

Experimental platform with high-power nanosecond laser at SACLA

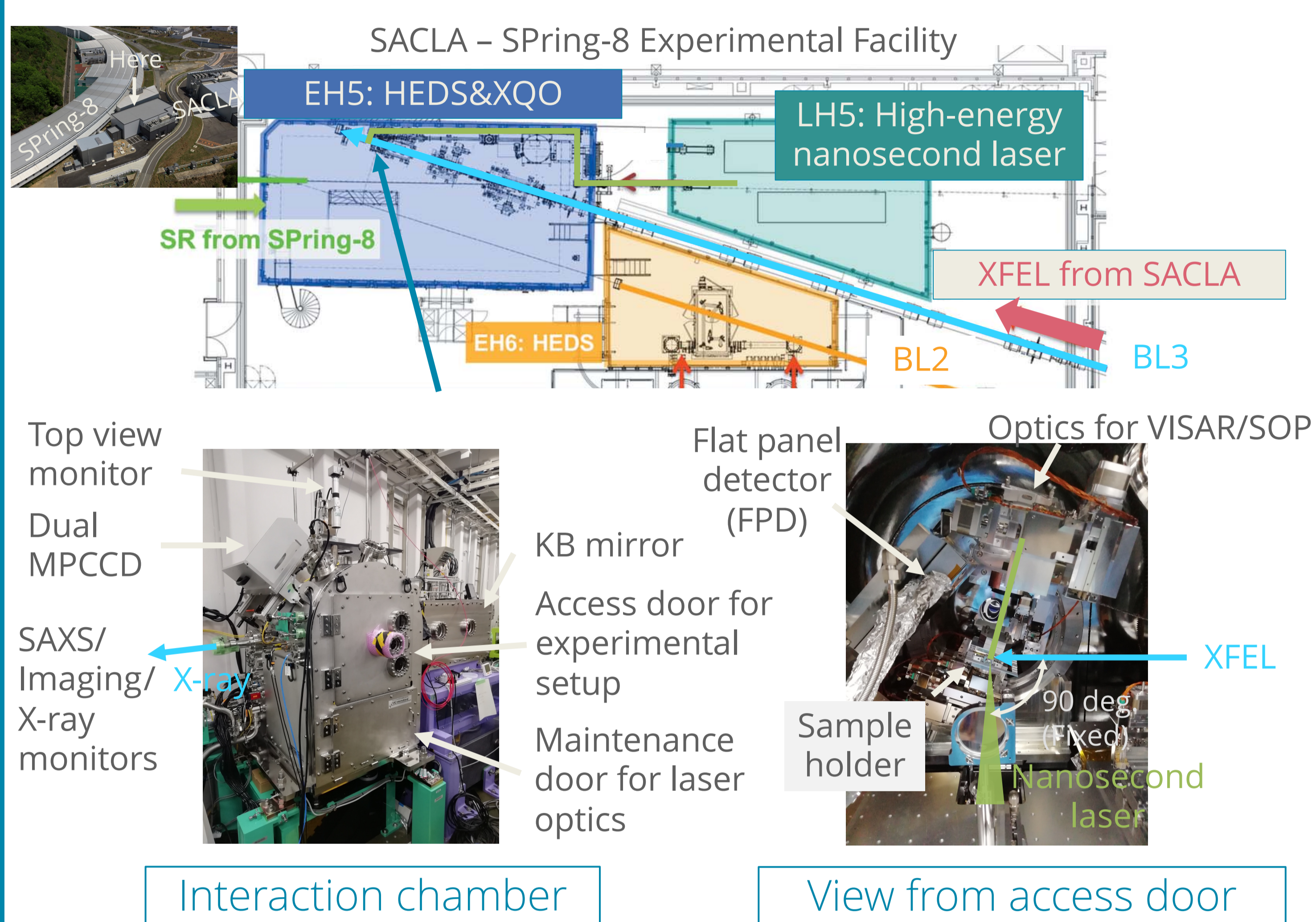
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SACLA

Summary

- An experimental platform for combinative use of high-power nanosecond laser and XFEL designed for exploring dynamically compressed matters is available for users' experiments at SACLA [Y. Inubushi+, *Appl. Sci.* **10**, 2224 (2020)].
- Expansion of experimental configuration capability is in progress.
- Further improvements and developments are planned.

