

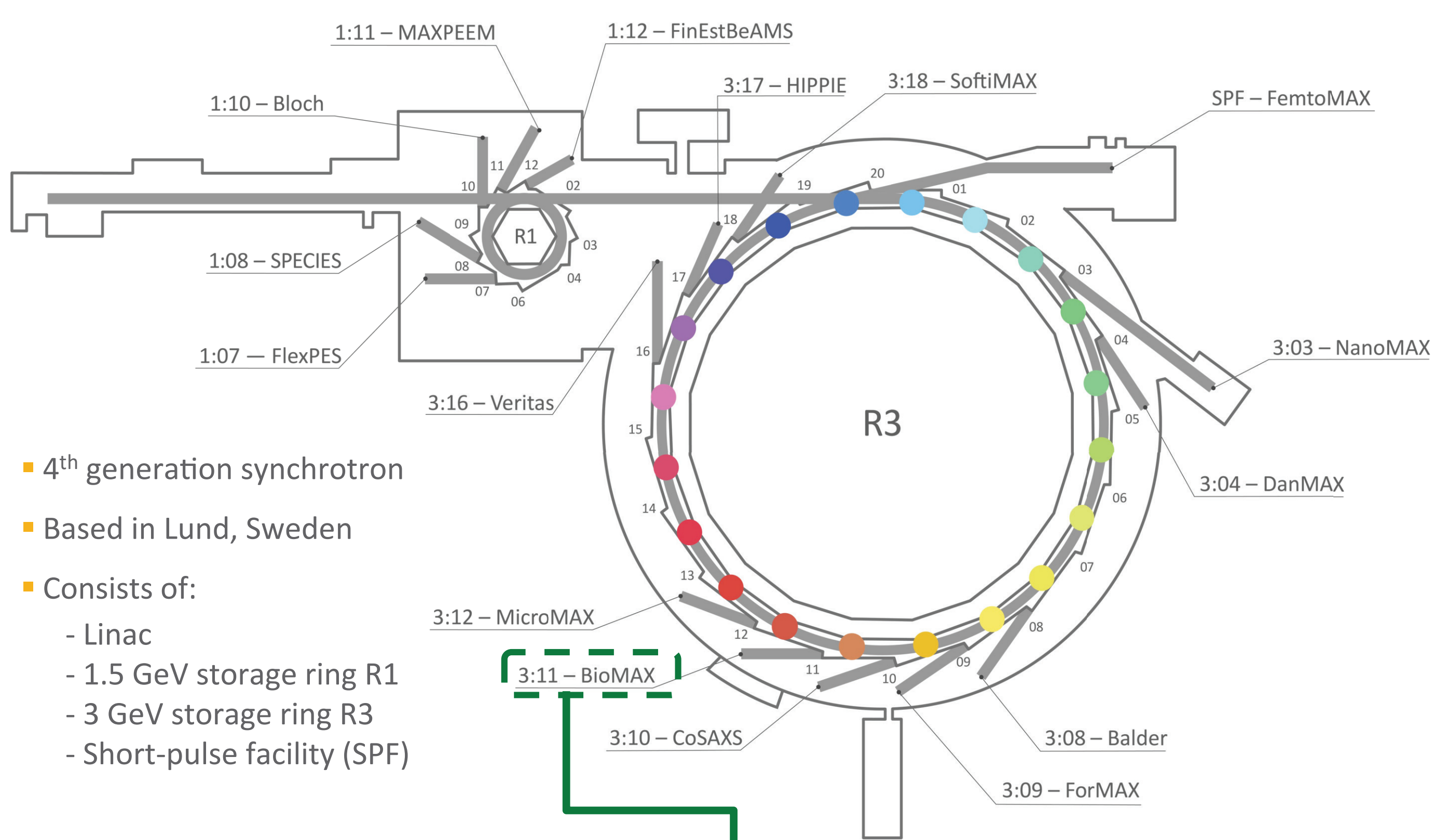
Fast, fully automated continuous energy scan at the BioMAX beamline at MAX IV



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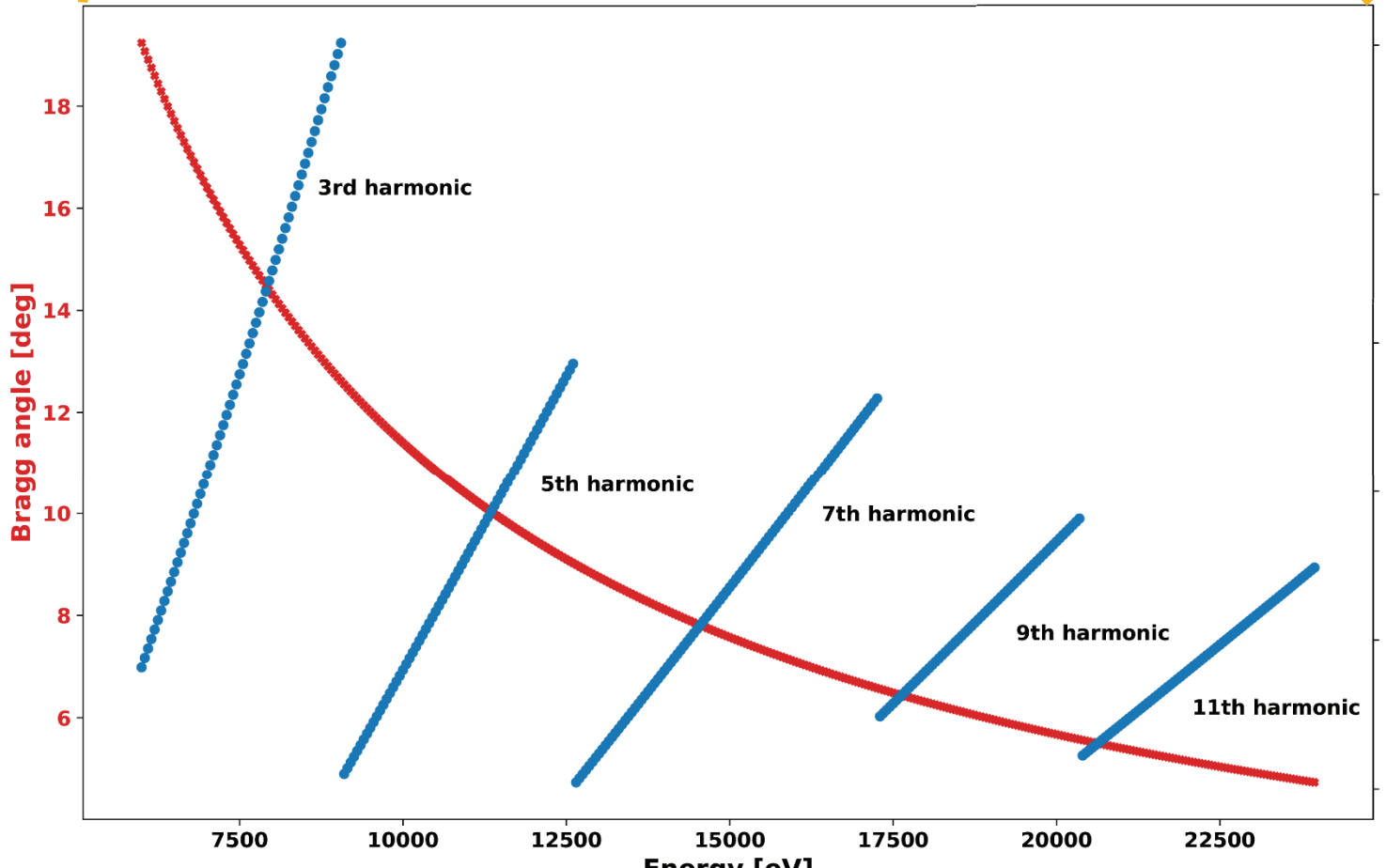
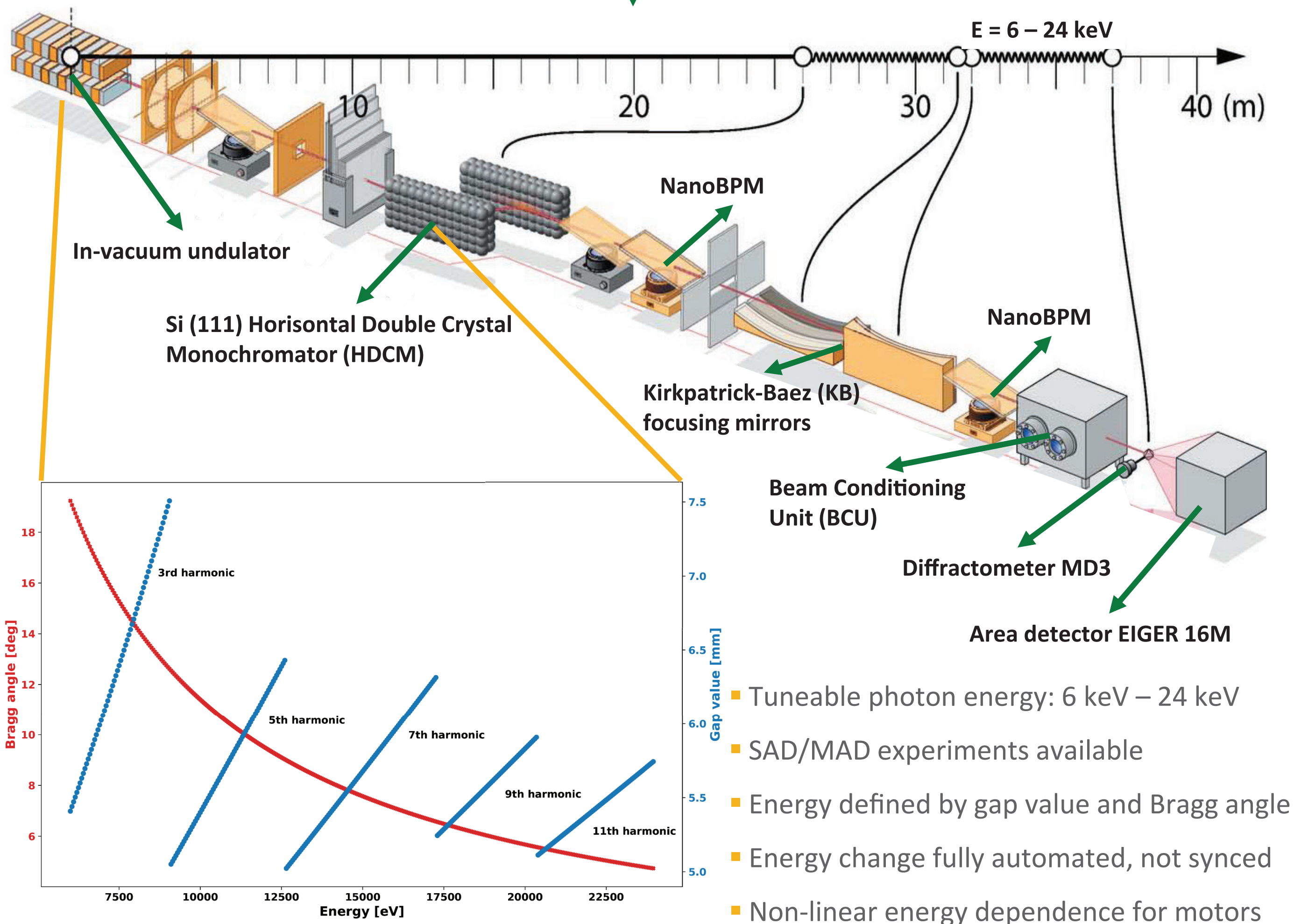
