

1. SPring-8-II
2. Demands for detectors
3. Upgrade of BLs
4. Examples of the upgrades
5. Summary



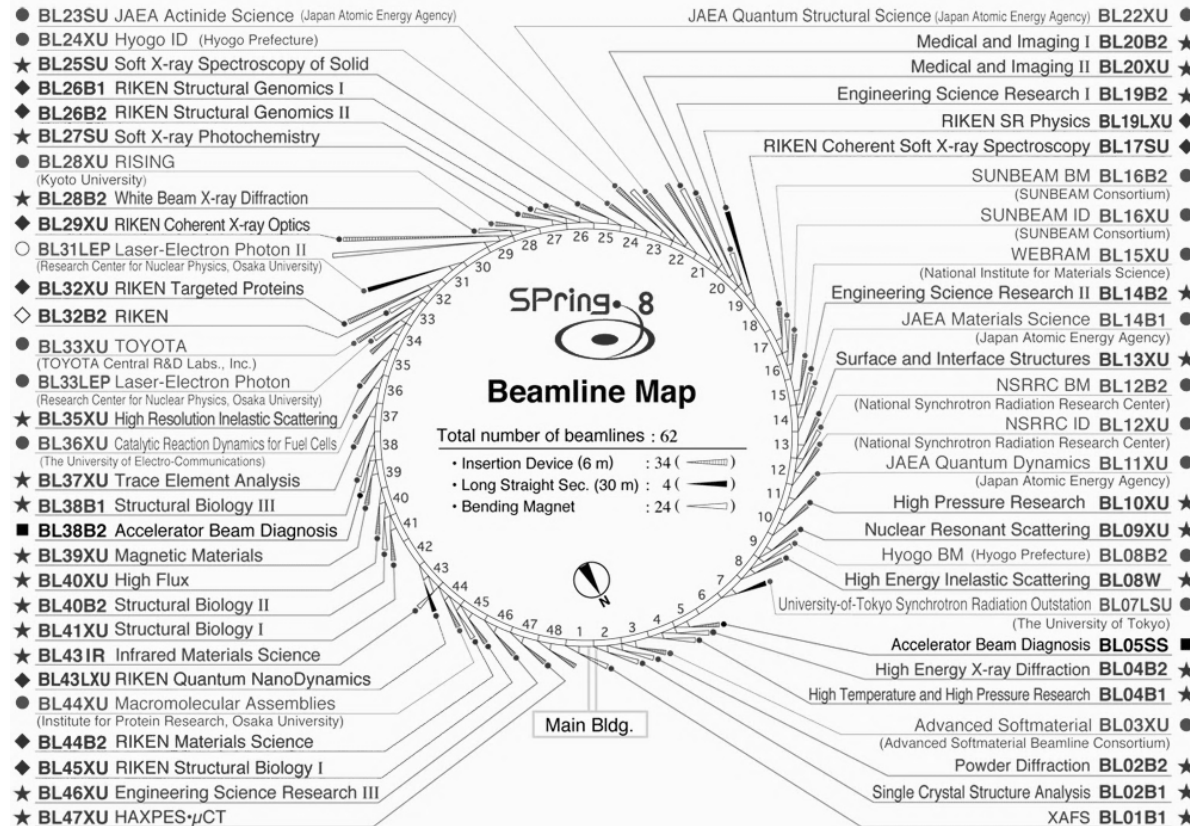
57 beamlines in operation  
5: vacant

- Key features of the upgrade:
  - lower-energy ( 8 GeV  $\rightarrow$  6 GeV )
  - lower-emittance ( 2.4 nm·rad  $\rightarrow$  ~90 pm·rad )  
(under investigation, can be changed)
  - higher-brilliance and higher-spatial coherence
  
