



J-PARC, MLF

The commissioning workshop of
ESS-J-PARC collaboration
10-12 October 2022

OVER VIEW OF J-PARC MLF INSTRUMENTS

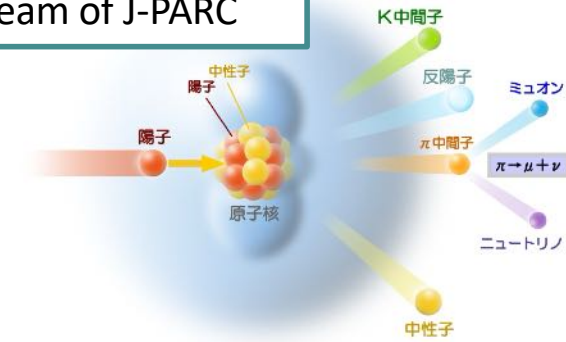
J-PARC MLF / KEK IMSS

Toshiya Otomo



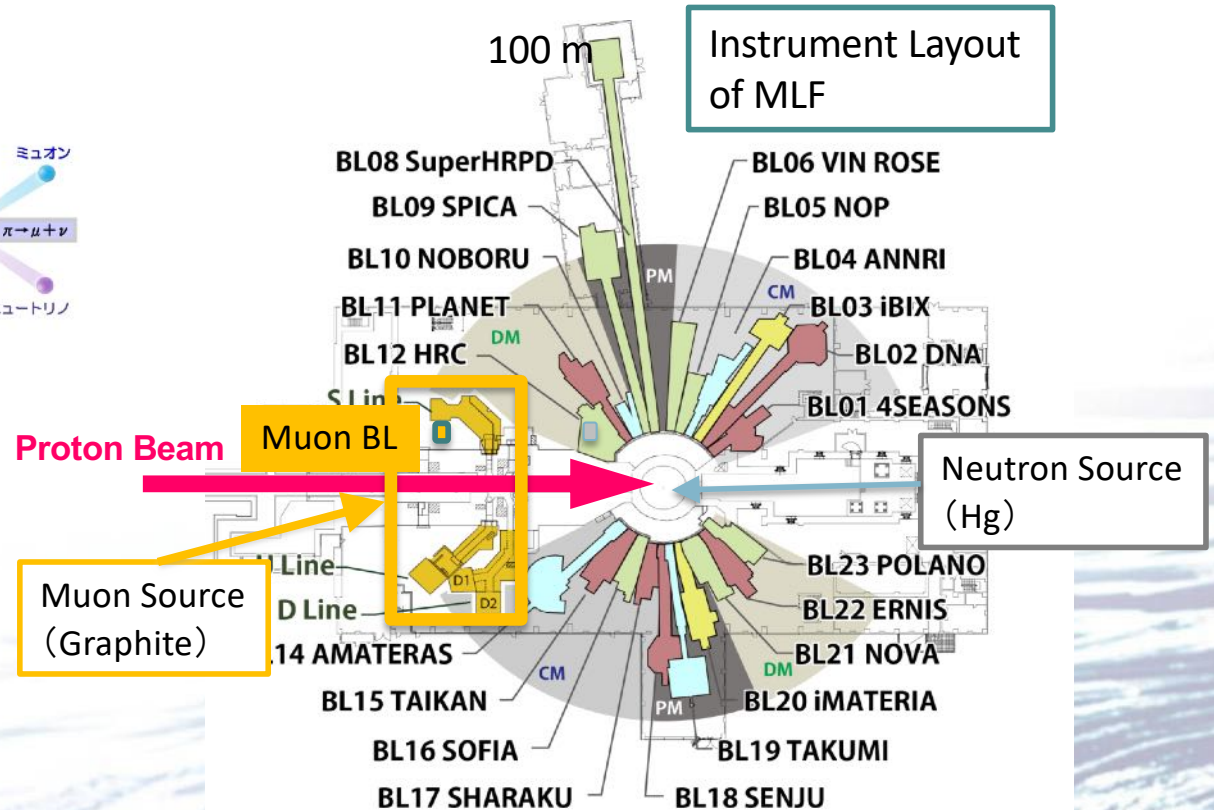
Overview of Materials & Life science experimental Facility (MLF)

Neutron & Muon sources utilizing the high-power proton beam of J-PARC

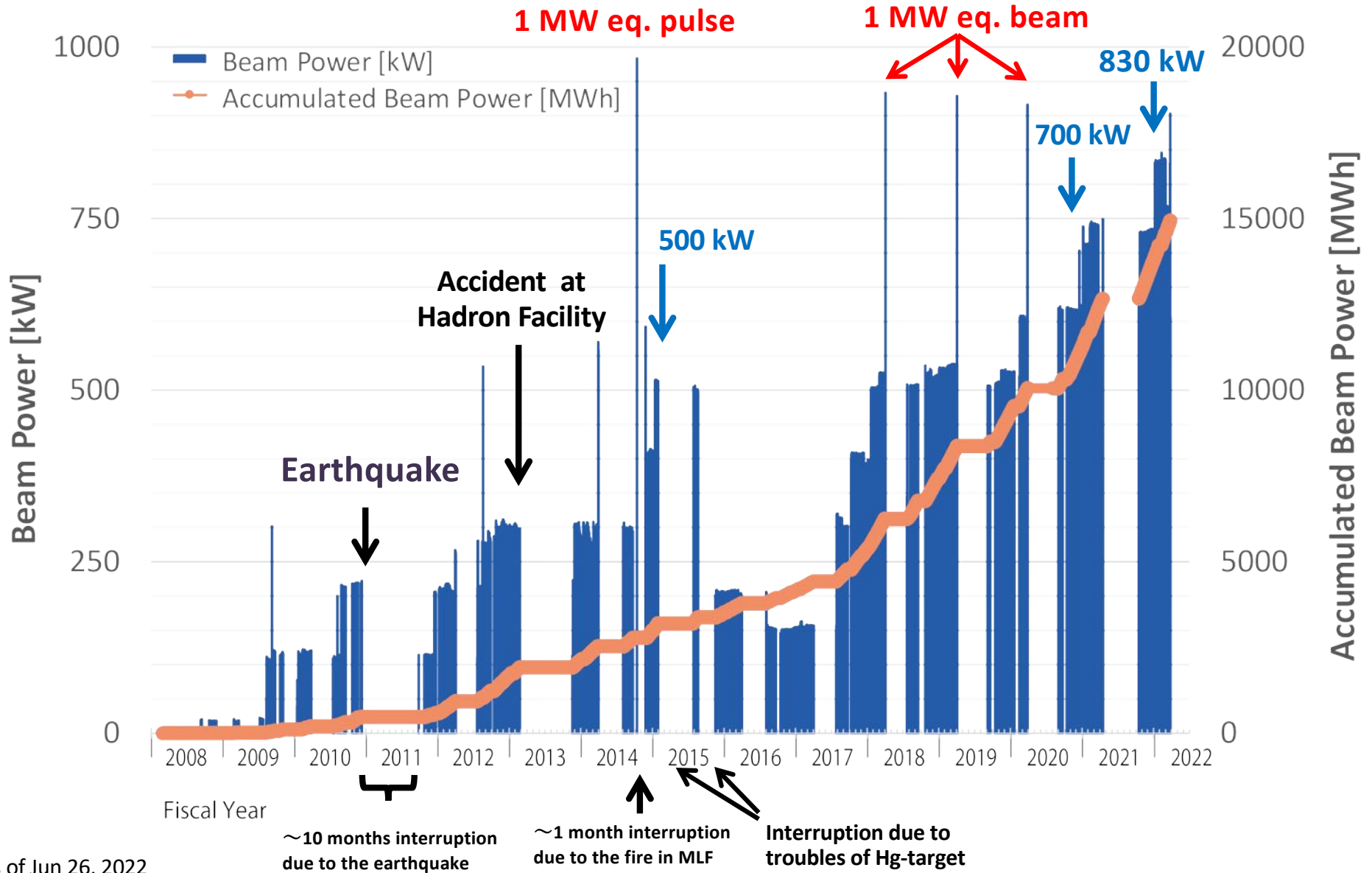


MLF is one of the global centers

Instrument Layout of MLF



Beam Power History at MLF



as of Jun 26, 2022

Materials and Life Science Facility (MLF)



