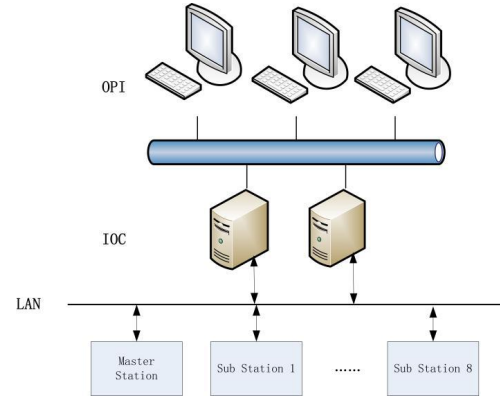




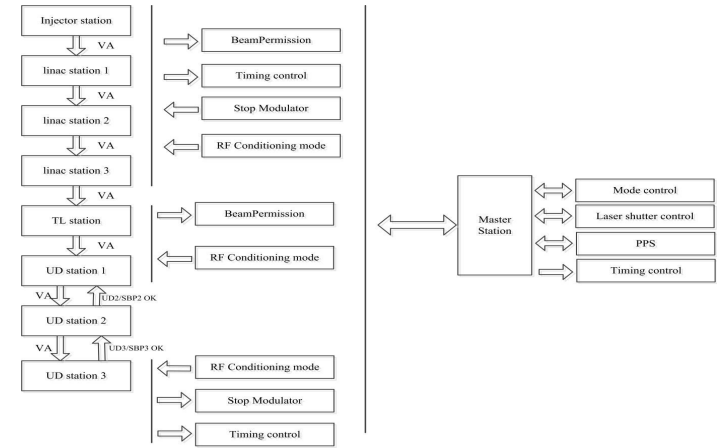
Shanghai Advanced Research Institute, Chinese Academy of Sciences, Shanghai, P.R China

## Introduction and system structure

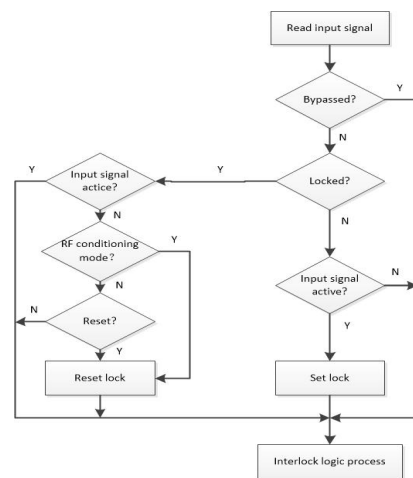
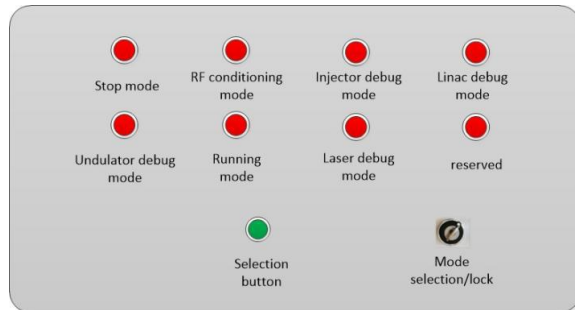
- Master-Slave scheme
- based on EPICS
- Omron PLC is used



## Signal interaction



## Operation mode design



## Operation GUI

- MOXA DA-662 embedded IOC sever
- OPI is designed by EDM, which is composed of the main interface of MPS and various sub-interfaces.

## Conclusion

After a long-term operation measurement, the SXFEL-UF MPS is stable and reliable, and the interlocking function is running normally, which effectively meets the requirements of debugging and operation at various stages.



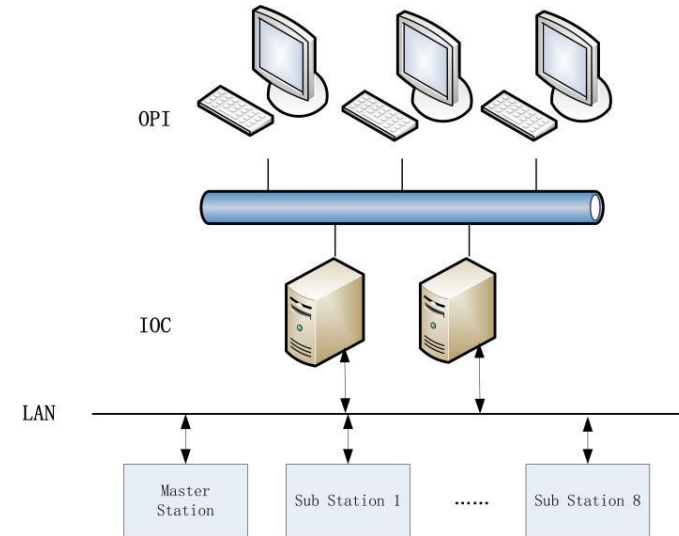
The global interface of SXFEL-UF MPS

# Introduction

- SXFEL-TF has been successfully completed in 2020, and SXFEL-TF is a critical development step toward the construction of a soft X-ray FEL user facility in China and has been currently undergoing commissioning at the Shanghai Synchrotron Radiation Facility (SSRF) campus.
- There are two FEL line in user facility named SXFEL beamline project (BSP) and undulator (UD) , and the corresponding design of MPS is completed.