- **Schedule is delayed** (first beam in 2026?)  
budget is not secured yet

# Upgrade of BLs

➤ Upgrade of BLs are going. Trying to follow ESRF model

Started from 2018



- Refurbished 2018~2020:**
- BL05XU (R&D)
  - BL32B2 (R&D)
  - BL38B1 (PX → SAXS)
  - BL36XU (→ XAFS)
  - BL45XU (SAXS → PX)
  - BL09XU (NRS → HAXPES)
  - BL35XU (IXS → IXS/NRS)
  - BL20B2 (Imaging)

- Planning 2021~2022:**
- BL13XU (XRD for MS)
  - BL02B1, 02B2, 04B2, 19B2
  - BL28B2 (Imaging)
  - BL46XU (HAXPES)
  - BL40XU (SAXS)

Total: 57 beamlines  
 8 refurbished  
 8 to be upgraded

BL: Beamline  
 B1, B2: Bending Magnets  
 XU: X-ray Undulator  
 SU: Soft X-ray Undulator  
 W: Wiggler

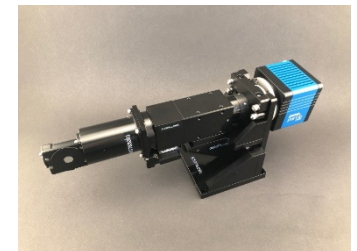
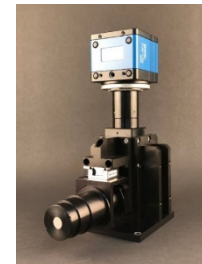
IR: Infrared Radiation  
 LEP: Laser-Electron Photon  
 LXU: Long-length X-ray Undulator  
 LSU: Long-length Soft X-ray Undulator  
 SS: Straight Section

# Examples of the upgrades

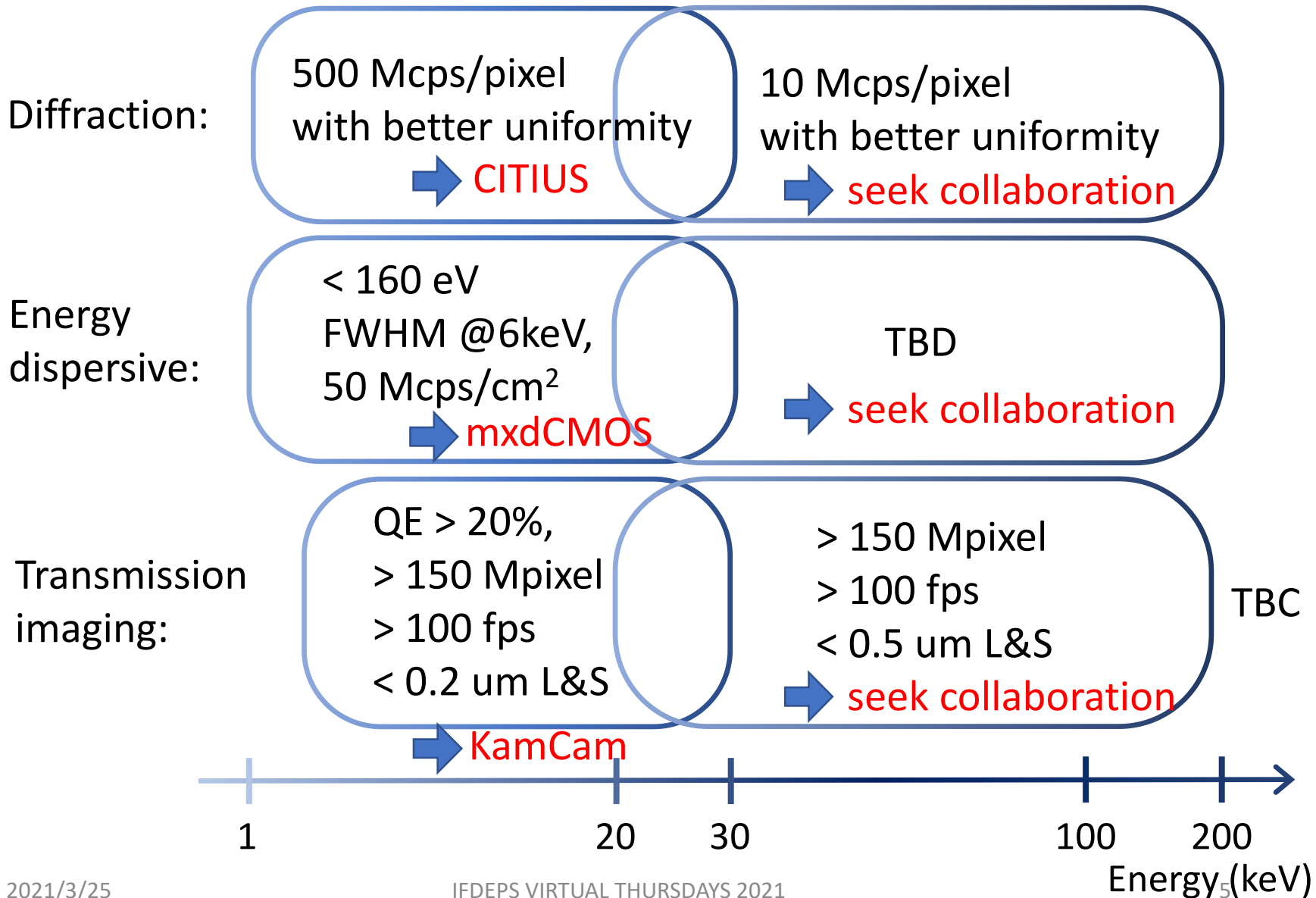
Red: procurement & installation in FY2020 and FY2021