J-PARC

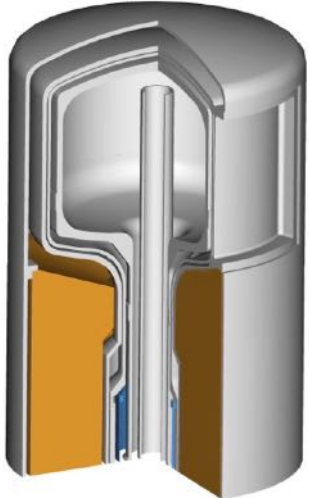
JAEAの技術開発

高性能水銀標的容器

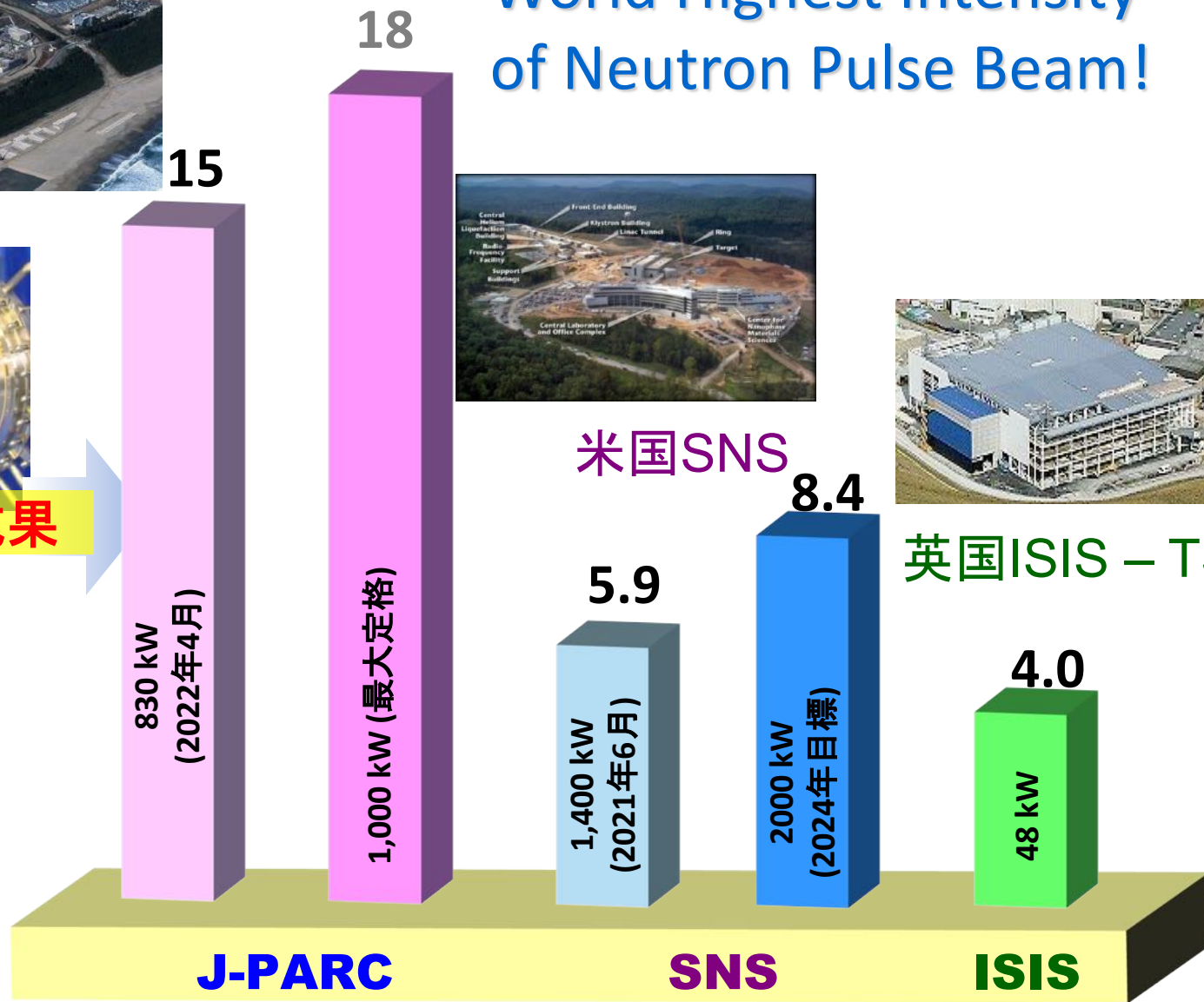


原子力技術の成果

高性能 結合型減速装置



World Highest Intensity of Neutron Pulse Beam!



米国SNS

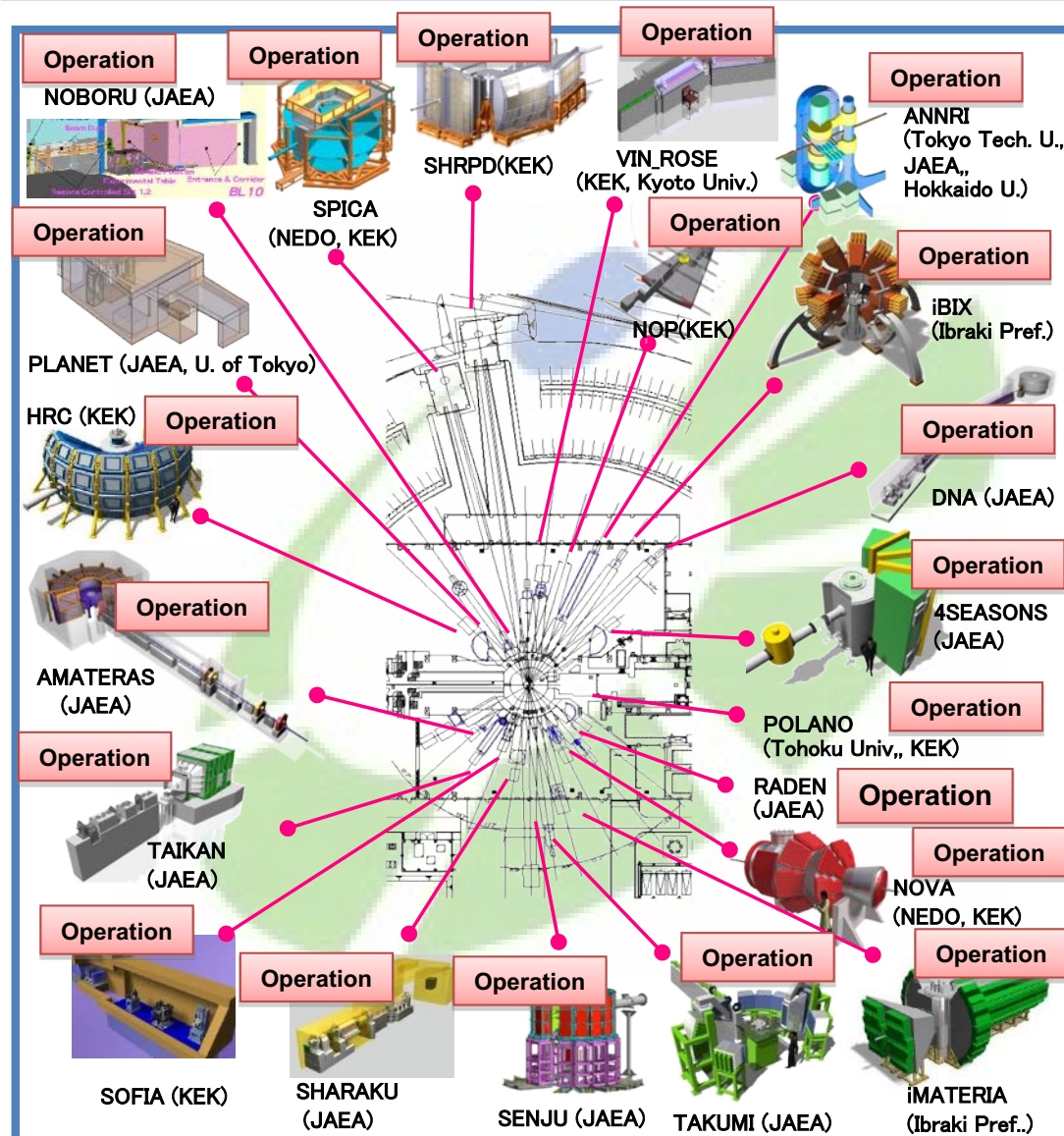


英国ISIS - TS2

単位: 10¹² n/(sr·pulse)

単位: 10¹² n/(sr·pulse)

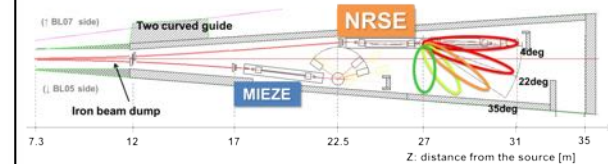
Neutron Instruments in MLF



- 23 Neutron Beam Ports
- Operation: **21**
- Commissioning: **0**

VIN-ROSE (NSE): opened to users @2017B

Schematic top view of VIN_ROSE



POLANO
(Polarization Analysis Spect.)

