5~18 keV	7~15 keV	5~20 keV
Energy Resolution	$\leq 2 \times 10^{-4}$ @12keV	$\leq 2 \times 10^{-4}$ @12keV	$\leq 2 \times 10^{-4}$ @12keV
Intensity (@12keV @300mA)	$\geq 6 \times 10^{11}$ phs/s	$\geq 2 \times 10^{12}$ phs/s	$\geq 3 \times 10^{11}$ phs/s
Beam Size (@12keV) (H×V)	$25 \times 15 \sim 10 \times 5 \mu\text{m}^2$	$\leq 130 \times 80 \mu\text{m}^2$	$\leq 150 \times 180 \mu\text{m}^2$
Divergence (@12 keV) (H×V)	$\leq 0.7 \times 0.25 \text{mrad}^2$	$\leq 0.7 \times 0.25 \text{mrad}^2$	$\leq 1.5 \times 0.2 \text{mrad}^2$

# BL19U1- Protein complex crystallography beamline

Source: U20 in vacuum undulator

Focusing:  $120 * 80 \mu\text{m}^2$

Tunable: 7-15 keV

Flux:  $2*10^{12}\text{phs/s}@12\text{keV}@300\text{mA}$

Area Detector: Pilatus 3-6M

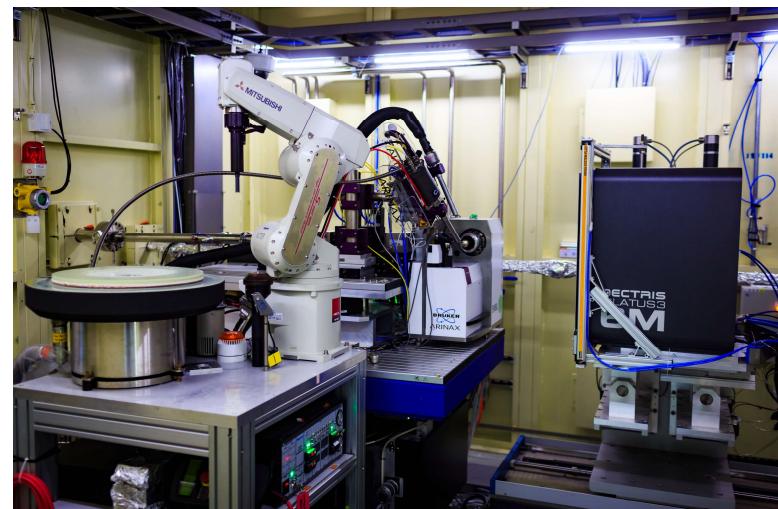
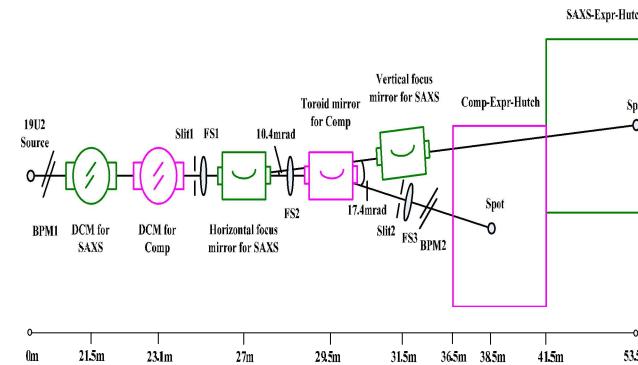
Goniometer: MD2