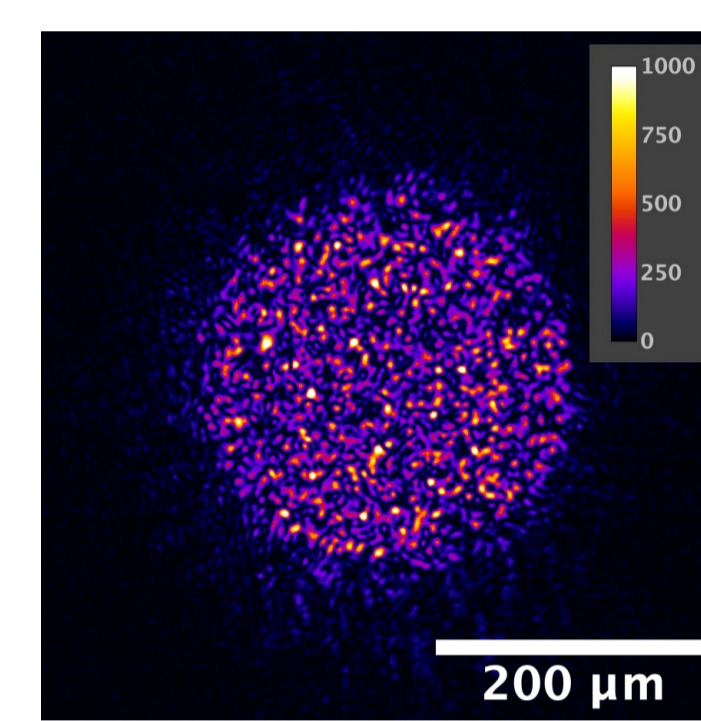
Experimental platform



Beam parameters

High-power nanosecond laser	
Pulse Energy	> 15 J@5 ns on sample (current)
Spot size	120, 170, 260 μm in FWHM (typical)
Wavelength	532 nm
Repetition Rate	0.1 Hz

