

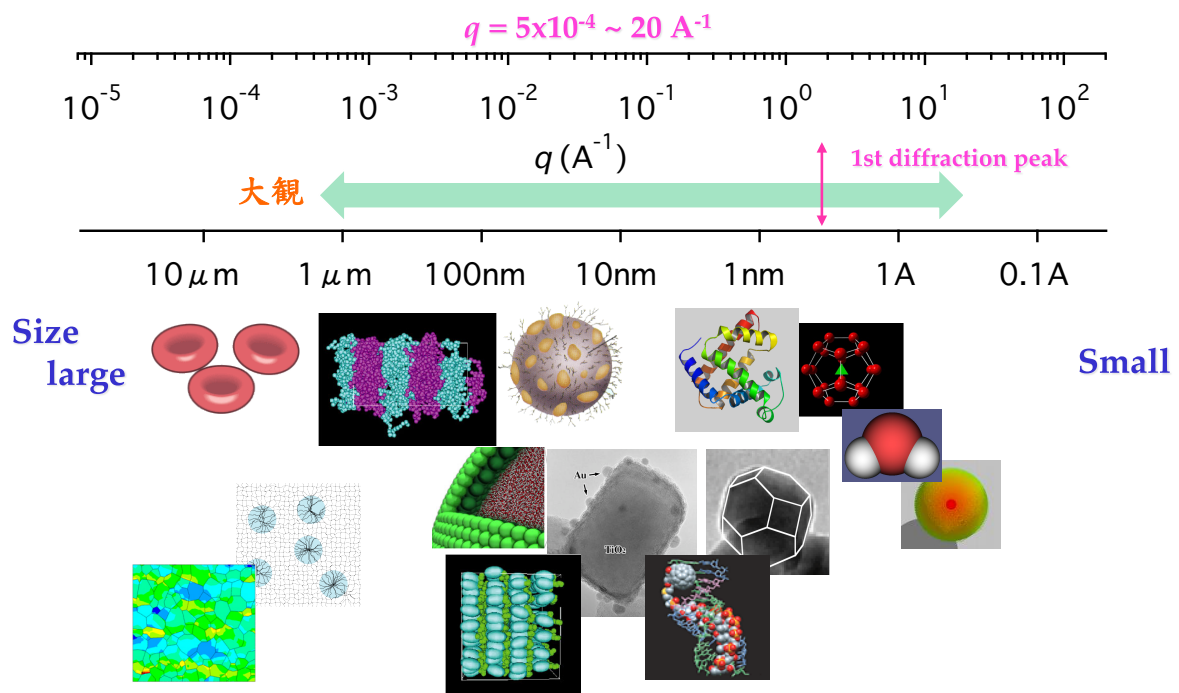
Development of Smaller-Angle Neutron Scattering Instrument TAIKAN (大観) of J-PARC

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 T. Nakatani, Y. Inamura, K. Suzuya, K. Aizawa, M. Arai,
 T. Otomo, H. Iwase, K. Ohishi, T. Ito, H. Kira, M. Sugiyama