Sample Changer: Rigaku ACTOR

XRF Detector: Hitachi Vortex®-90EX

HClab for humidity control

Experiment-control software: Blulce



# BL18U- Protein micro-crystallography beamline

Source: U25 in vacuum undulator

Focusing:  $25 \times 15 \sim 10^5 \mu\text{m}^2$

Tunable: 5-18 keV

Flux:  $6 \times 10^{11} \text{ phs/s@12keV@300mA}$

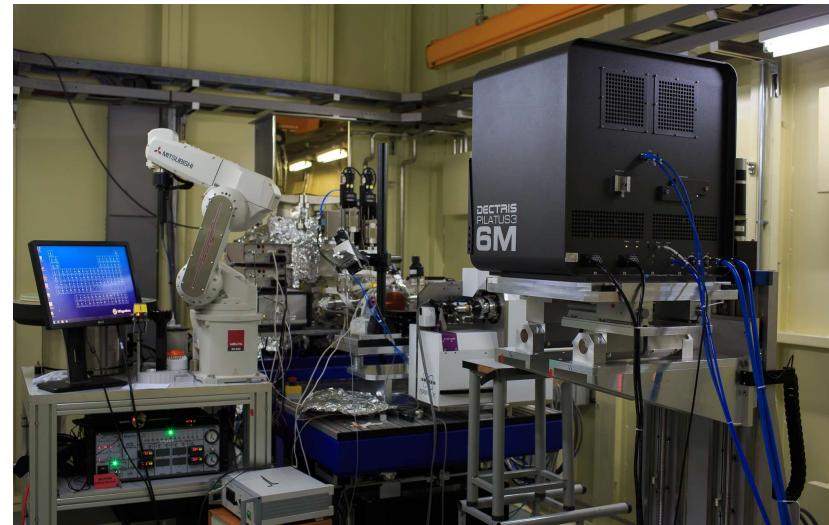
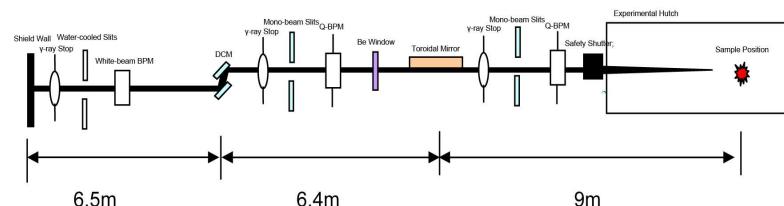
Area Detector: Pilatus 3-6M

Goniometer: MD2

Sample Changer: Rigaku ACTOR

XRF Detector: Hitachi Vortex®-90EX

Experiment-control software: Blulce



# BL17B- High-throughput crystallography beamline

Source: Bending Magnet

Focusing:  $120 * 80 \mu\text{m}^2$

Tunable: 5-20 keV

Flux:  $3*10^{11}\text{ phs/s}@12\text{keV}@300\text{mA}$

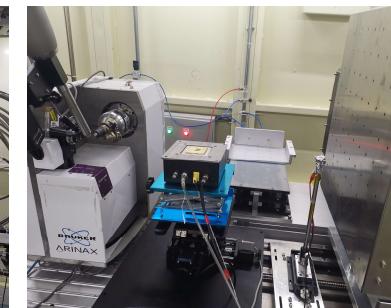
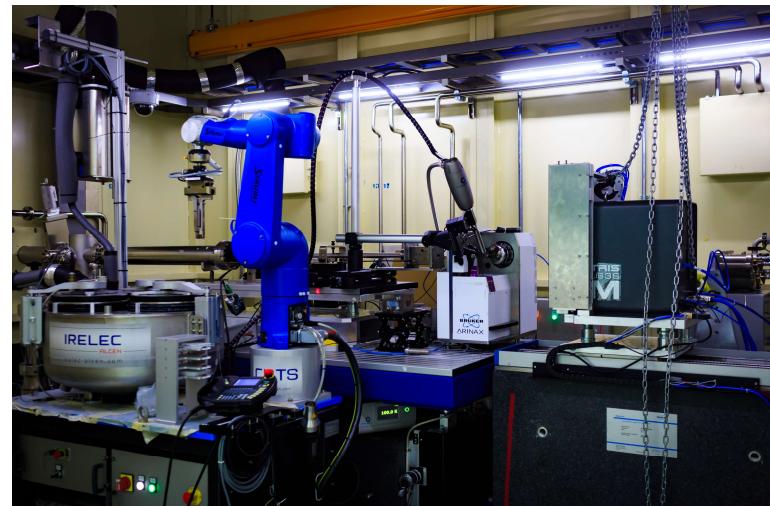
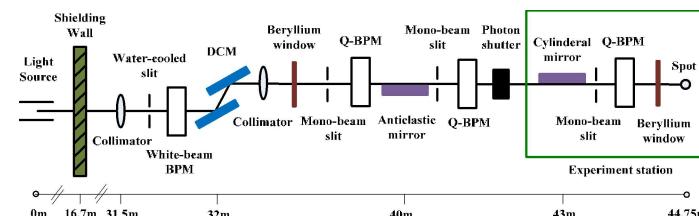
Area Detector: Pilatus 3-2M