Diffractive optical elements (DOEs) for focal spot smoothing are open to users



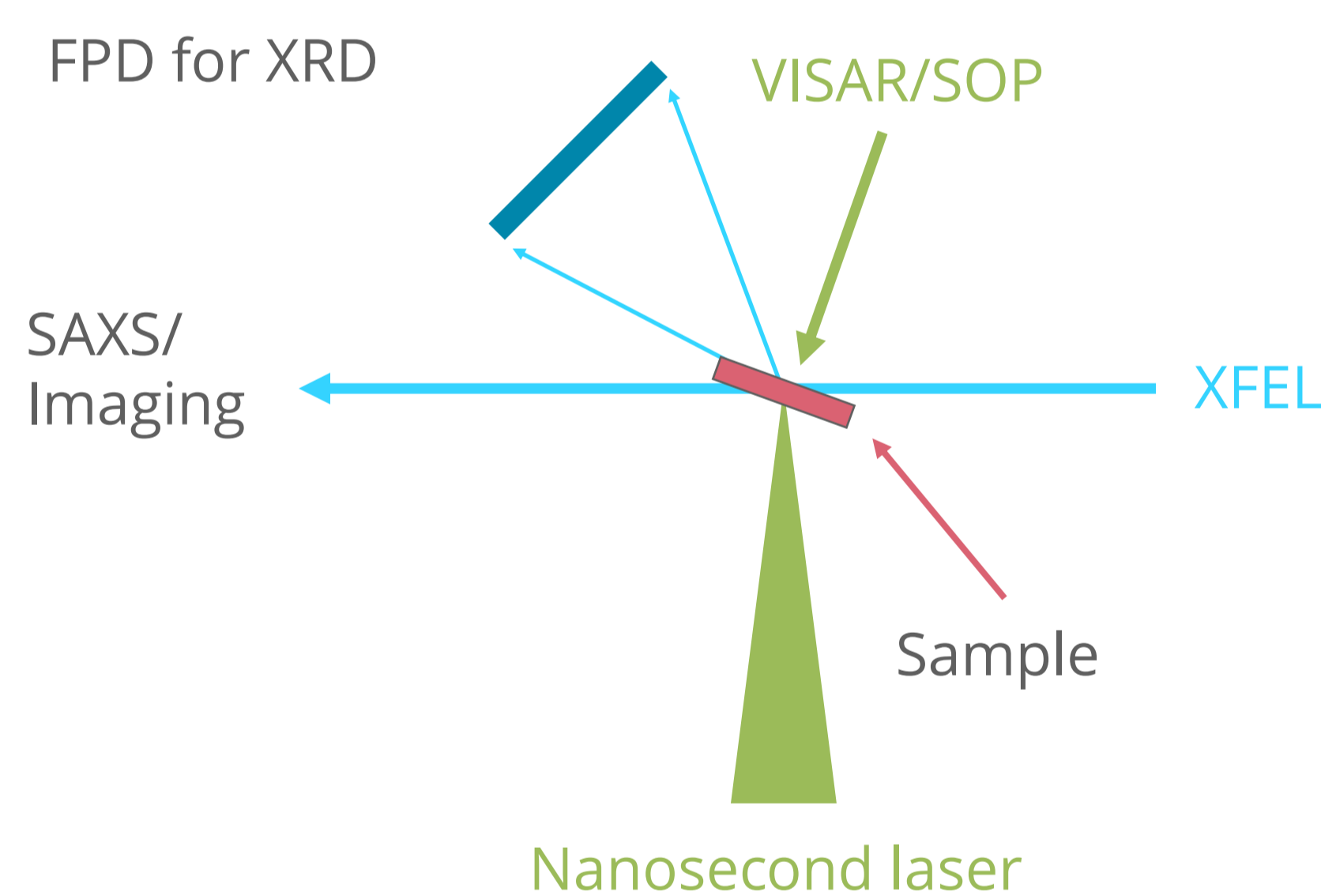
- Smoothed profiles with diameters of 120, 170, and 260 μm in FWHM are available

XFEL	
Beamline	BL3
Beam size (FWHM)	sub- μm to 10s μm (KB mirror focusing) ~600 μm (Unfocused)

See poster "Overview of Beamlines (BL1,2,3)" for more details on XFEL characteristics