Instrument Scientist Workshop, 2011/11/20, EPOCAL

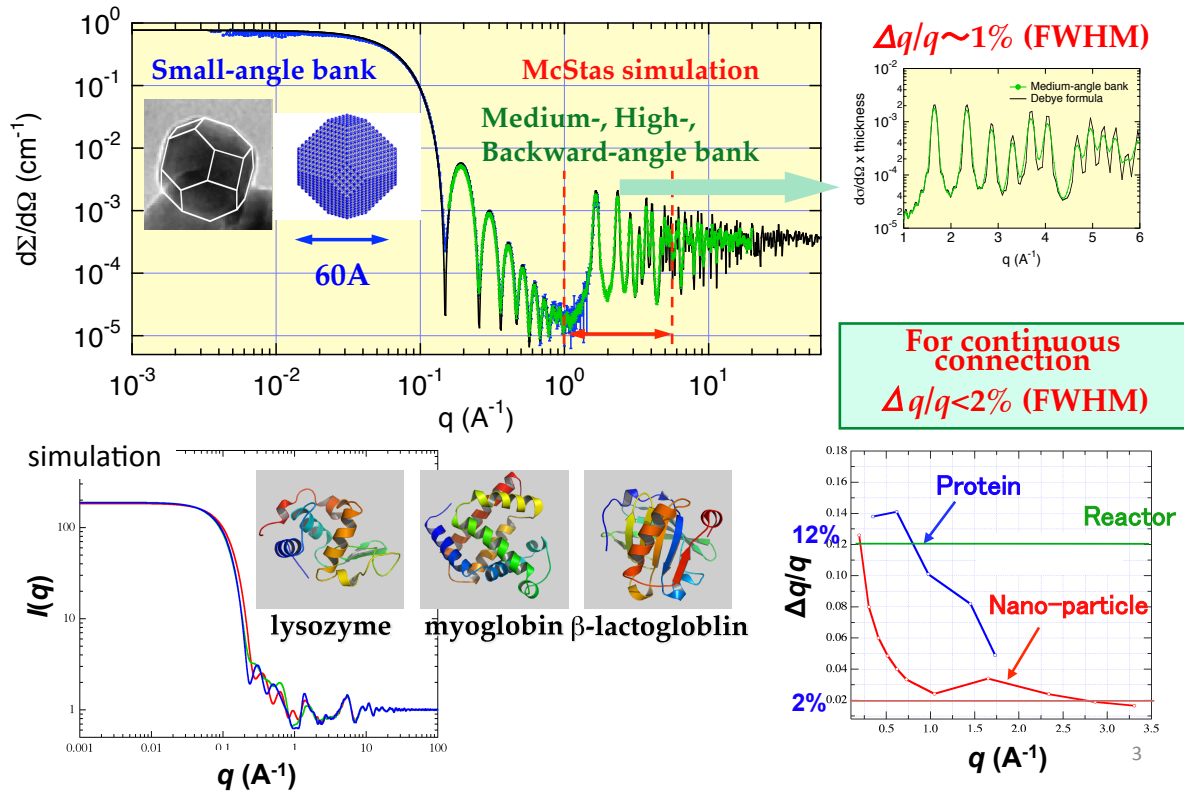


Small-Angle Neutron Scattering Method



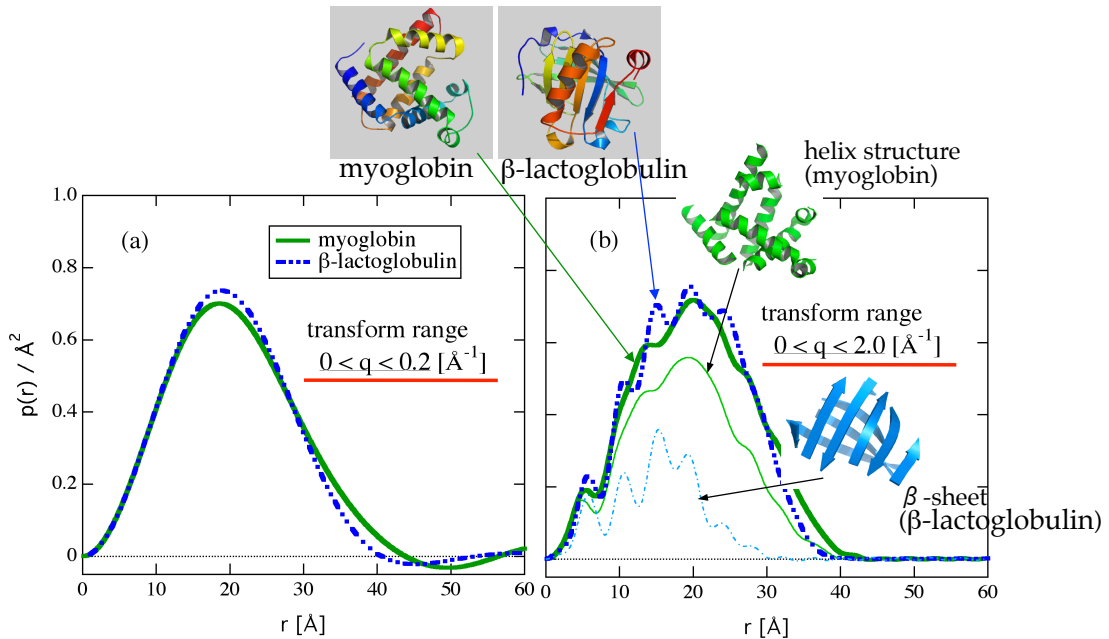
Various Scientific Fields

q-Range and q-Resolution

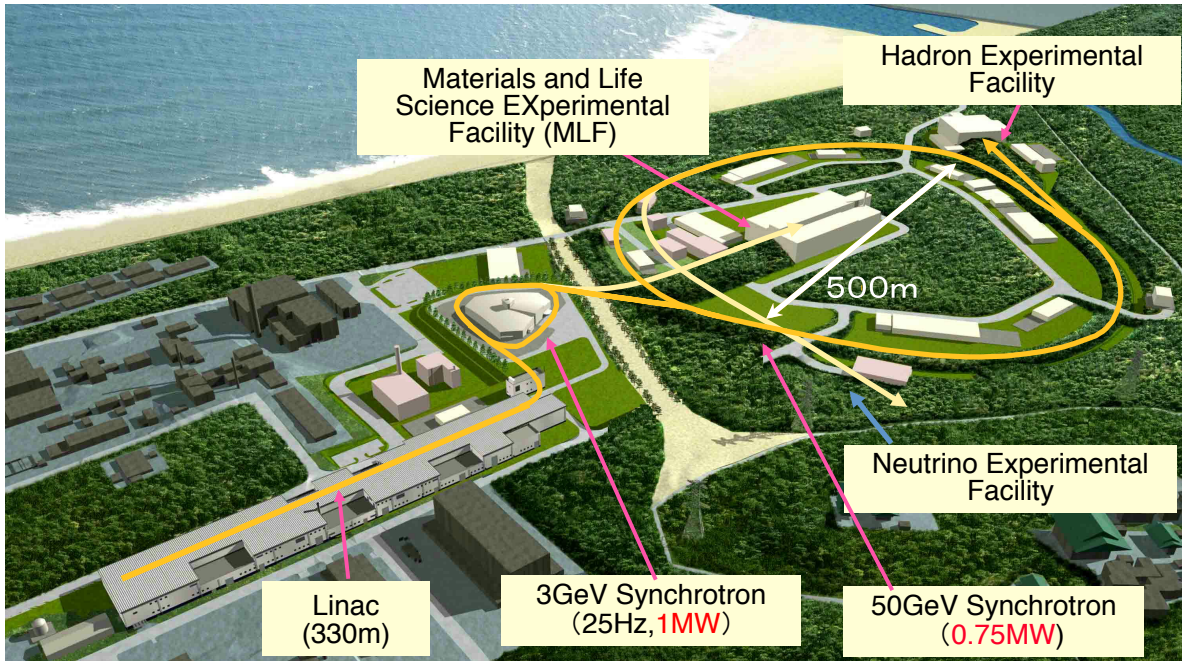


Merit of Wide- q Measurement