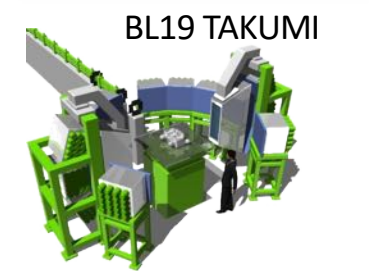
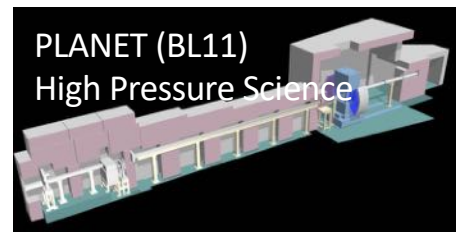
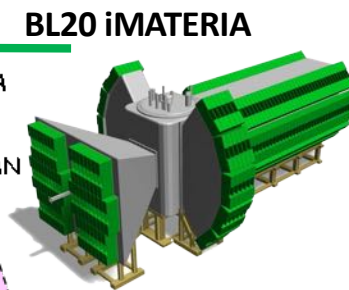
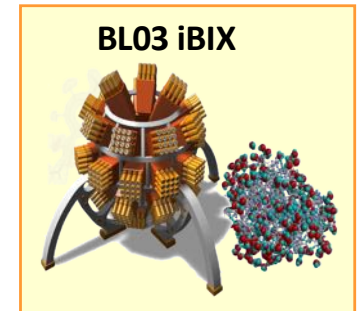
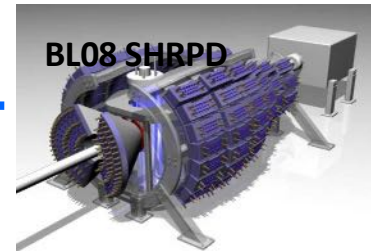
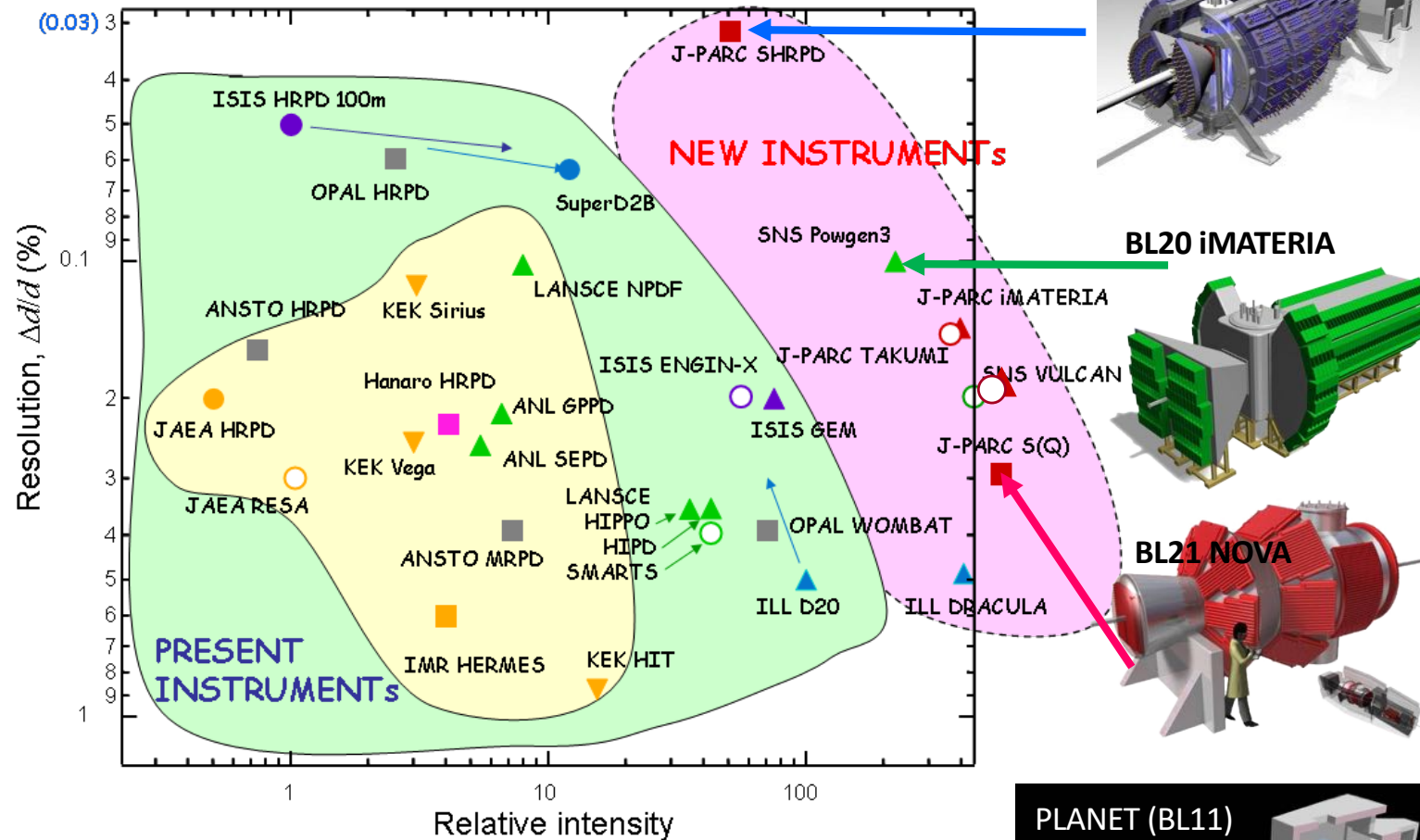


Opened to users @2019A



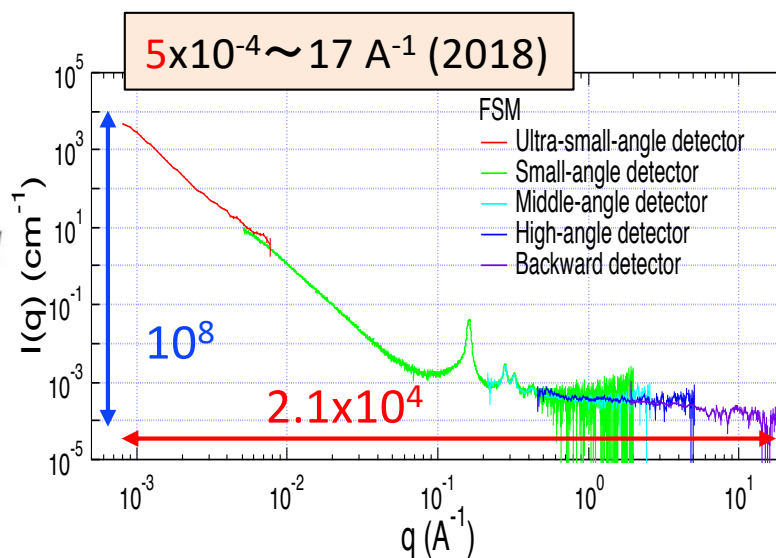
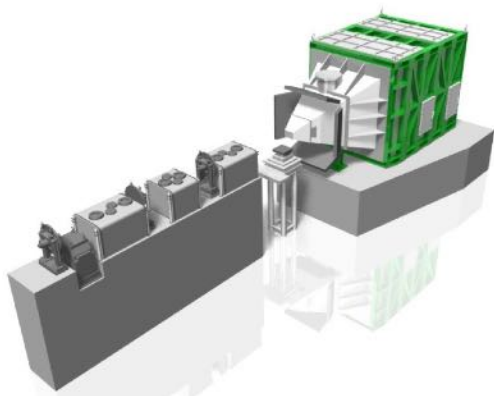
Crystal Structure Group