Goniometer: MD2

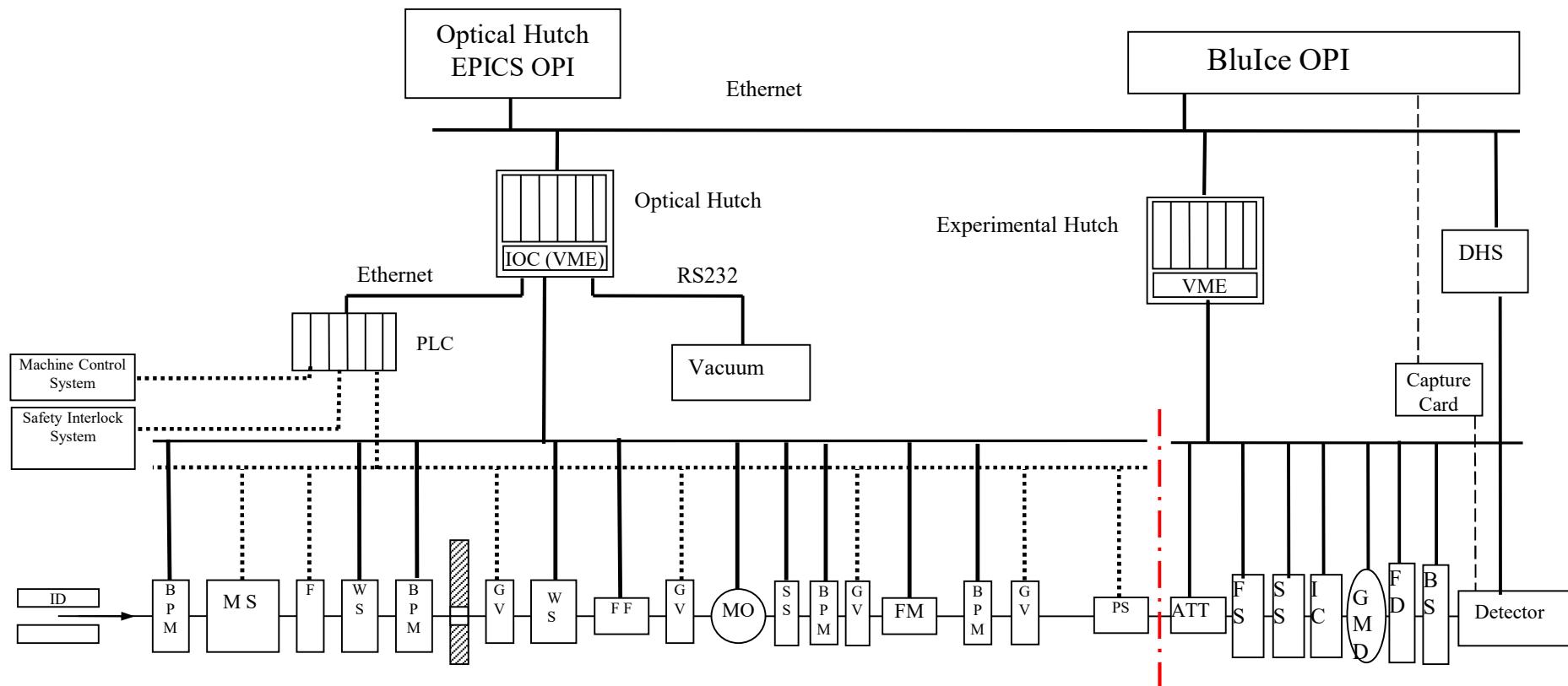
Sample Changer: Irelec-CATS