Pair distribution function

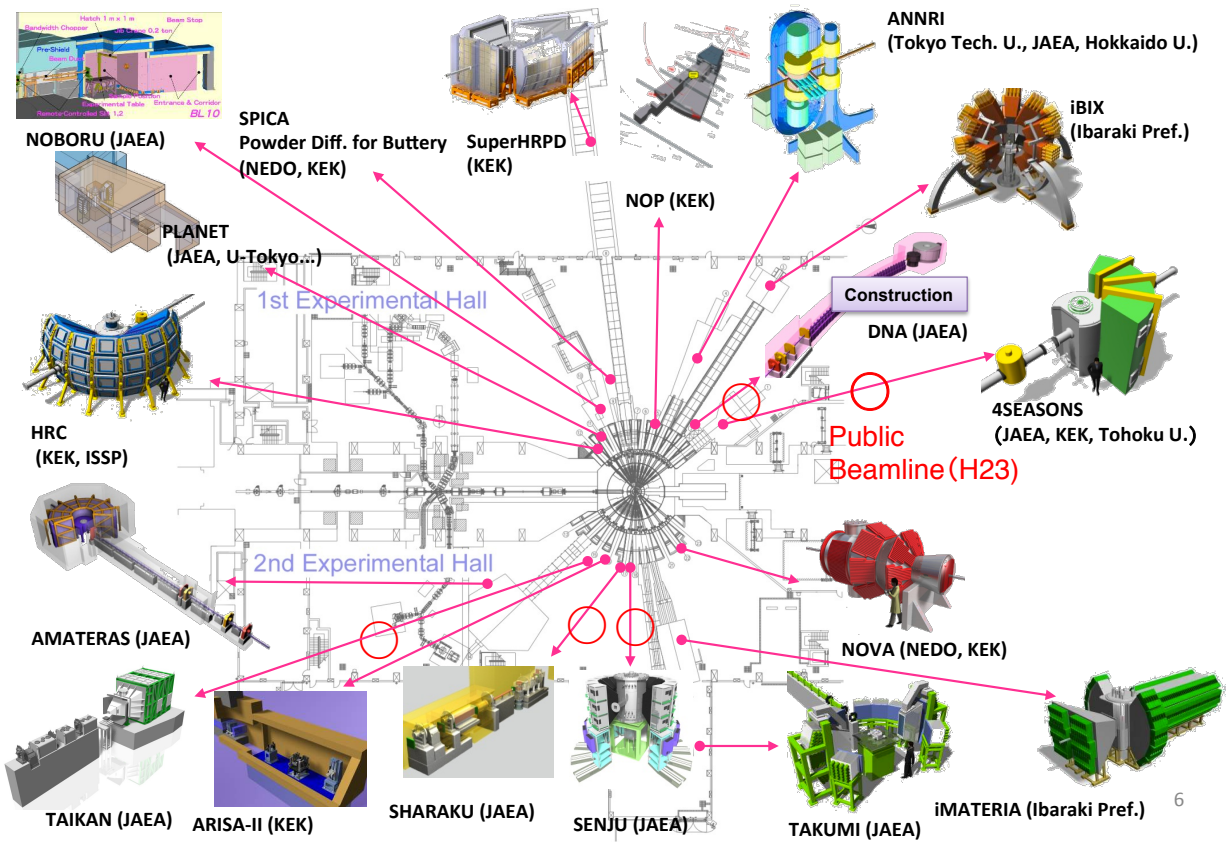


J-PARC (Japan Proton Accelerator Research Complex)



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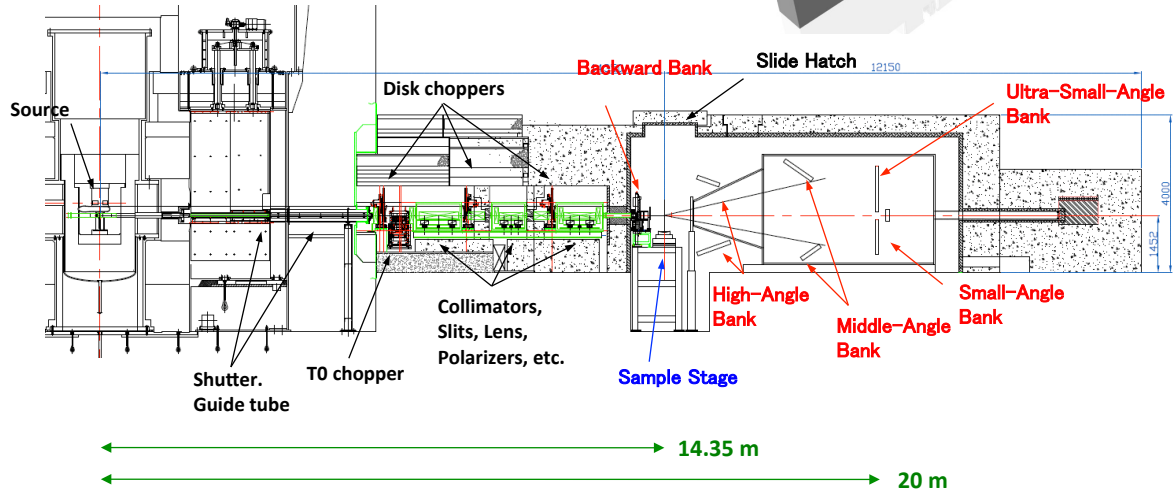
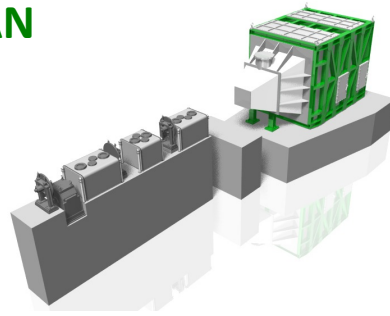
Neutron Instruments @ MLF