Diffractometer in the World

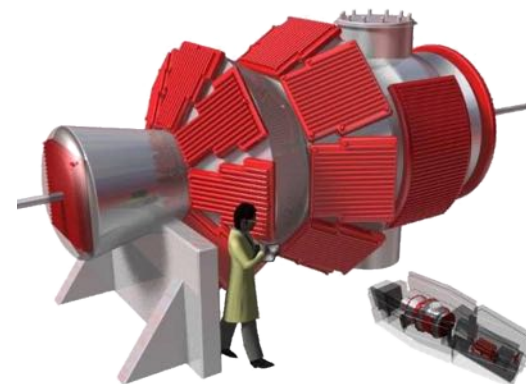


Nano Structure Group

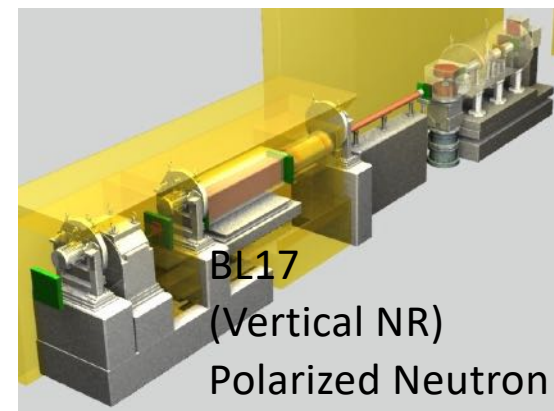
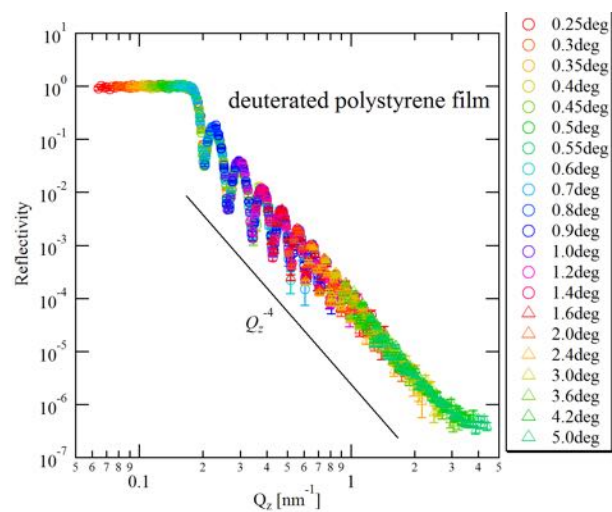
BL15 TAIKAN
(SANS)



BL21 Versatile Total
Scattering Diff. (NOVA)



BL16 SOFIA
(horizontal NR)



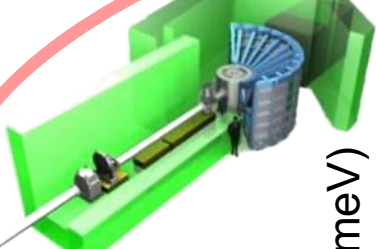
BL17
(Vertical NR)
Polarized Neutron



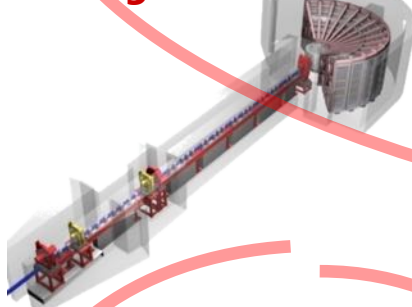
J-PARC MLF

Neutron Spectrometers in MLF

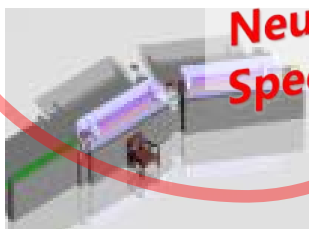
4SEASONS
High intensity
Medium resolution



AMATERAS
Low energy
High resolution



VIN ROSE
Ultra high energy resolution
Direct measurement of $I(Q,t)$

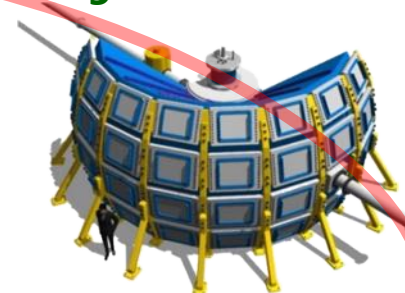


Neutron Spin-Echo Spectrometers

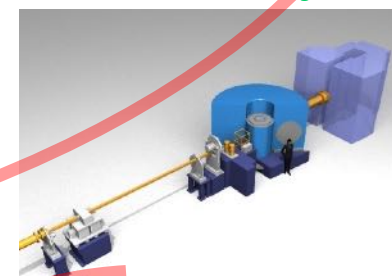
Direct-Geometry Chopper Spectrometers

Q-E range covered by the spectrometers
 10^{-5} - 10^3 meV
 10^{-2} - 10^1 Å⁻¹

HRC
High energy
High resolution

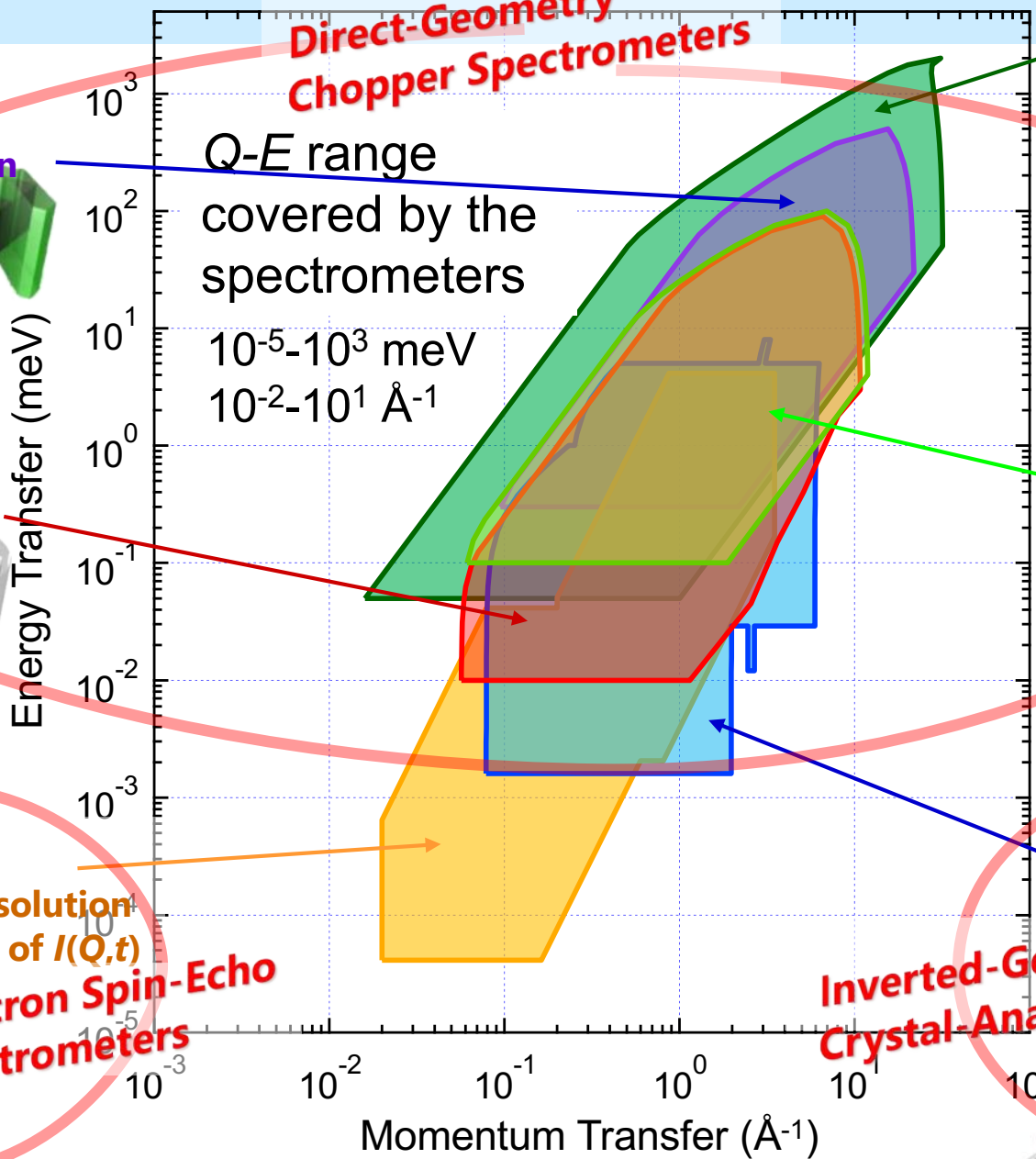
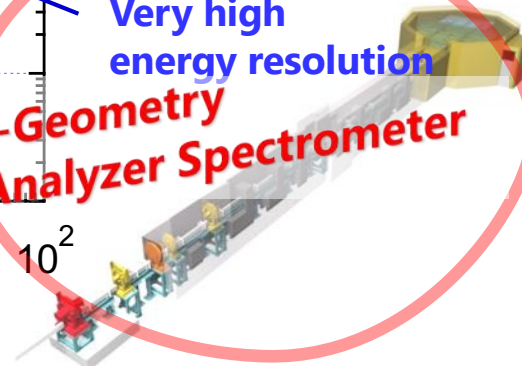