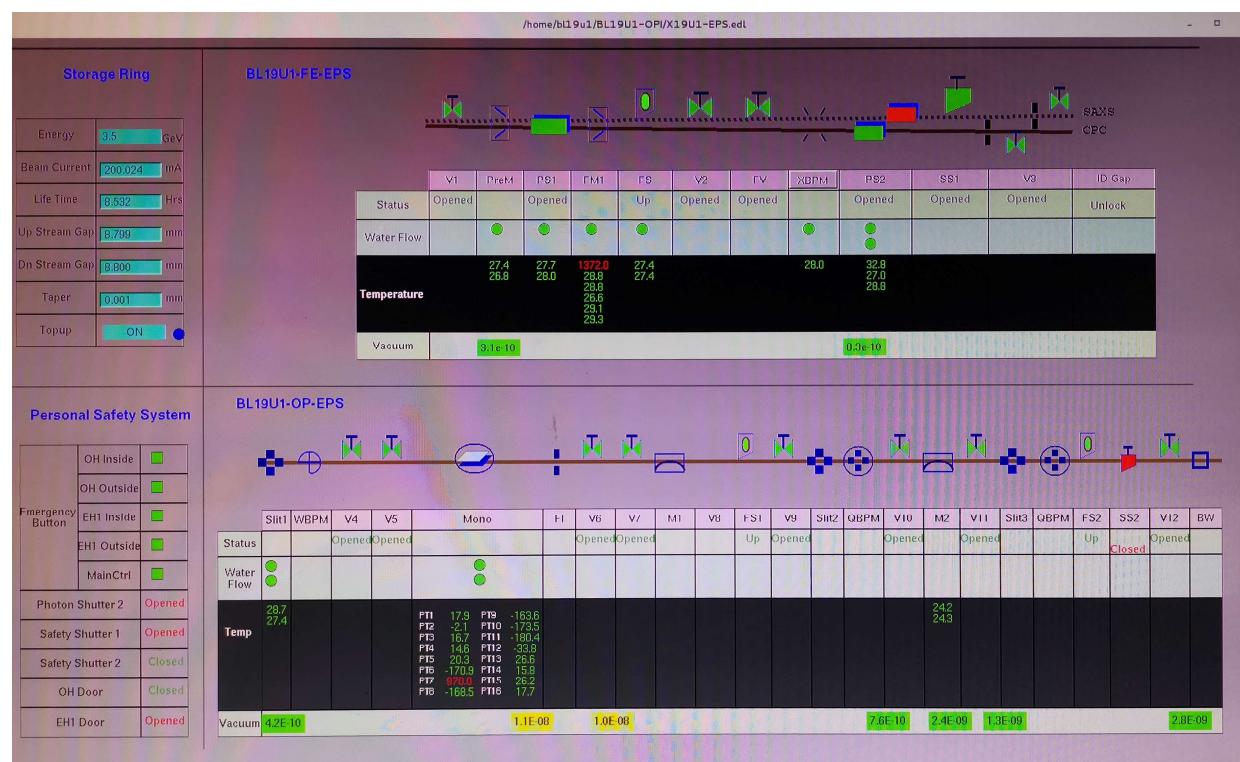
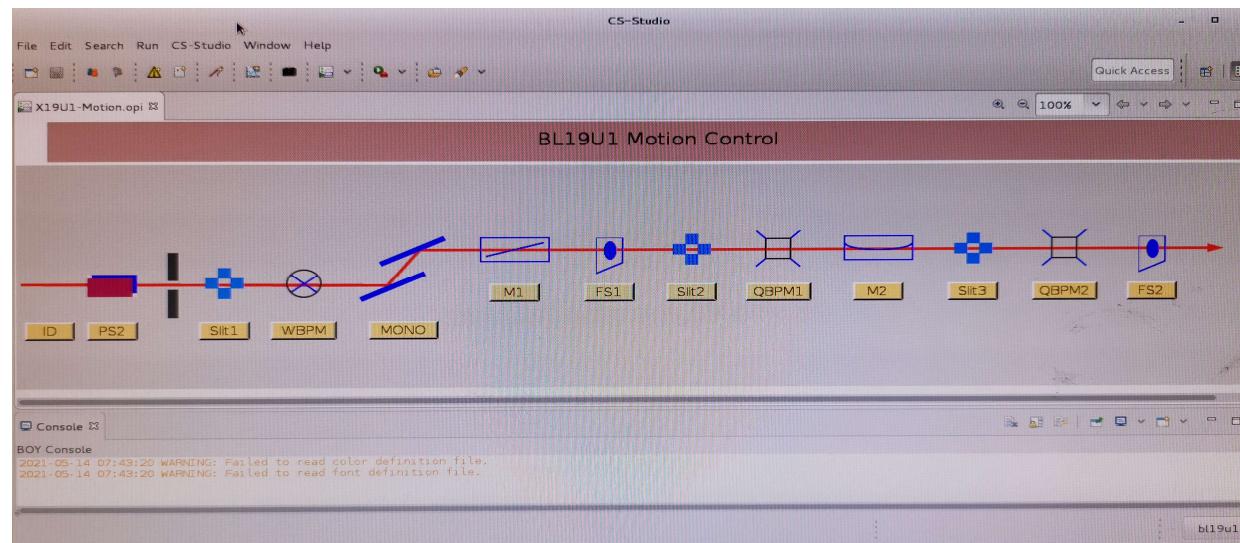
XRF Detector: Hitachi Vortex®-90EX