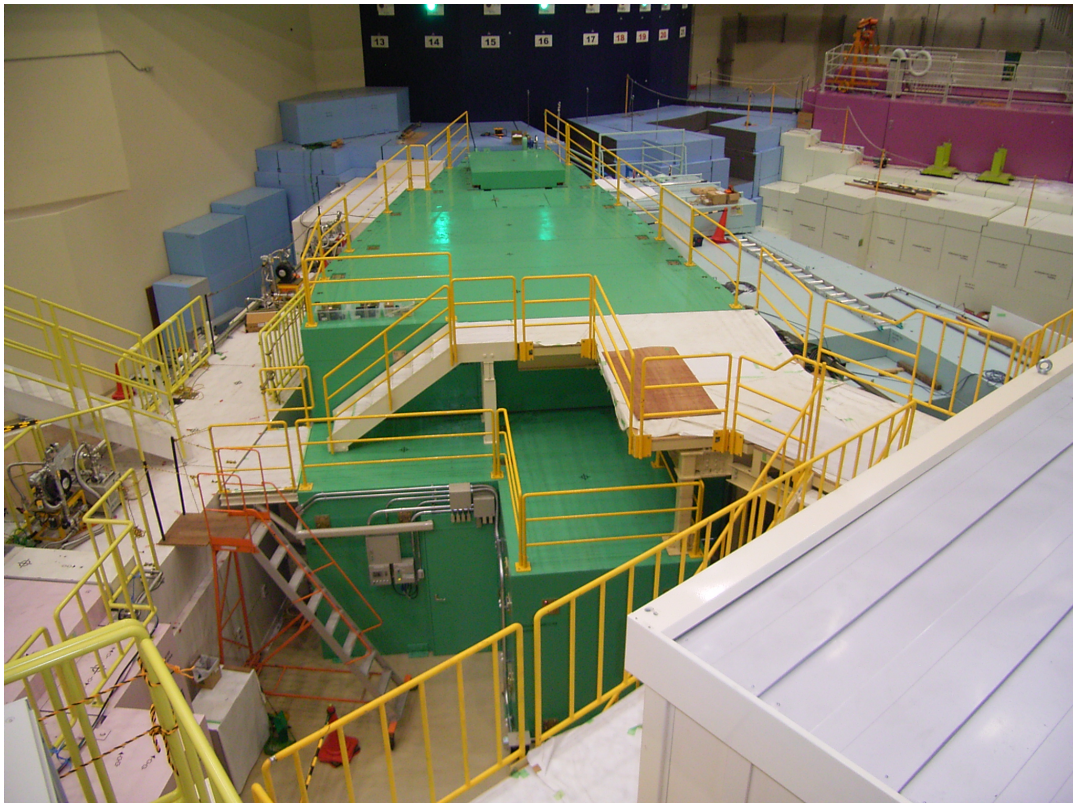
6

Layout of TAIKAN

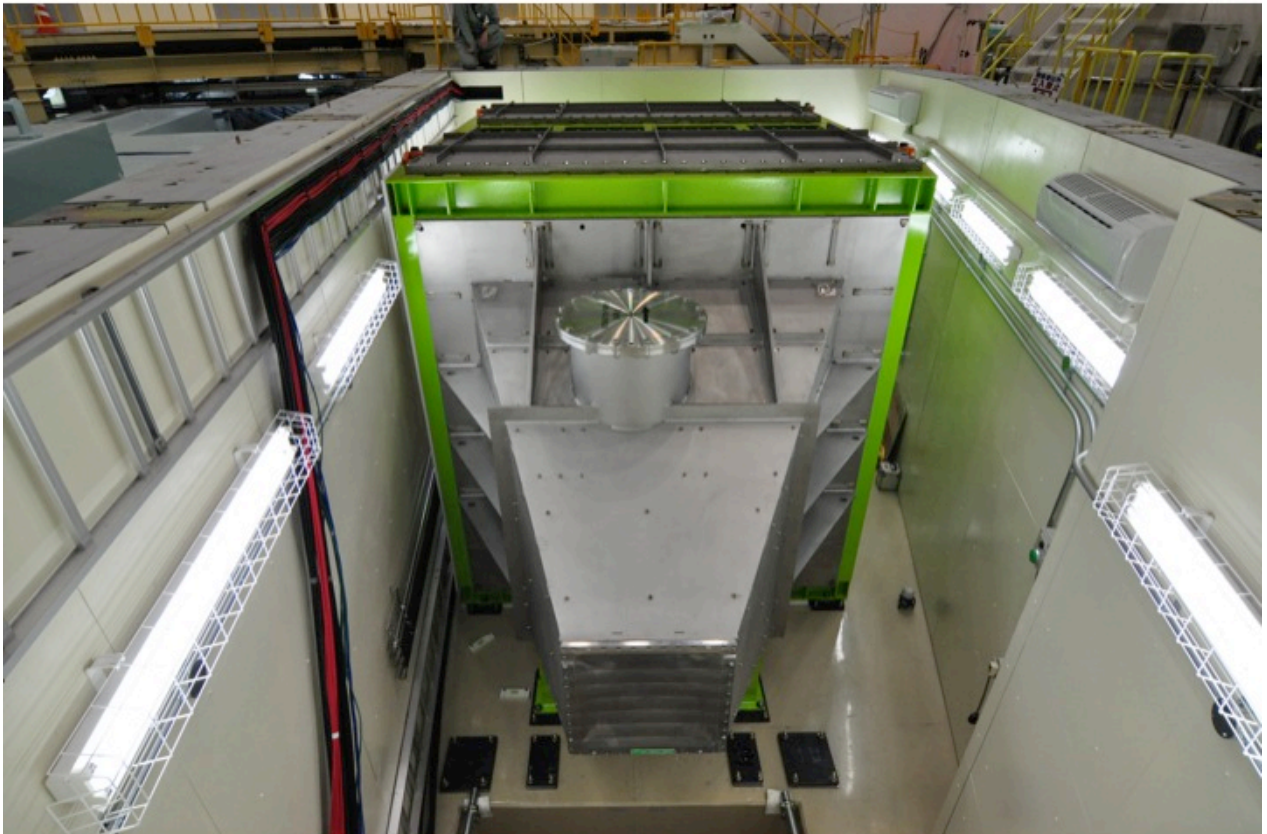
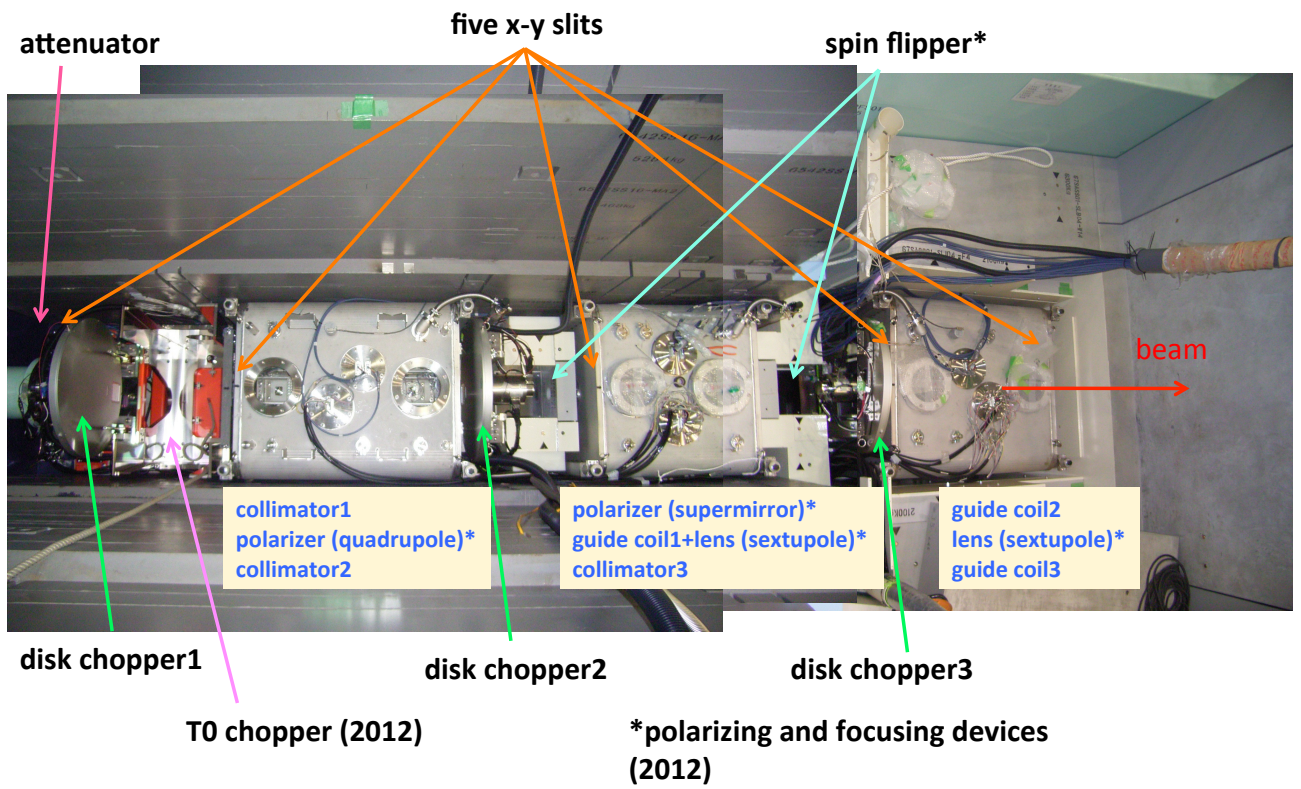
Beam port: BL15 (Coupled moderator)
Wavelength : $\lambda = 0.8(0.4) \sim 7.8 \text{ \AA}$