- Powder diffraction and total scattering for PDF analysis, BL13XU  
A new diffractometer with **X-Spectrum Lambda CdTe 750K (6 set)** and **Varex Imaging CMOS flat panel**
- Imaging, BL20B2 (200 m-long BL)  
Multi-layer mirrors:  **$3 \times 10^{10}$ ,  $1.5 \times 10^9$  photons/s/mm<sup>2</sup>** (@ 110 keV, 43 or 200 m from the light source, designed values)  
**200-nm-resolution imaging detector with a field of view of 2x2 mm<sup>2</sup> KamCam**
- High-energy X-ray diffraction R&D BL, BL05XU  
Multi-layer mirrors:  **$10^{13}$  photons/s/mm<sup>2</sup>** (@ 100 keV)  
**DECTRIS PILATUS3 X CdTe 300K** and **X-Spectrum Lambda CdTe 750K**
- PX-BL  
**DECTRIS EIGER2 X CdTe 4M** in BL41XU
- CITIUS demonstration station, BL29XU  
**CITIUS 280K, 840K, and 2.2M**

flash talk on April 8<sup>th</sup> (Session 8)



# Demands for detectors @ SP8-II



- To fully exploit SPring-8-II potential, wide range of detectors are indispensable. Especially;
  - X-ray Imaging detectors for diffraction measurements
    - Better specifications: Pile-up free for operational cost reduction
    - < 30 keV CITIUS (facility report from SACLA)
    - > 30 keV seek collaboration for photon counting as a baseline
      - DESY through X-Spectrum
      - PSI through DECTRIS
    - We are interested in novel technologies such as high throughput CdTe, Ge, etc.
  - X-ray Imaging detectors for transmitted x-rays
    - KamCam (flash talk from T. Kameshima on April 8<sup>th</sup> in Session 8.)
  - X-ray energy dispersive detectors toward >100 M photons/s/system
    - < 30 keV Multi-element monolithic CMOS detector (silicon as sensor material, under development)
    - HEXITEC of RAL (Collaborations among RAL, Gunma Univ. and SPring-8 )



## ➤ Current status

More than 20 DECTRIS 2D detectors (Si sensor)

5 DECTRIS 2D CdTe detectors

4 X-Spectrum Lambda CdTe 750K now and another 4 in FY2021

1 RIGAKU 2D CdTe detector

## ➤ Future plan under discussion

- energy dispersive detectors