BioMAX at MAX IV

MAX IV Laboratory



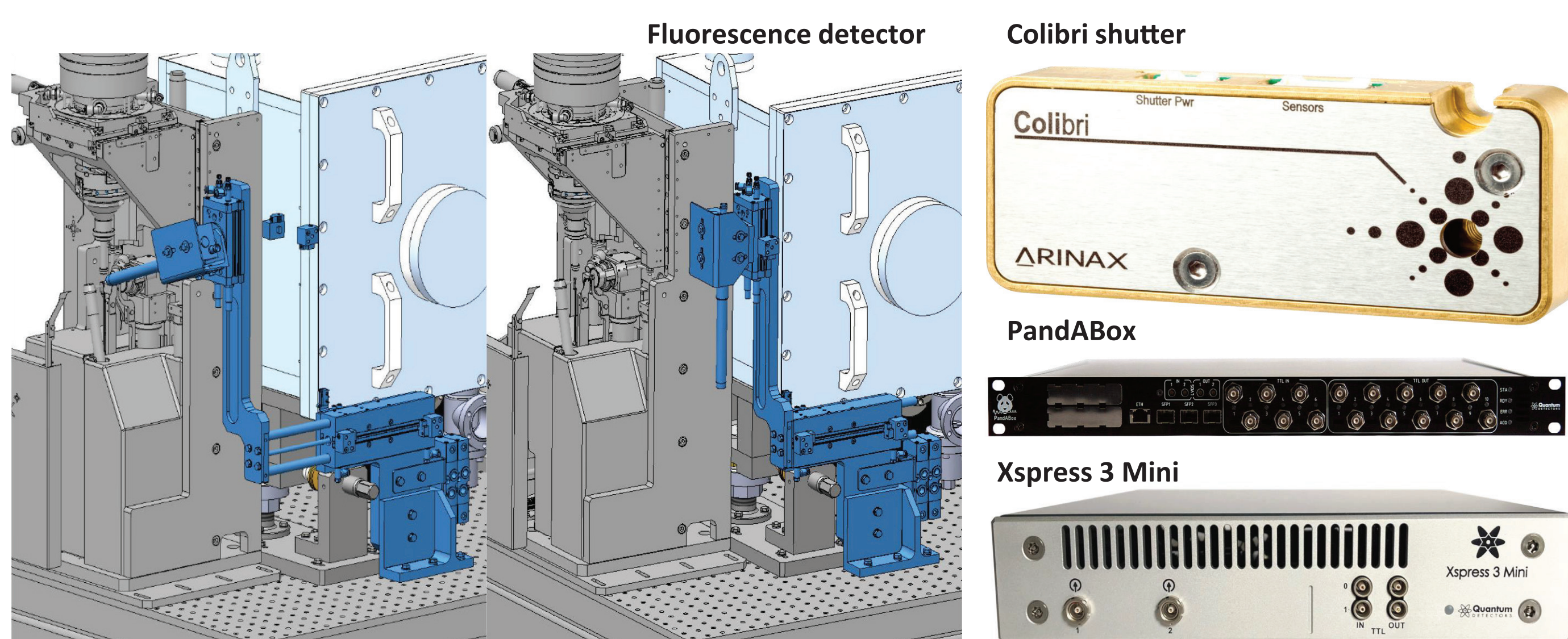
- 4th generation synchrotron
- Based in Lund, Sweden
- Consists of:
 - Linac
 - 1.5 GeV storage ring R1
 - 3 GeV storage ring R3
 - Short-pulse facility (SPF)

BioMAX Beamline