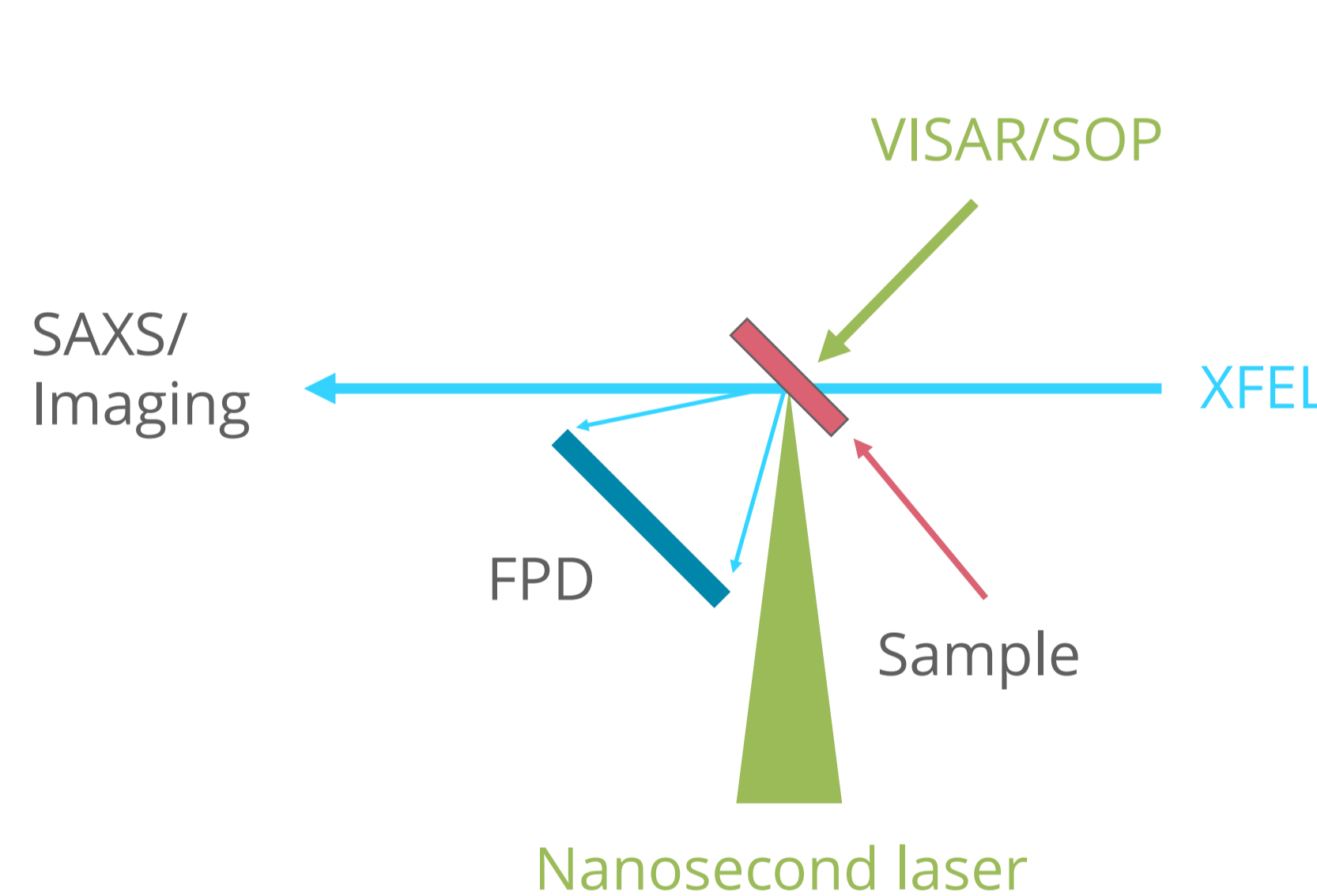
Experimental configurations

Reflection geometry