POLANO
Polarization analysis

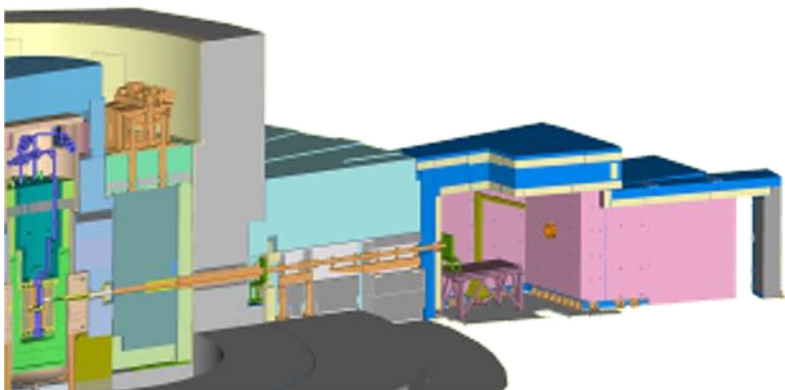


DNA
Very high energy resolution

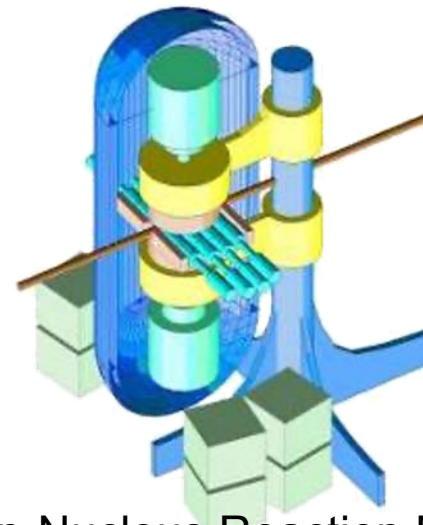
Inverted-Geometry Crystal-Analyzer Spectrometer



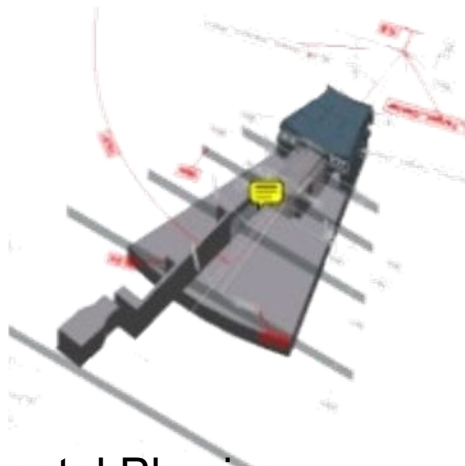
Pulsed Neutron Application Group



Neutron Source Diagnostic & Test Port
BL10: NOBORU



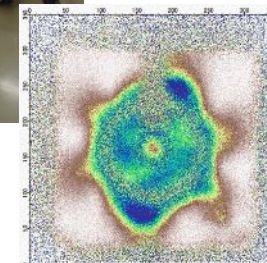
Neutron-Nucleus Reaction Meas. Inst.
BL04: ANNRI



Fundamental Physics
BL05: NOP



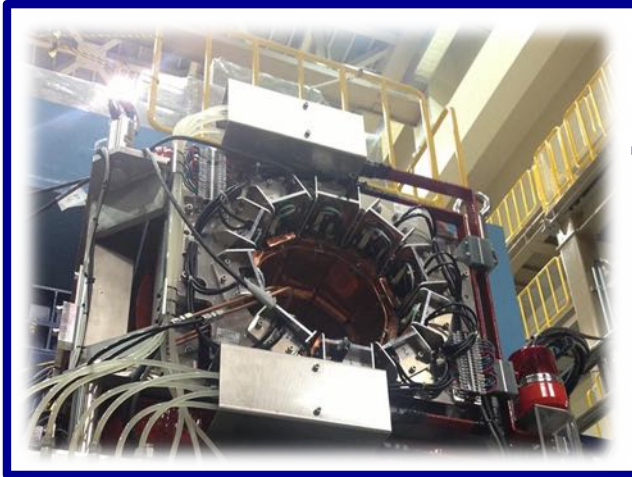
Neutron Imaging
BL22: RADEN



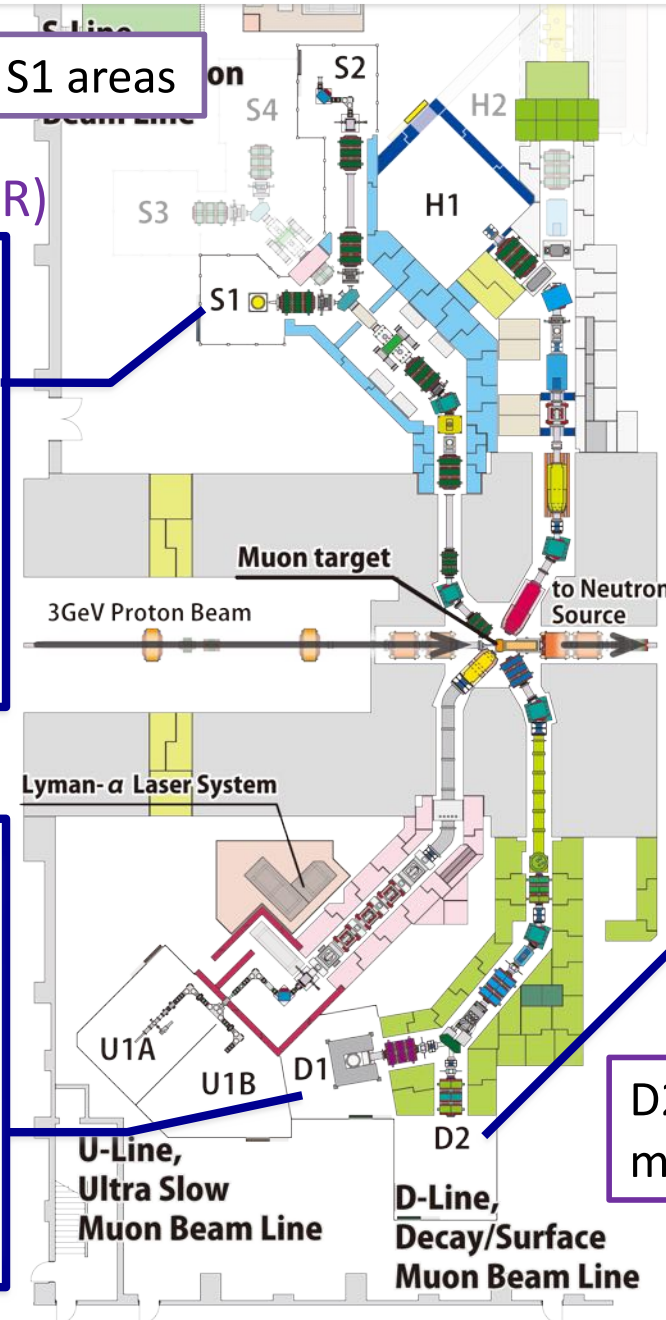
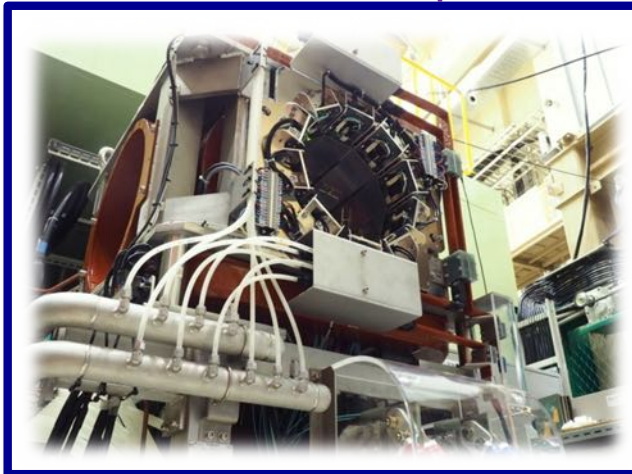
Instruments Open to General Use Program