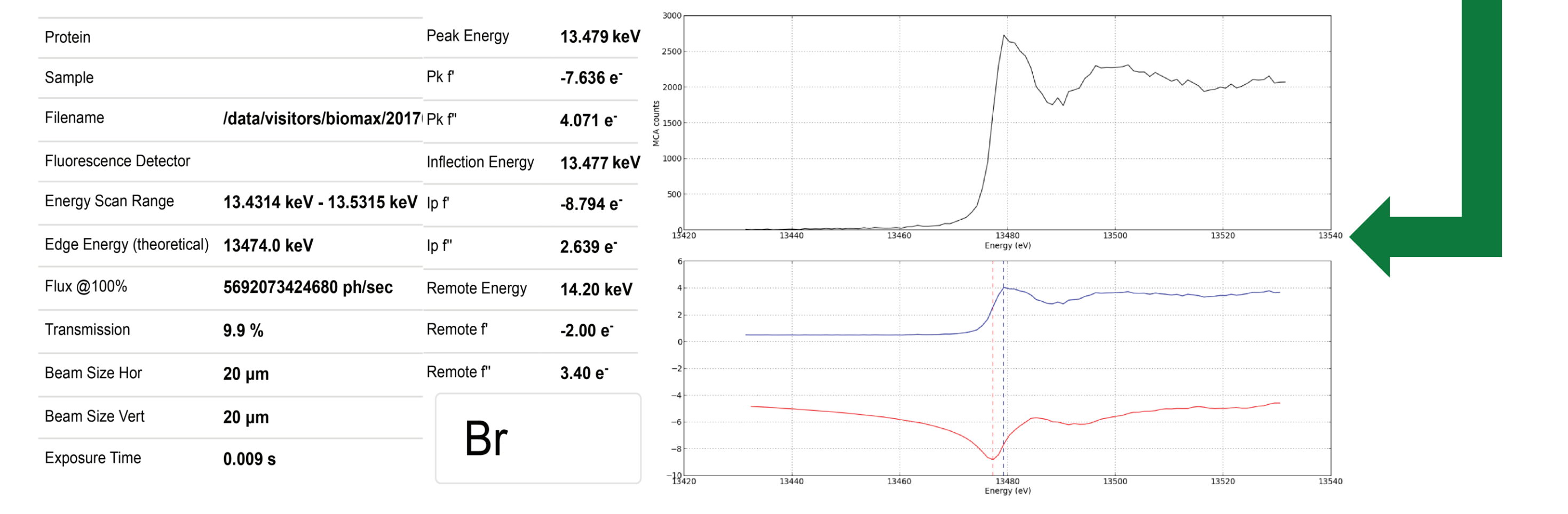
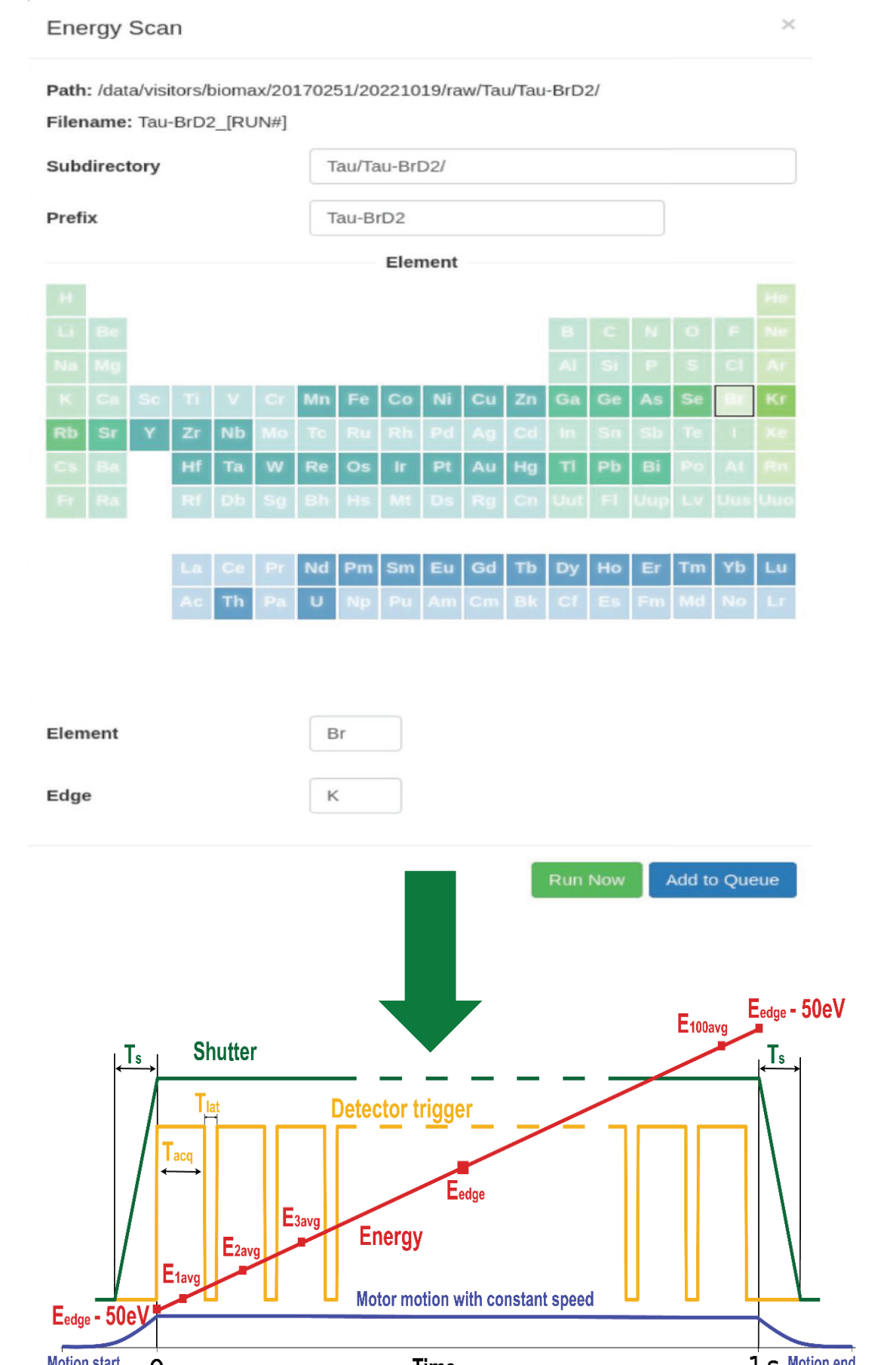
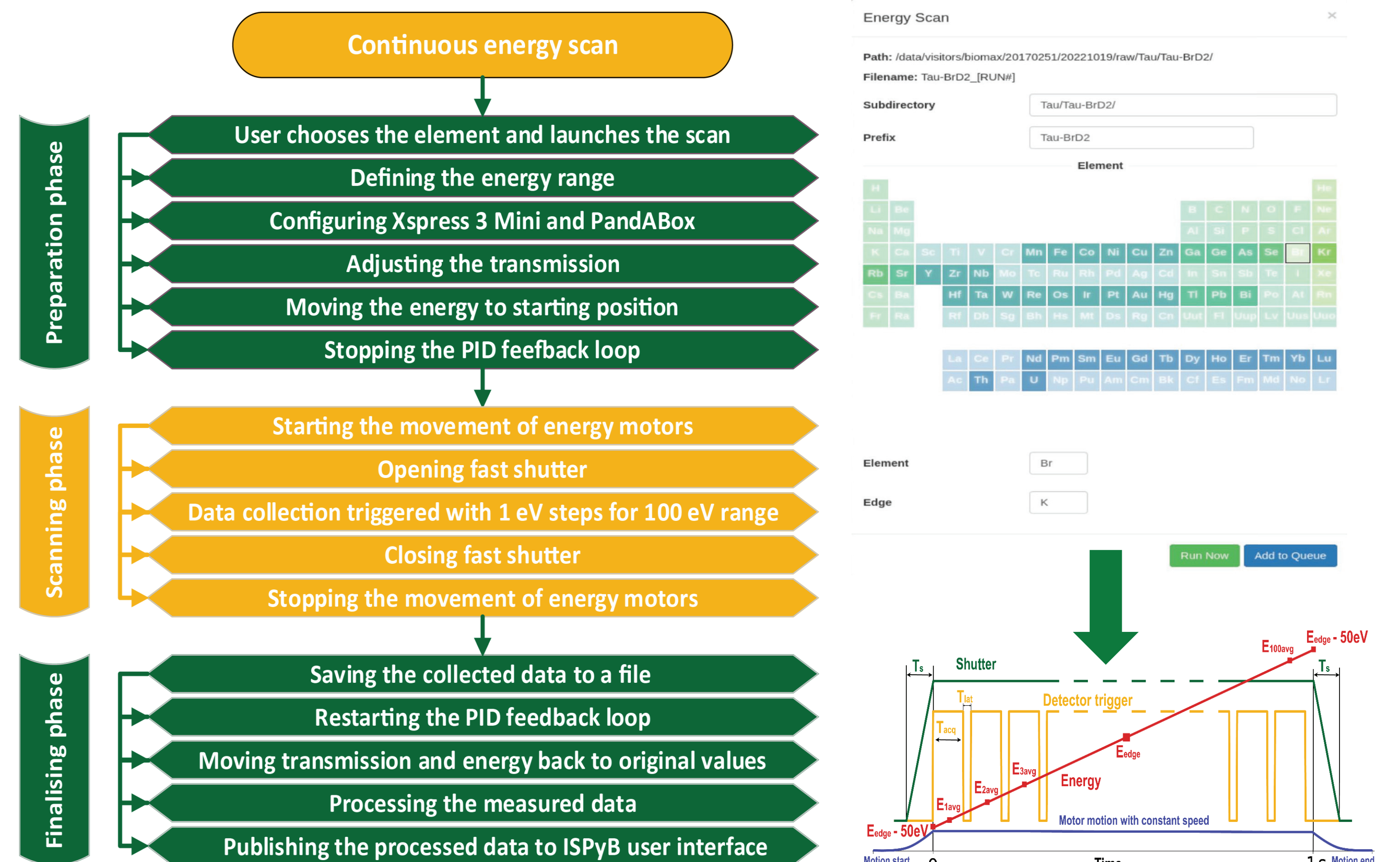
- Tunable photon energy: 6 keV – 24 keV
- SAD/MAD experiments available
- Energy defined by gap value and Bragg angle
- Energy change fully automated, not synced