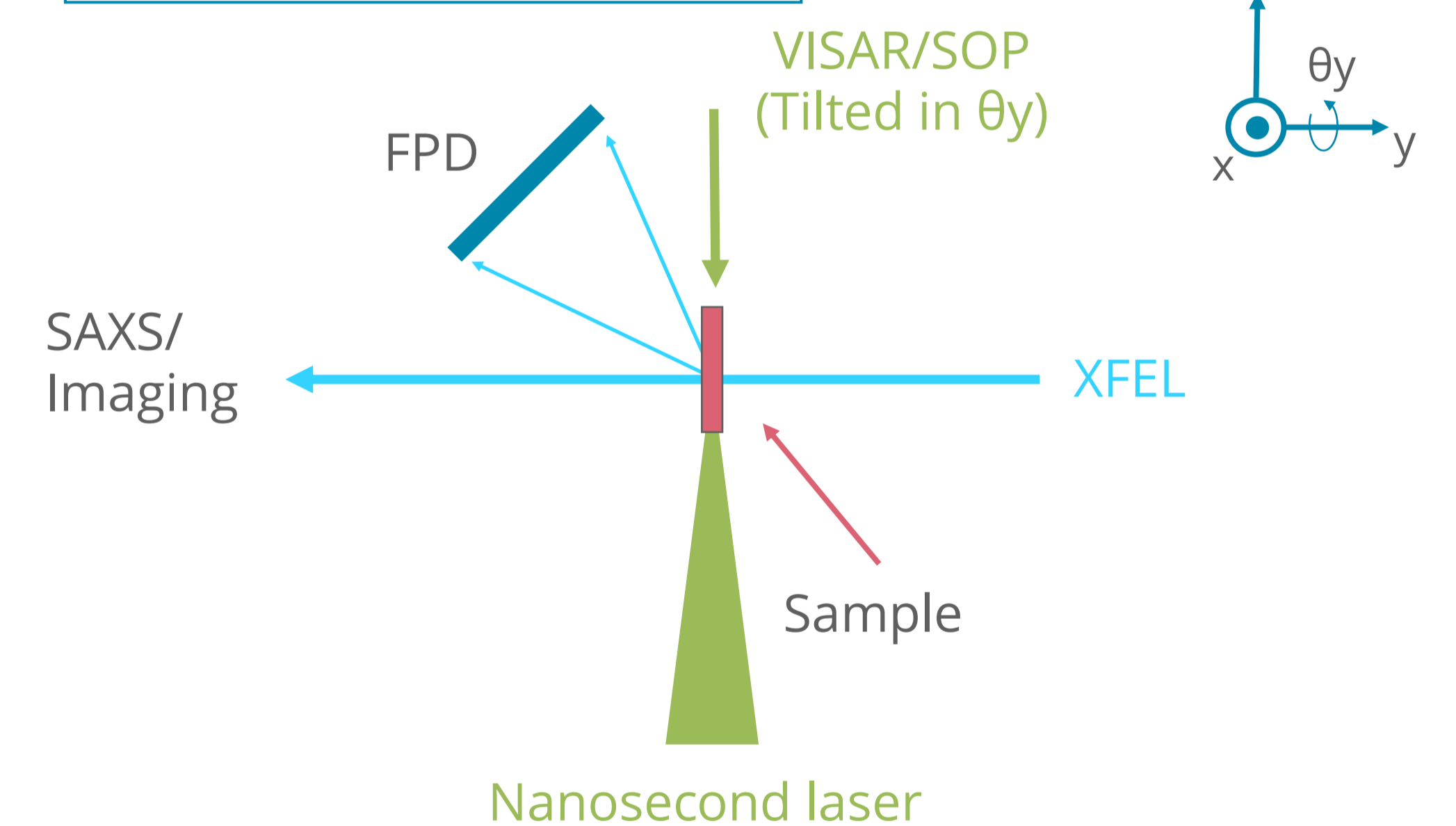
- Has been used for users' experiments since 2018