μ SR Spectrometers at D1 and S1 areas

S1 Instrument: ARTEMIS (μ SR)

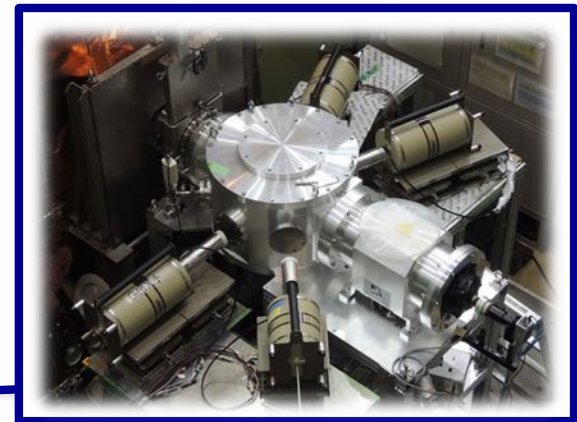


D1 Instrument: μ SR



U1A/B: commissioning
S2: 1st beam delivered
H1: commissioning

D2 Instrument: μ^- X-ray



D2 area is also available for user-made one-time setup.

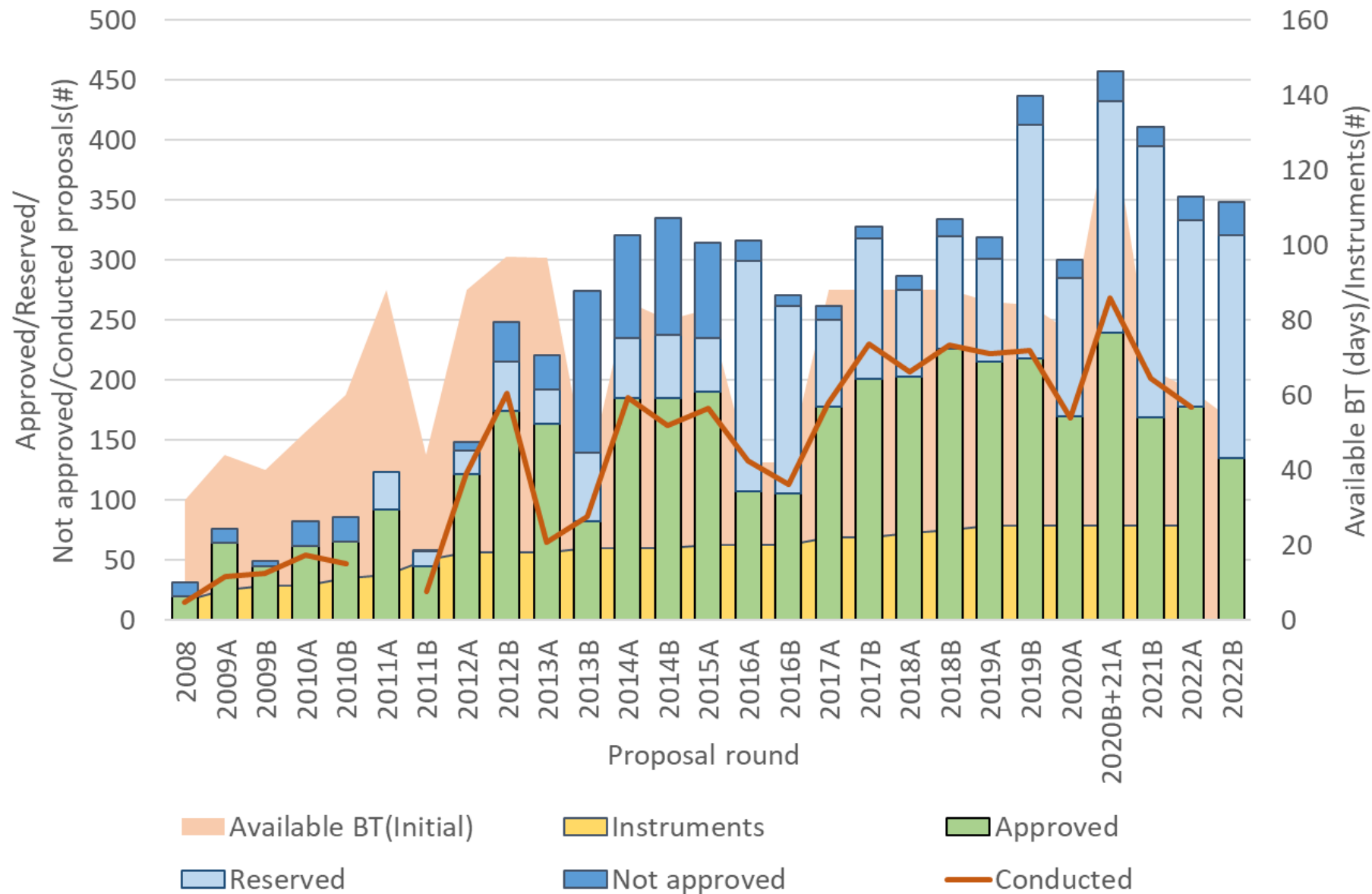


Instruments Categories

- ◆ 6 Inelastic instruments
 - BL01 BL02 BL06 BL12 BL14 BL23
- ◆ 8 Diffractometers
 - BL03 BL08 BL09 BL11 BL18 BL19 BL20 BL21
- ◆ 3 SANS and Reflectometers
 - BL15 BL16 BL17
- ◆ 1 Imaging
 - BL22
- ◆ 1 Neutron-Nuclear Reaction, Prompt Gamma-Ray Analysis
 - BL04
- ◆ 2 Neutron Fundamental Physics, Neutron Device Development
 - BL05 BL10
- ◆ 4 Muon areas
 - D1 D2 S1 U1 H1

Number of Proposals

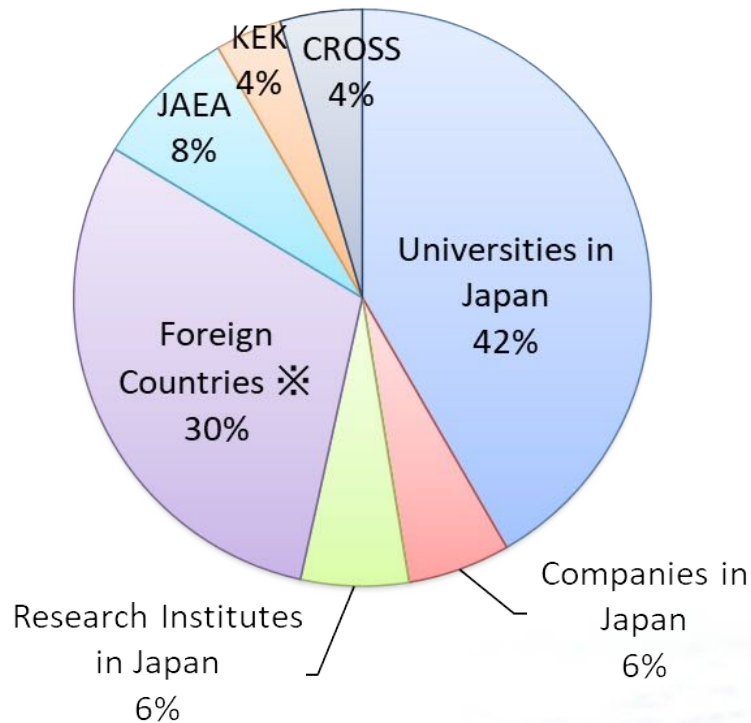
J-PARC, MLF



PI's affiliation in 2022B

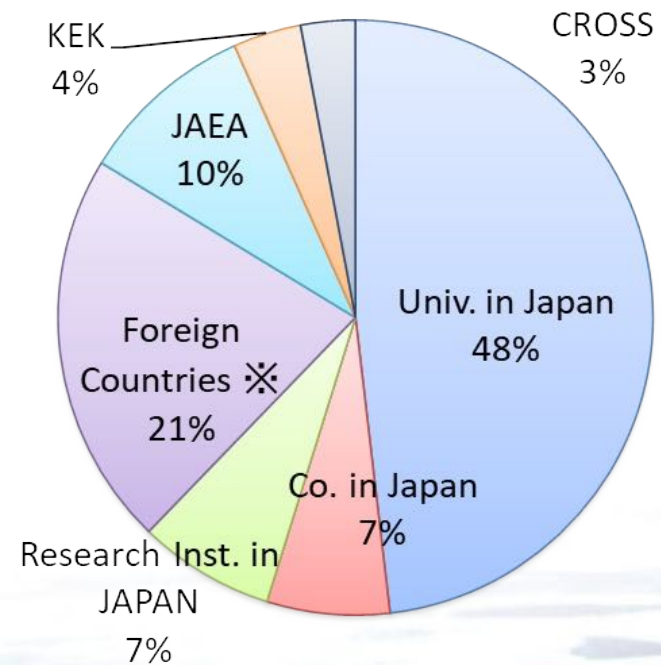
Proposed

Neutron + Muon



Accepted

Neutron + Muon



No. of proposed : 348 (Neutron : 291、 Muon : 57)