# MPS Component

- base on EPICS
- MOXA DA-662 embedded computer is used as IOC server
- Master-Slave scheme
- 9 stations have been arranged for total interlock processing together
- At present, the number of interlocking input/output signals is about 1000, the main equipment interlocking signals are listed.



No.	device/signal	number
1	timing control	17
2	vacuum warn and alarm	234
3	pump power supply	302
4	vacuum valve status and control	135
5	modulator status and control	51
6	PPS signal	12
7	cooling water status	78
8	RF switch signal	8
9	Leakage/pressure monitor signal	24

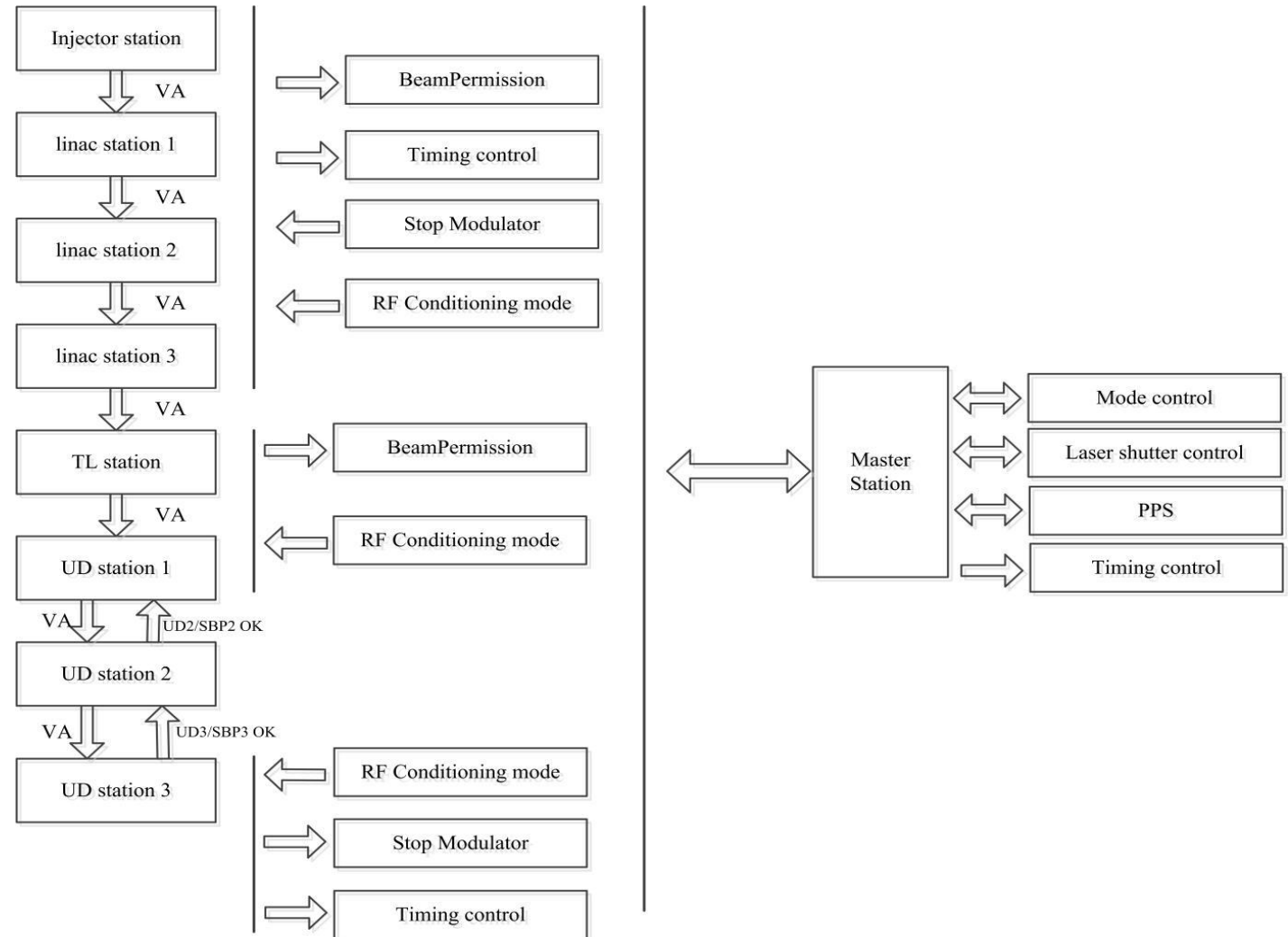
# Function Realization

## Master station

- operation mode management
- synthesize the selected mode and interlock input signals
- process and control the global signals
  - Beam permit.
  - Timing system permit signals.
  - Driving laser shutter.
  - PPS and shutter permit.
  - Undulator line selection.
  - Operation mode switching.