Transmission geometry



- Has been tested
- Needs to improve filtering noise from laser-plasma

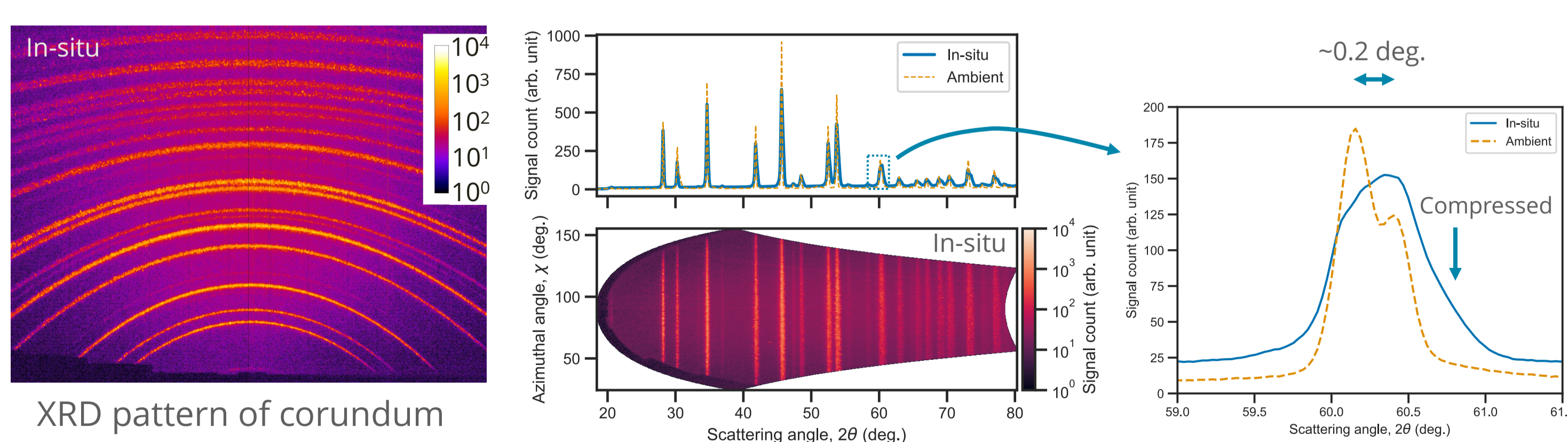
Side-on geometry



- VISAR compatible with side-on geometry is under development with the cooperation of K. Michel and B. Albertazzi of LULI Ecole polytechnique.

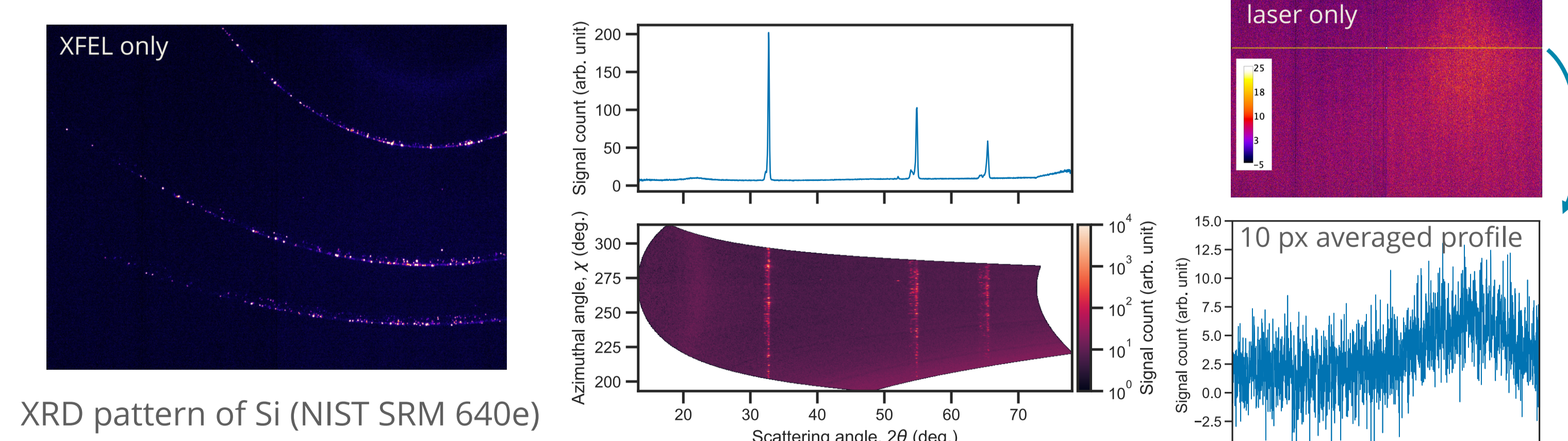
X-ray diffraction measurement with flat panel detector (FPD)

Reflection geometry



- Angular range of FPD at 130 mm from sample
 - Scattering angle: 18–78 deg.
 - Azimuthal angle: 40–140 deg.
- Resolution of 0.1–0.2 degrees

Transmission geometry



- Angular range of FPD at 130 mm from sample
 - Scattering angle: 14–72 deg.
 - Azimuthal angle: 200–300 deg.
- Resolution of 0.1–0.2 degrees
- Weak noise from laser-plasma
 - Needs to improve filtering

Other ongoing developments

- Development of vacuum compatible high-resolution X-ray imaging system
- Development of X-ray absorption spectroscopy system
- Installation of additional detector for XRD