Experiment-control software: Blulce

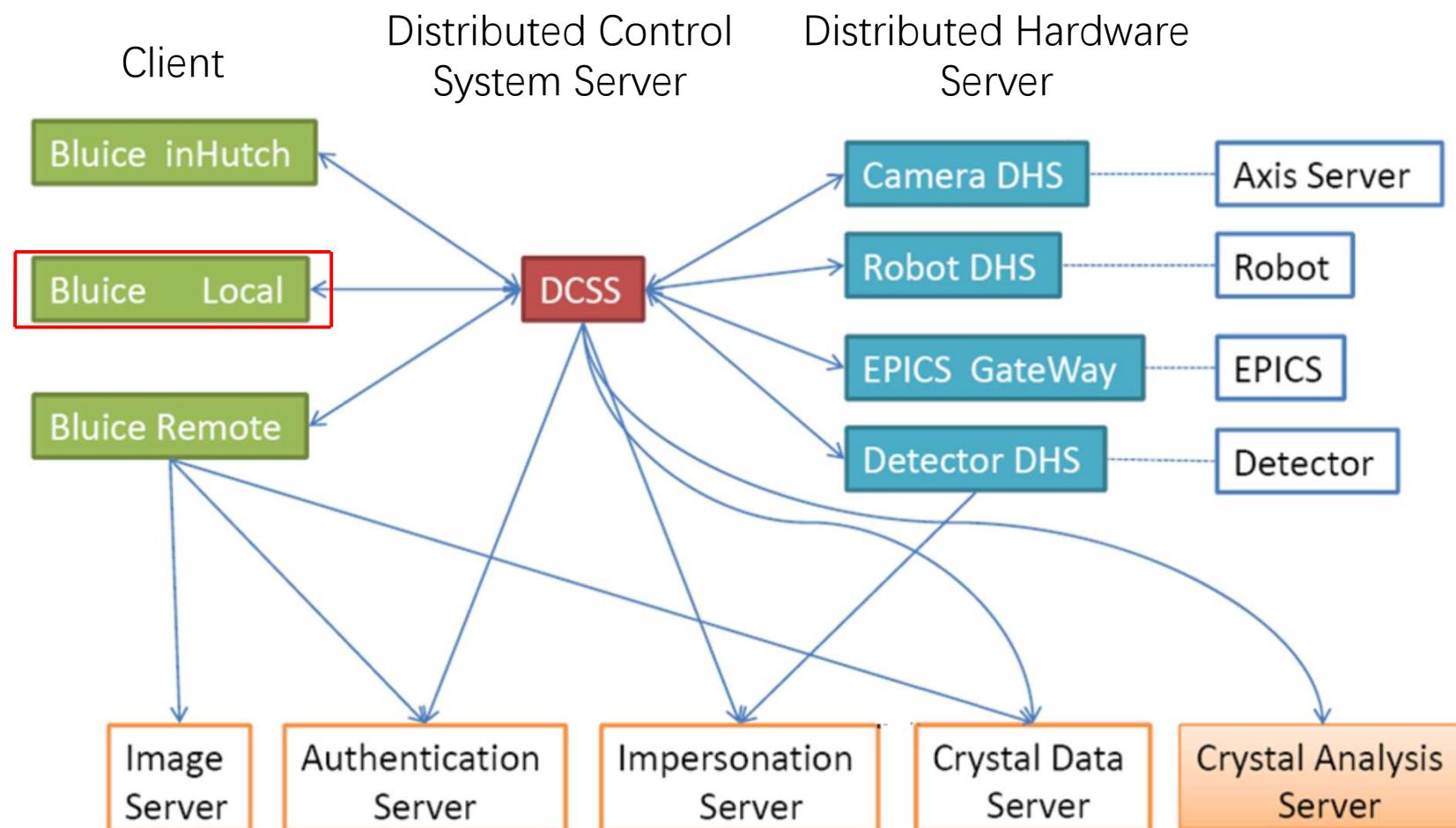


# Beamline-control