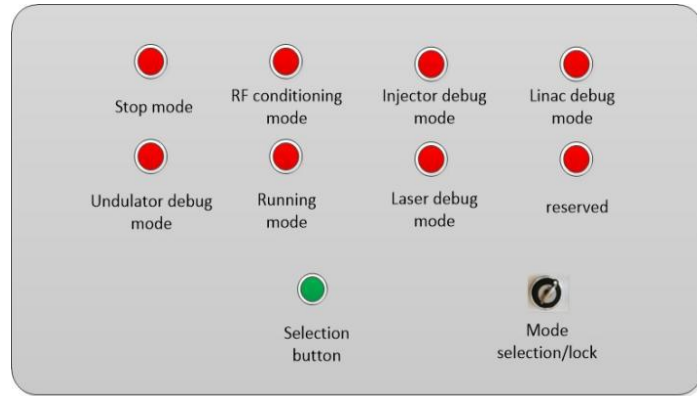
## Sub station

- process and control the local signals
  - vacuum
  - valves
  - water cooling
  - air pressure
  - water leakage
  - modulator

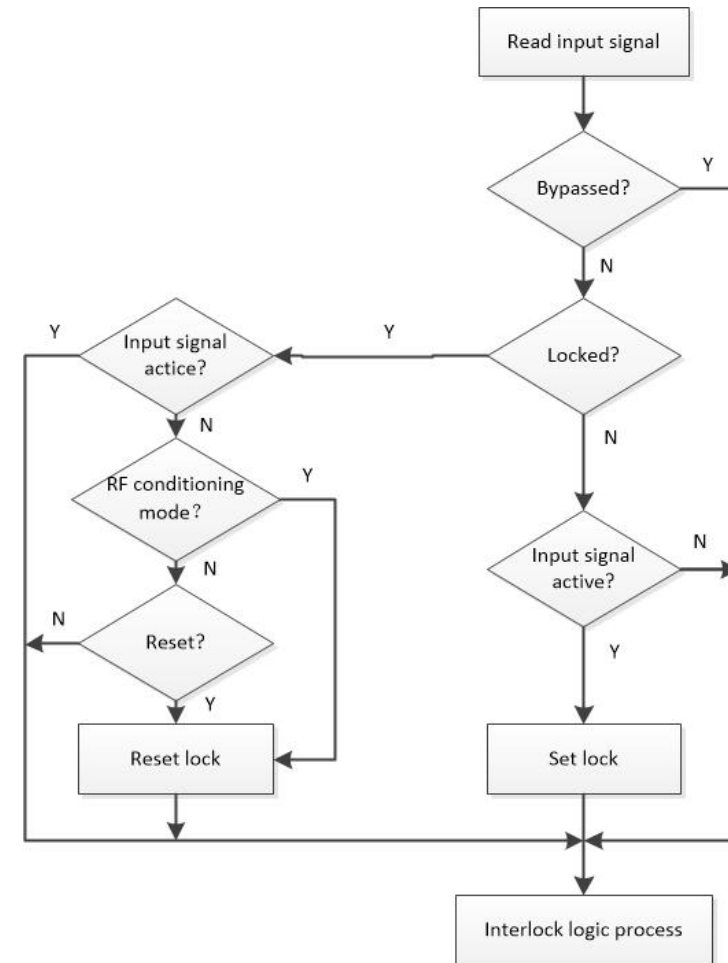


# Operation Mode Design

- 7 operation modes are realized in SXFEL-UF MPS, which continuing the original design in test facility.
- Two beamlines can be chosen flexibly, and the beamline selection is achieved individually.



According to the operation mode(RF conditioning mode), each sub-station will determine whether the local signals needs to be latched.



# Operaton GUI

- The operator interface (OPI) is developed by EDM, which is composed of the main interface of MPS and various sub-interfaces.

## Conclution

- Based on the architecture of Master main station and local sub-station design, interlocking protection with operation mode switching and management functions is realized.
- Through online testing, the response time of the system is less than 15 ms.
- After a long-term operation measurement, the SXFEL-UF MPS is stable and reliable, and the interlocking function is ruuning normally, which effectively meets the requirements of debugging and operation at various stages.