- Non-linear energy dependence for motors

Relevant Equipment



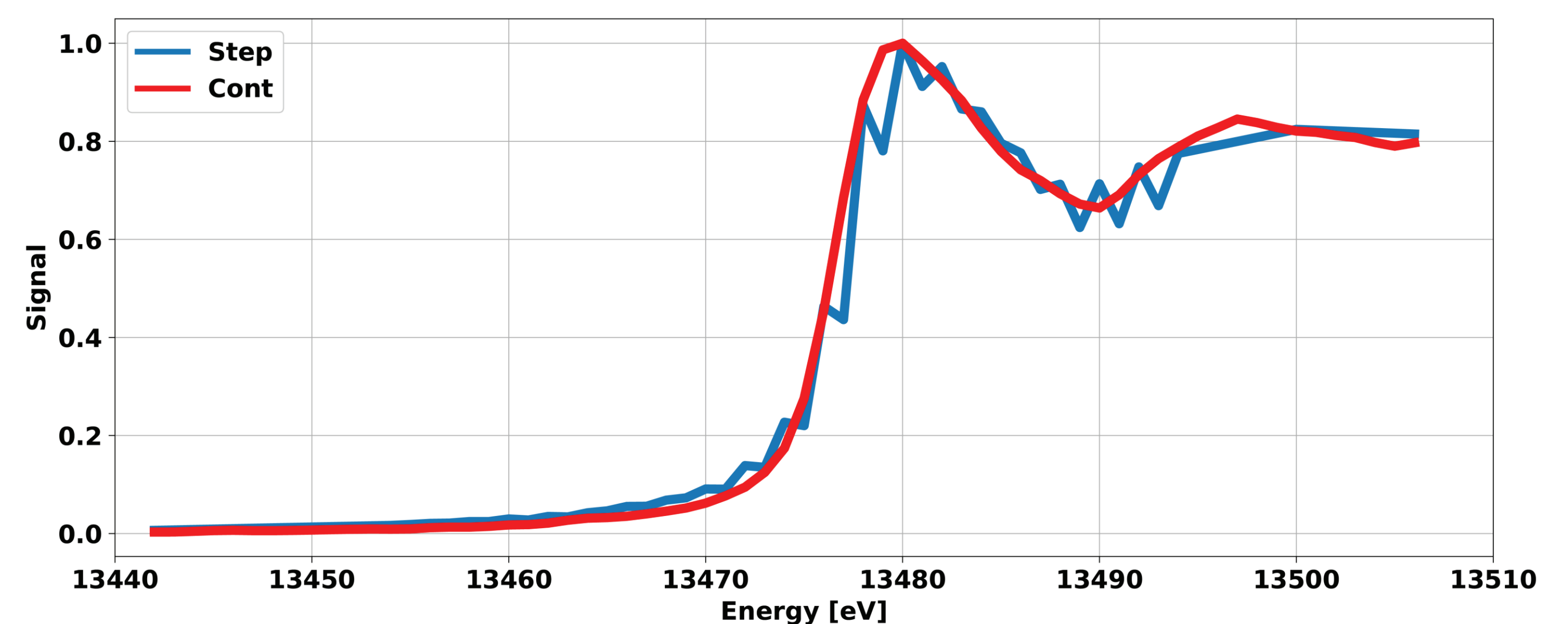
- XR-100SDD detector (Amptek, USA) for measuring fluorescence from samples
- Xspress 3 Mini (Quantum Detectors, UK) for fluorescence signal readout
- Colibri shutter (Arinax, Fr) for radiation exposure control of the sample
- PandABox (Quantum Detectors, UK) for timing and synchronisation control

Energy Scan Procedure



Energy Scan Results

- Scan duration reduced by two orders of magnitude from a few minutes to 1 s
- Overall procedure duration reduced to 80 s – 90 s, a factor of 4-5 times faster
- Hardware synchronisation of undulator gap and Bragg motors
- Energy synchronisation of undulator and monochromator better than 0.5 eV
- Energy change is considered linear within 0.4 eV for 100 eV range
- X-ray beam intensity and alignment remain stable during the scan
- Fast and easy access to anomalous diffraction for SAD and MAD techniques



Gorgisyan I. et al., Journal of Synchrotron Radiation 30.5 (2023).