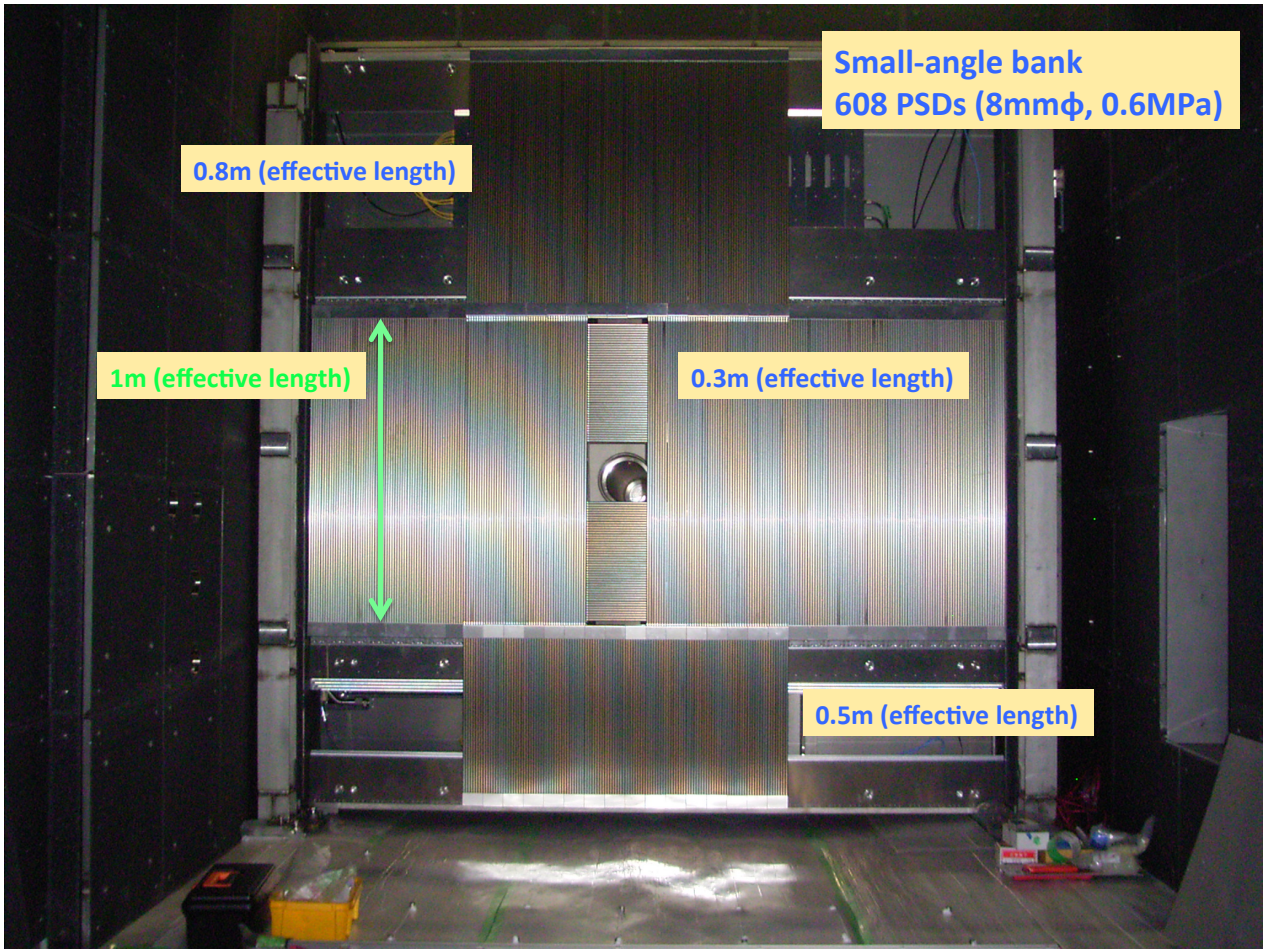


TAIKAN

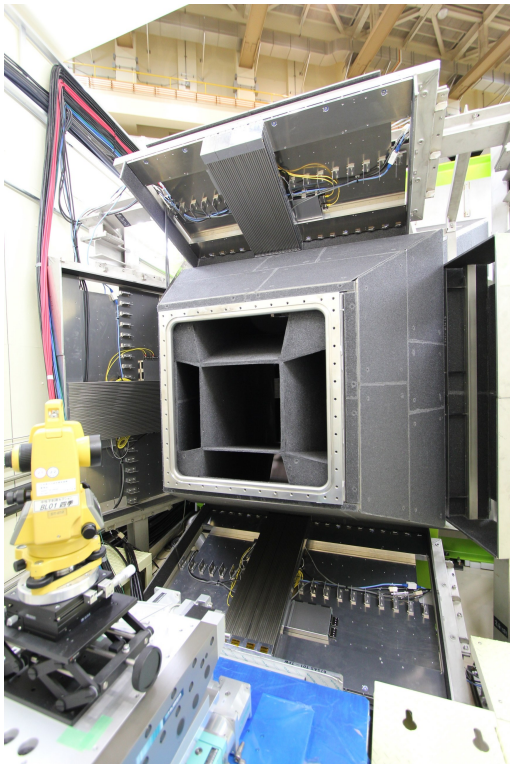


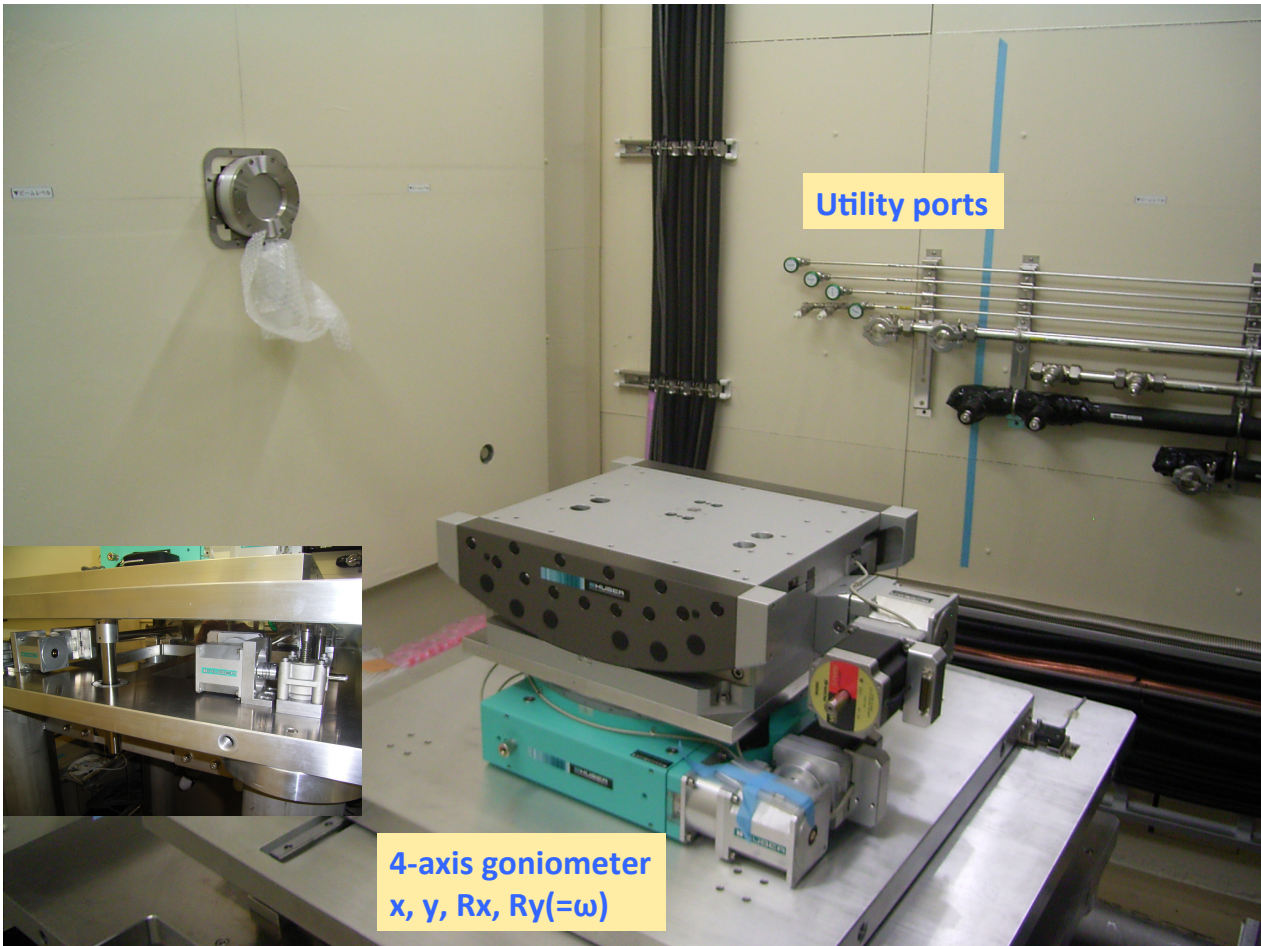
Optical devices in the beam line





High-Angle Bank





Utility ports

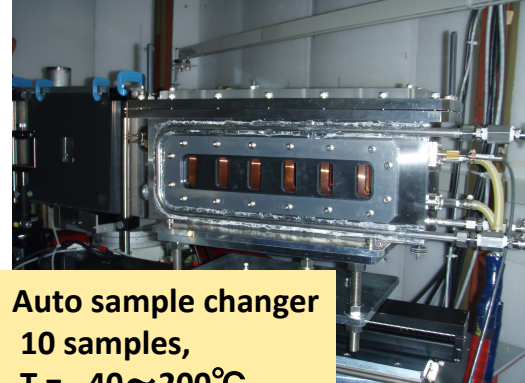
4-axis goniometer
x, y, Rx, Ry(=ω)