software(EPICS+BluIce)

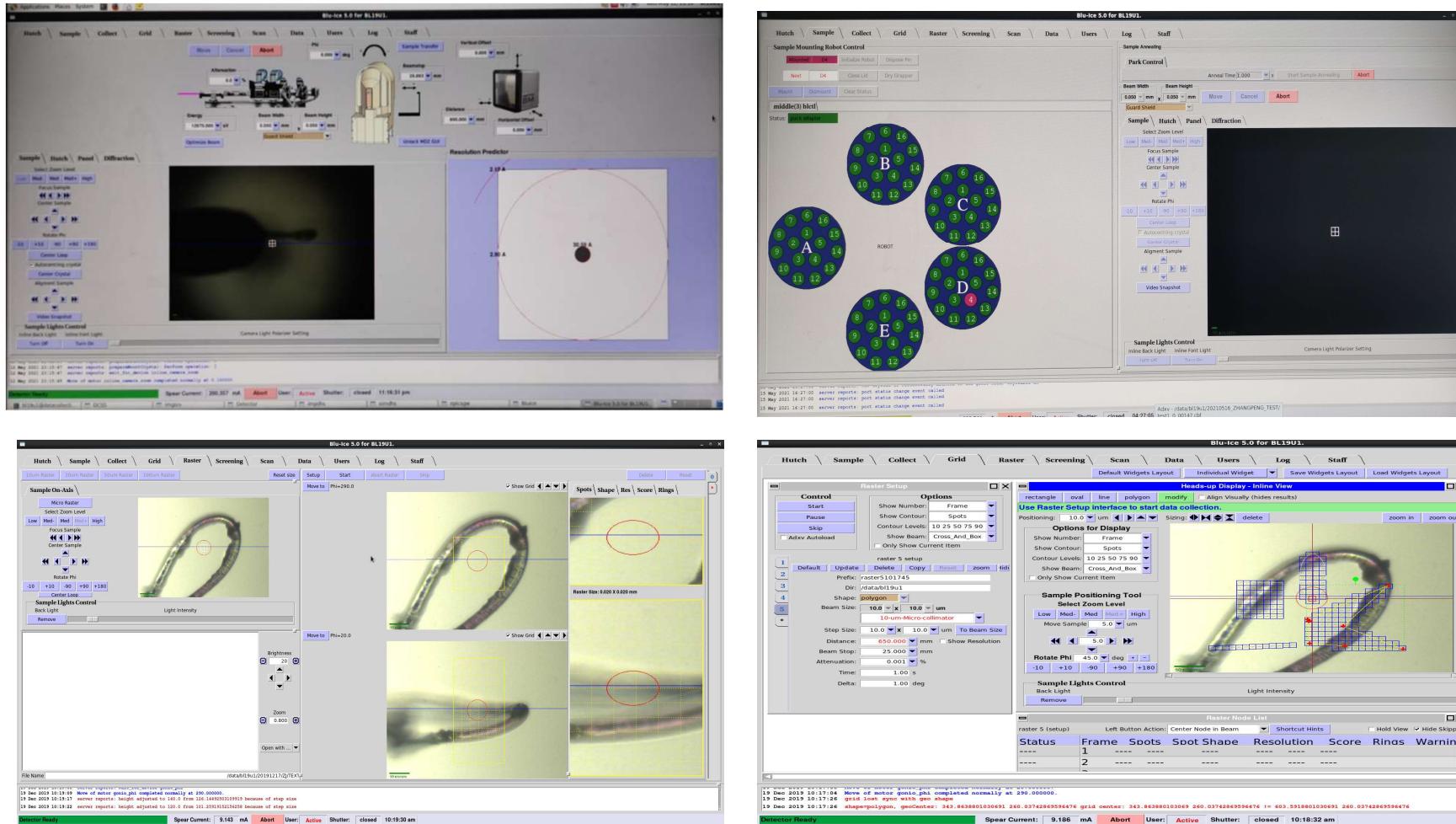




# Experiment-control