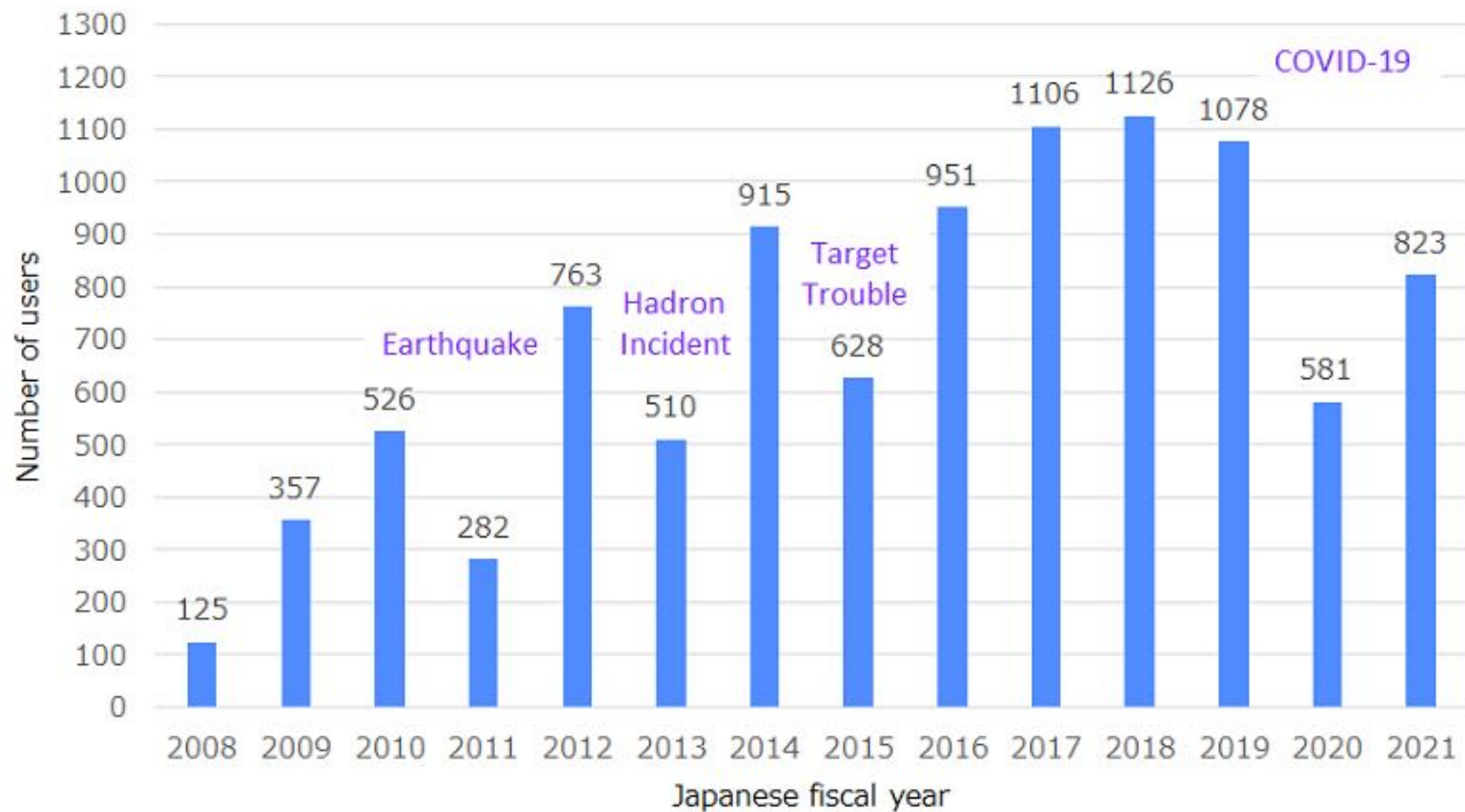
Accepted : 135 (Neutron : 114、 Muon : 21)