Sample environment

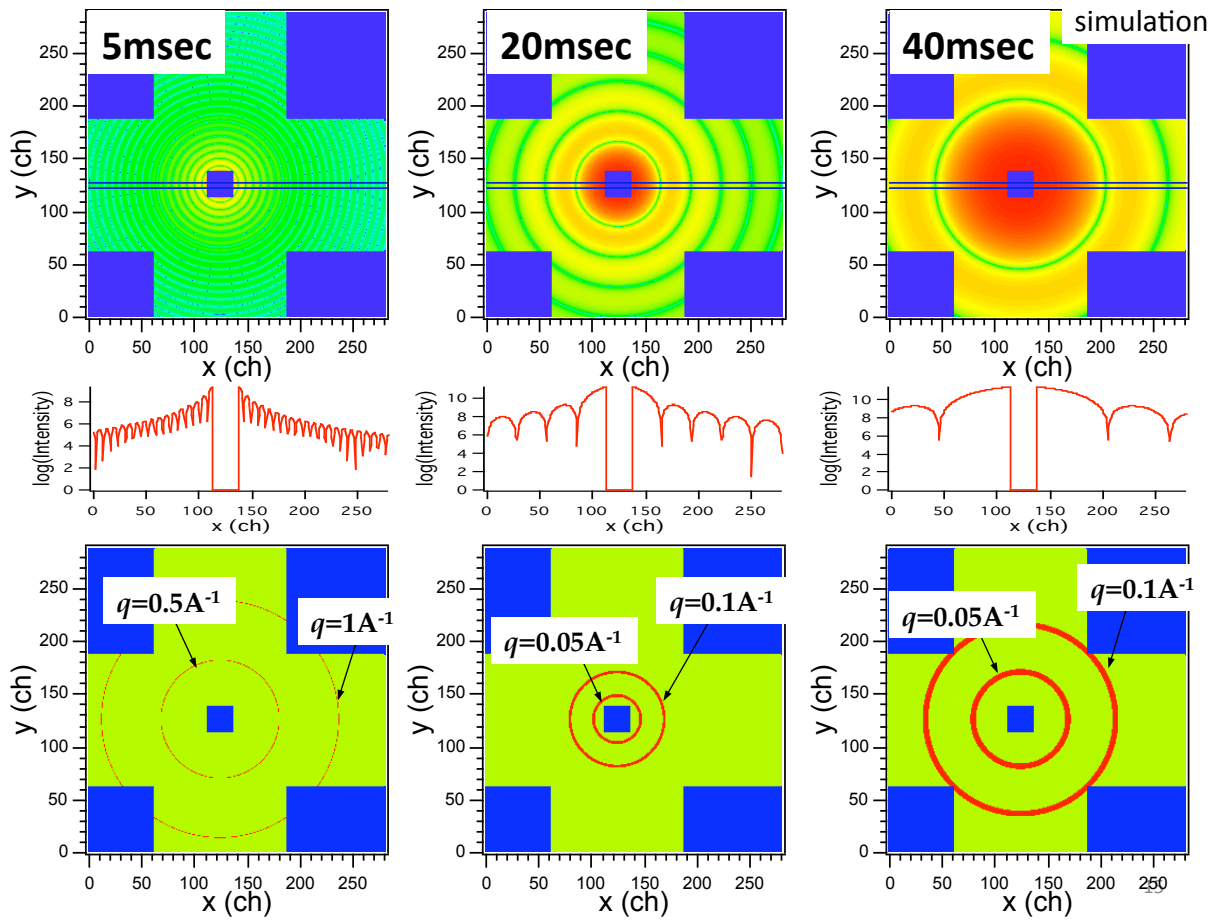
- Auto sample changer
- Magnets



10T magnet+
Furnace ($T_{max}=1,200^{\circ}C$)



Auto sample changer
10 samples,
 $T = -40 \sim 200^{\circ}C$
Ref. PNO's changer

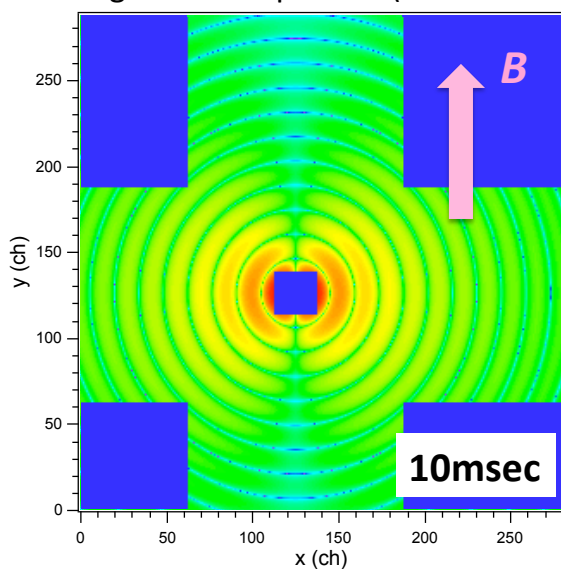


Scattering pattern (Small-angle bank)

simulation

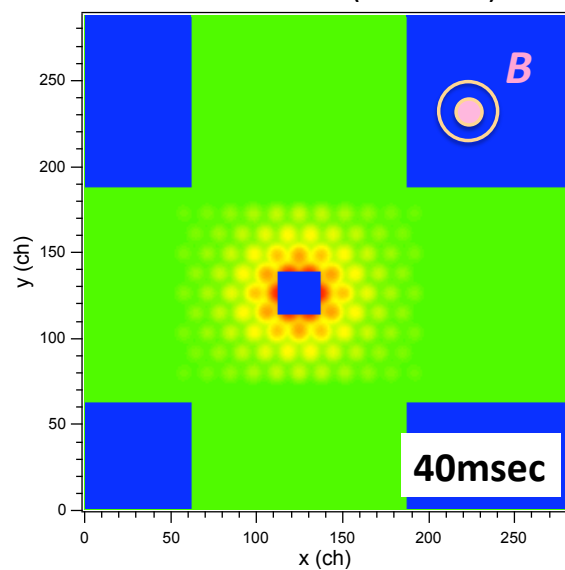
Magnetic scattering

Magnetic nanoparticle (Radius=50A)