software(Bluice)

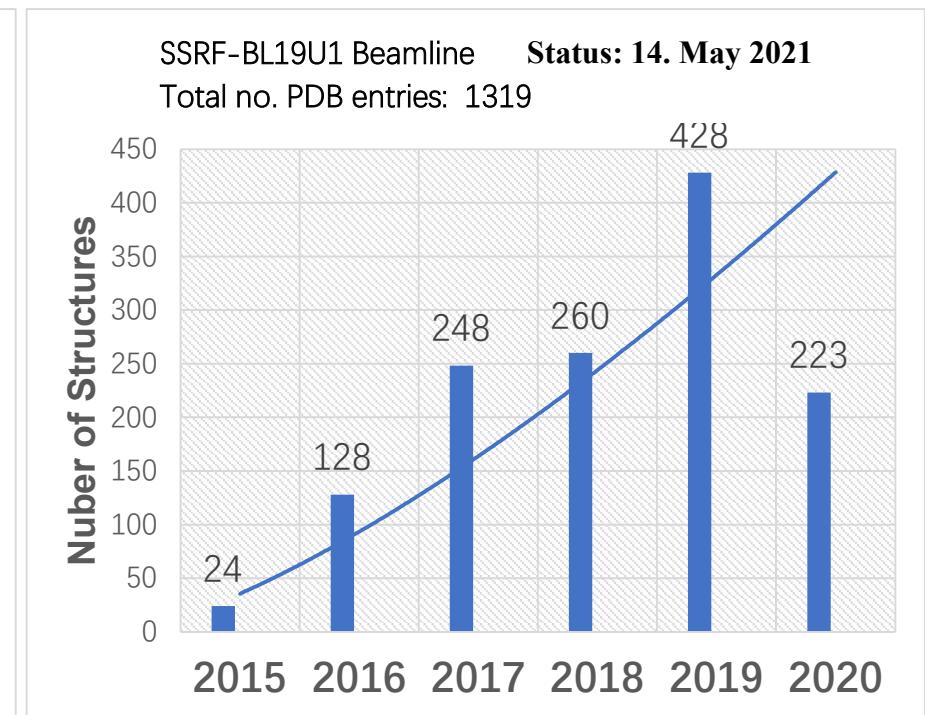
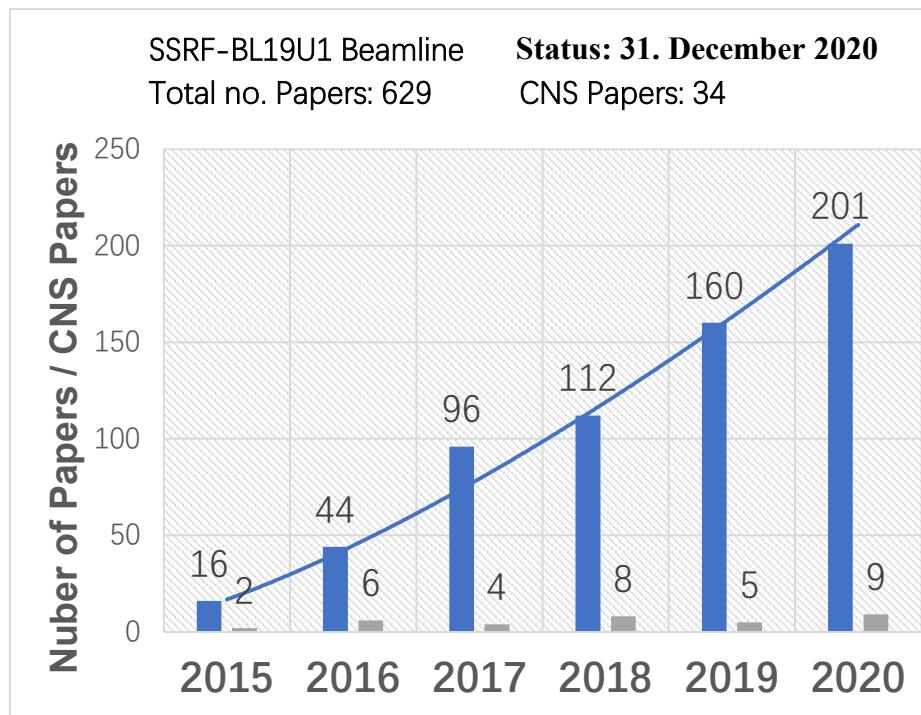