Accepted rate : 38 %

Note: Accepted rate on BL01, BL02, BL14, BL15 and BL19 were less than 30%

Unique No. of Users of MLF

<https://mlfinfo.jp/ja/aboutmlf/statistics.html>



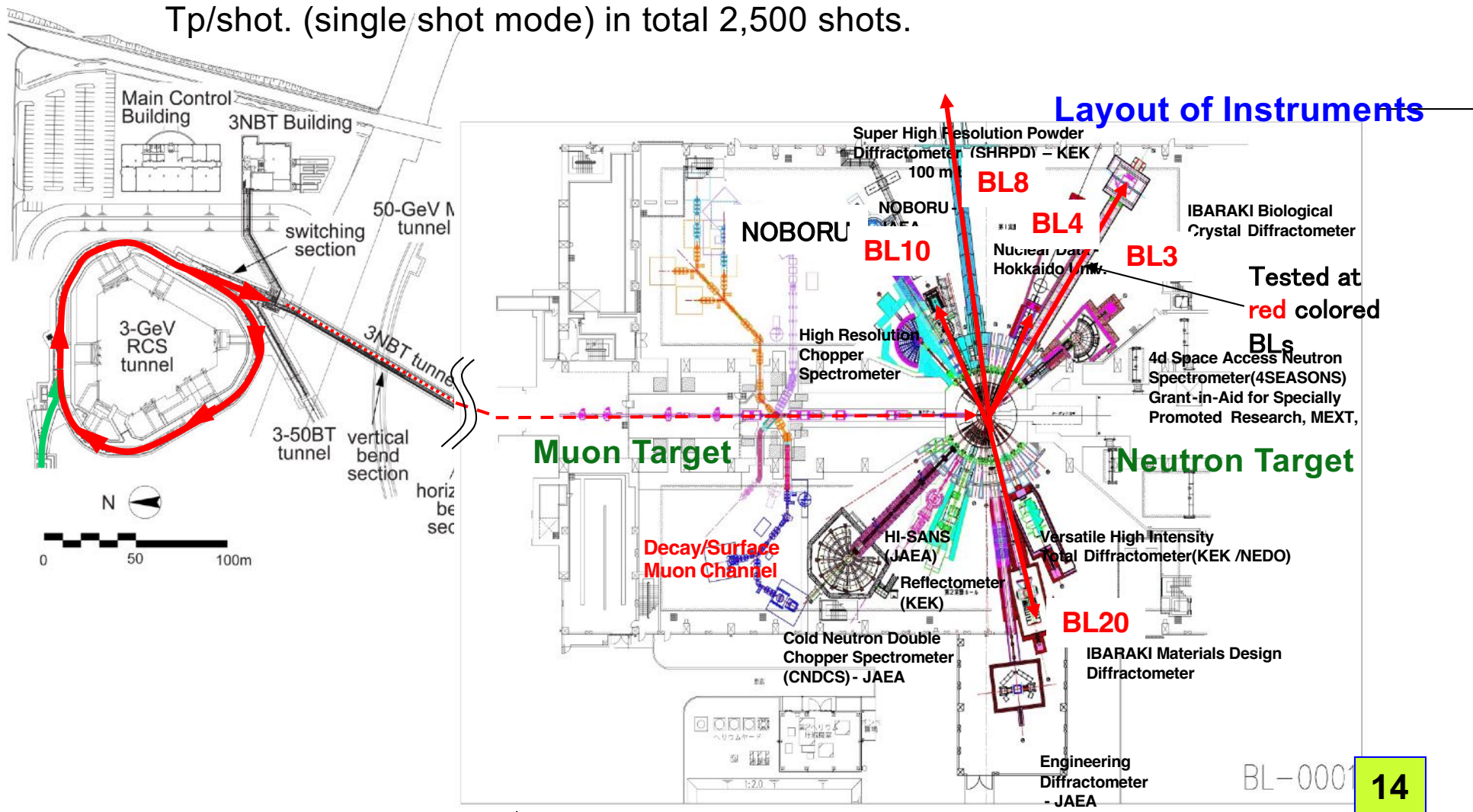
COMMISSIONING





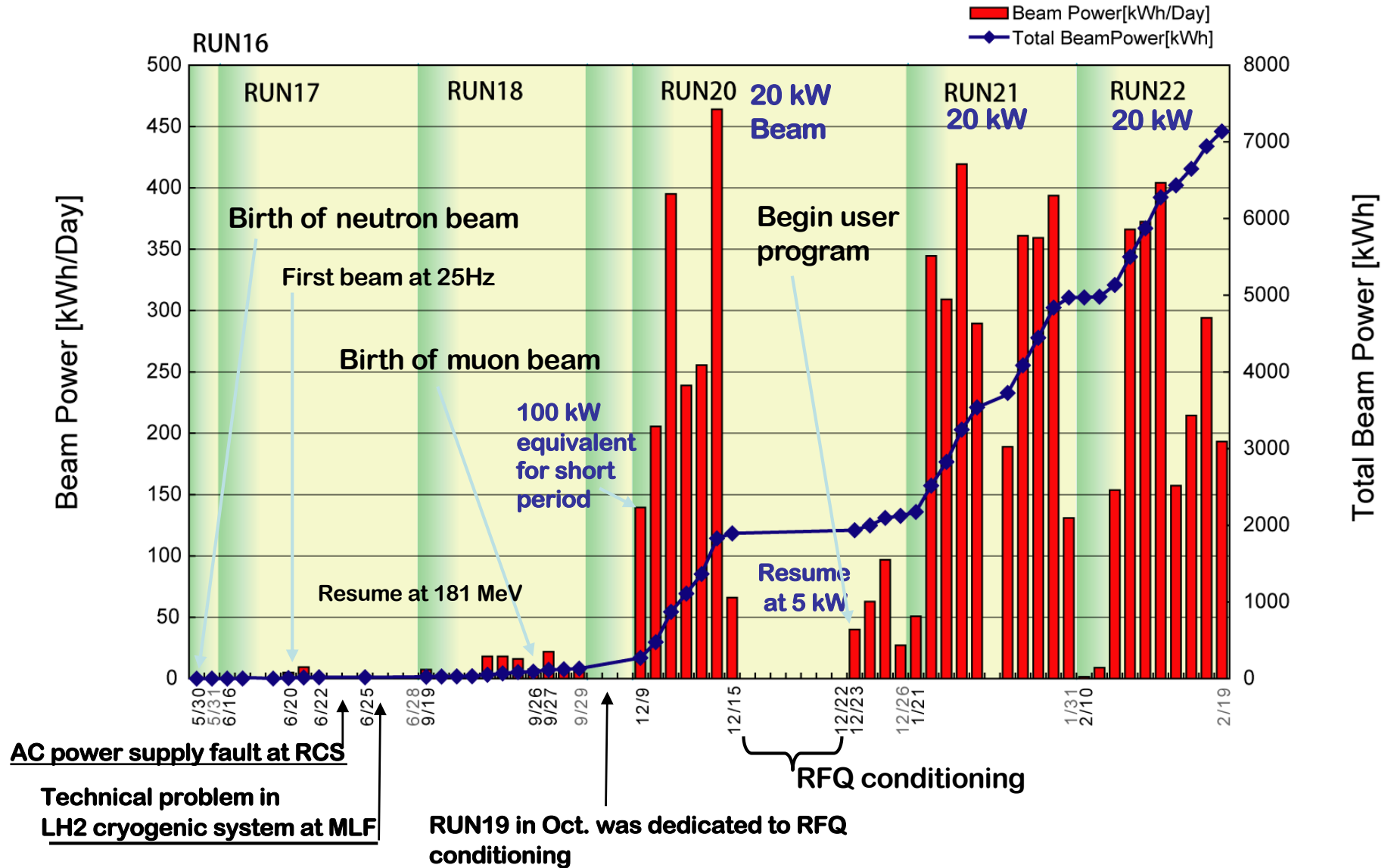
The first neutron production at JSNS

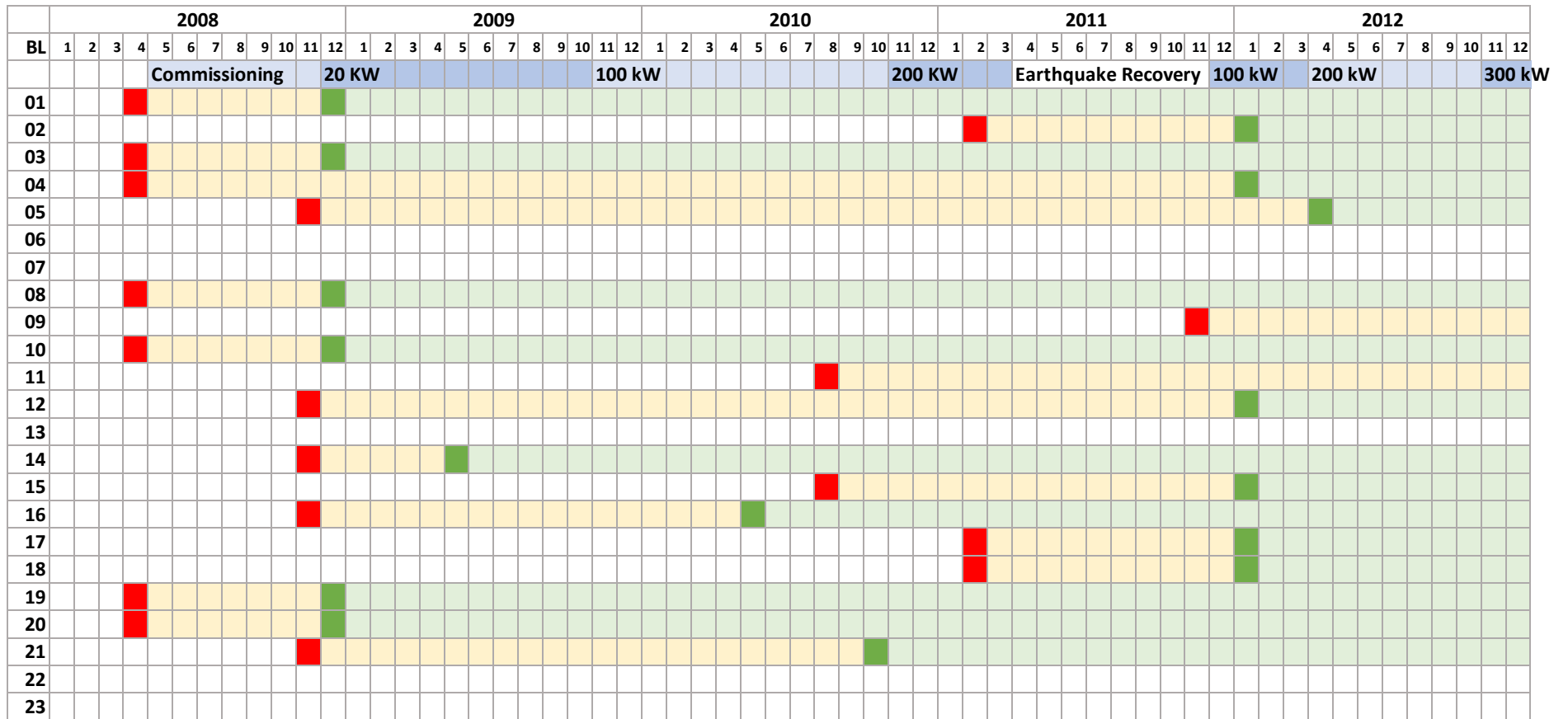
May 30, 2008, 14:25 at BL10 (NOBORU) the first neutron beam was observed. Right after on May 30 and May 31, BL3, BL4, BL8, BL20 were tested with 0.4 Tp/shot. (single shot mode) in total 2,500 shots.



MLF Proton Beam History in FY2008

(As of Feb. 19, 2009)





■ Radiation application permission
 ■ comissioning/project
 ■ opened to general use
 ■ under operation





BL	2013												2014												2015												2016												2017											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
	300 kW			Hadron Accident									300 kW			Fire									500 kW			Target trouble						Targe 200 kW			150 kW						300 kW																	
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