Anisotropic scattering pattern

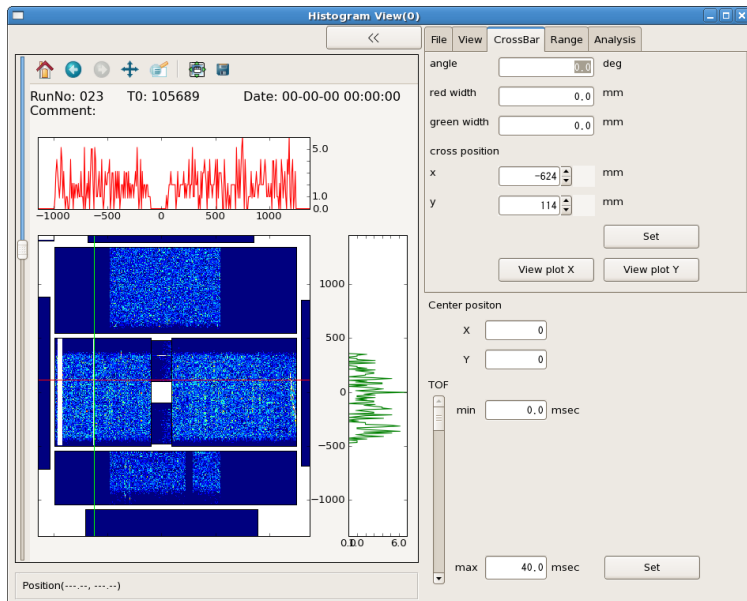
Vortex lattice ($B=1$ Tesla)



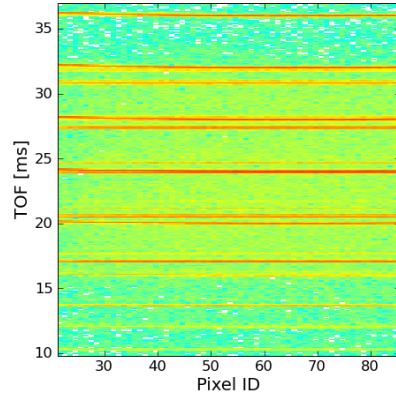
Long-range order

$$d [A] = \frac{480.6}{\sqrt{B [\text{Tesla}]}}$$

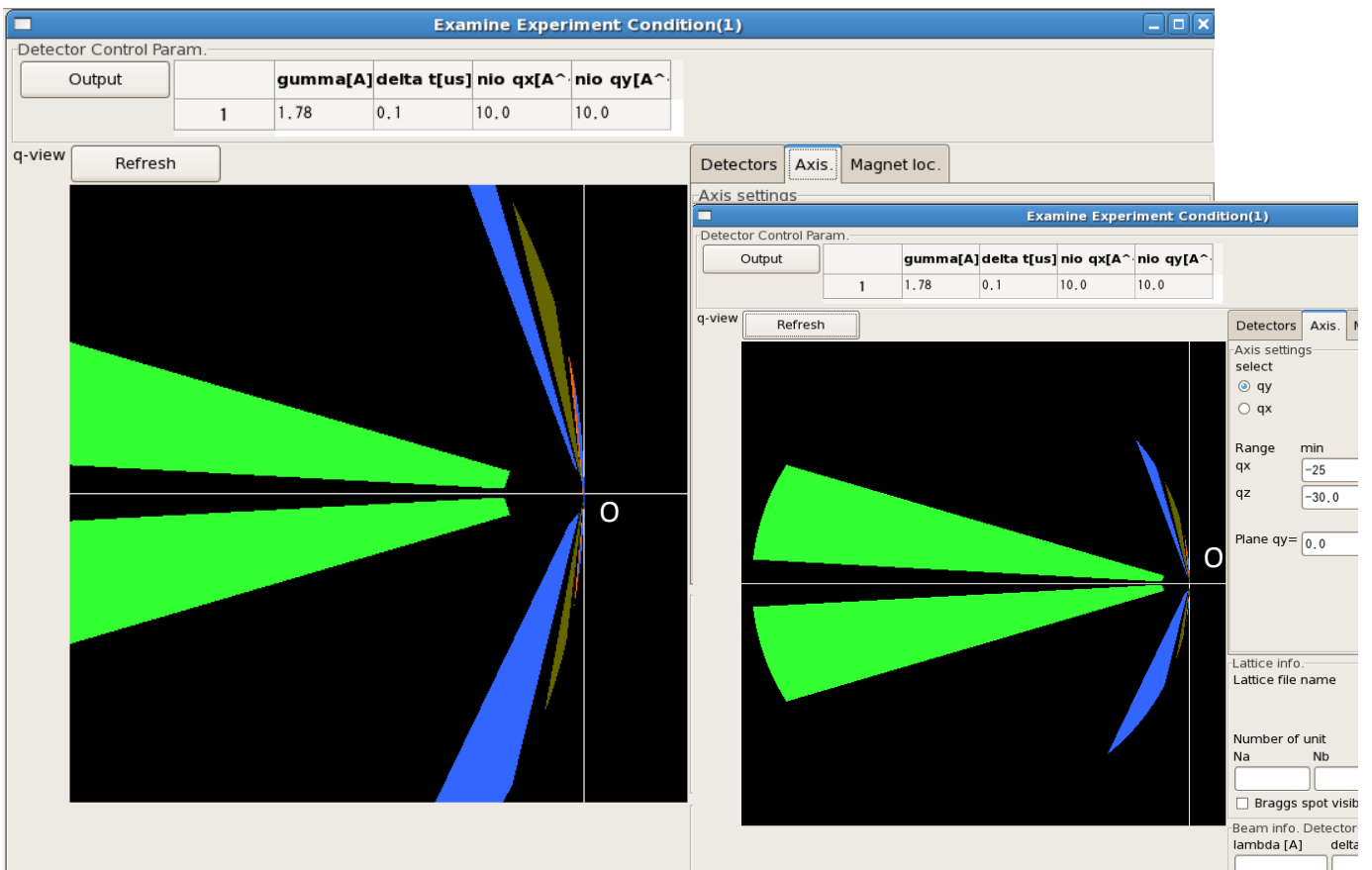
Software for Data Analysis



1 PSD



q-Range covered by detector banks





Summary and Future Plan

1. Development of the Smaller-Angle Neutron Scattering

Instrument TAIKAN (大観)

$$q = 10^{-4} \sim 20 \text{ \AA}^{-1}$$

2. Plan in this FY

Beam commissioning will be started in January, 2012.

User Experiment will be started in March, 2011.