# Blulce GUI



# NFPS-MX Beamline User Community

More than 300 user groups,  
About 1000 Papers, 43 CNS papers  
More than 2000 PDB entries



source:[biosync.sbk.org](http://biosync.sbk.org)

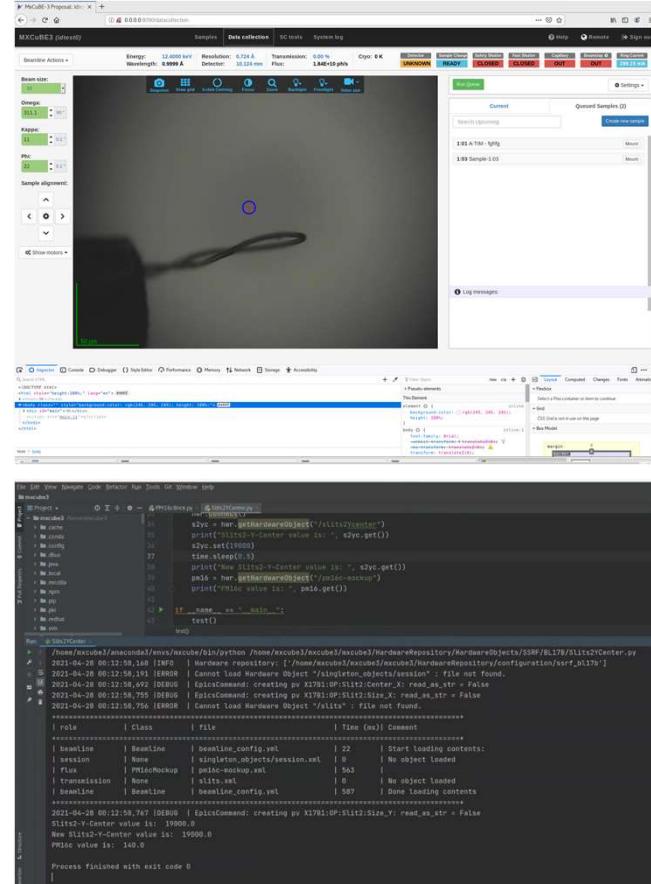
# MXCUBE Status

**We are at the very beginning!**

- ◆ What we did
- ◆ What we tried
- ◆ What we are planning to do

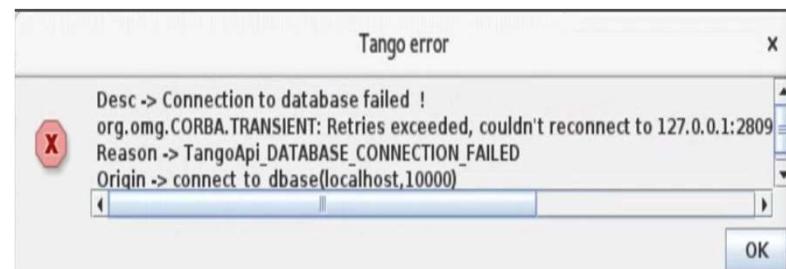
# What We Did

- ◆ Install the test version of MXCUBE3
- ◆ Read documents and codes to figure out how it works
- ◆ Figured out how it communicates with EPICS
- ◆ Control Motors and Detector through EPICS



# What We Tried

- ◆ Tried to control MD2 through tango server without database
  - ◆ Tried to control CATS robot through PyTango and PyCATS
  - ◆ Tried to control Pilatus 2M detector with lima-camera-Pilatus-tango
  - ◆ Tried to setup tango database
- Although PyCATS /PyTango /lima-camera were installed successfully, we got problems on setup tango database.



# What We are Planning to Do

EPICS

- All the Equipment in Optical Hutch (Energy, Mirrors..)
- Detector(Pilatus/MarCCD)
- Detector Distance
- Attenuator
- Fluoresce Detector
- Ion Chamber
- ...

Exporter

- MD2 MiniDiff
- shutter

Tango

- pyCATS—CATS Sample Changer?
- pyTango-ACTOR Sample Changer?

# **Thank you for your attention!**

## **Acknowledgments:**

- - Shanghai Sychrontron Radiation Facility
- - Mikel Eguiraun and Jie Nan from MAX IV
- - Arinax, Dectris, Rigaku, Irecle
- - MXCube community.