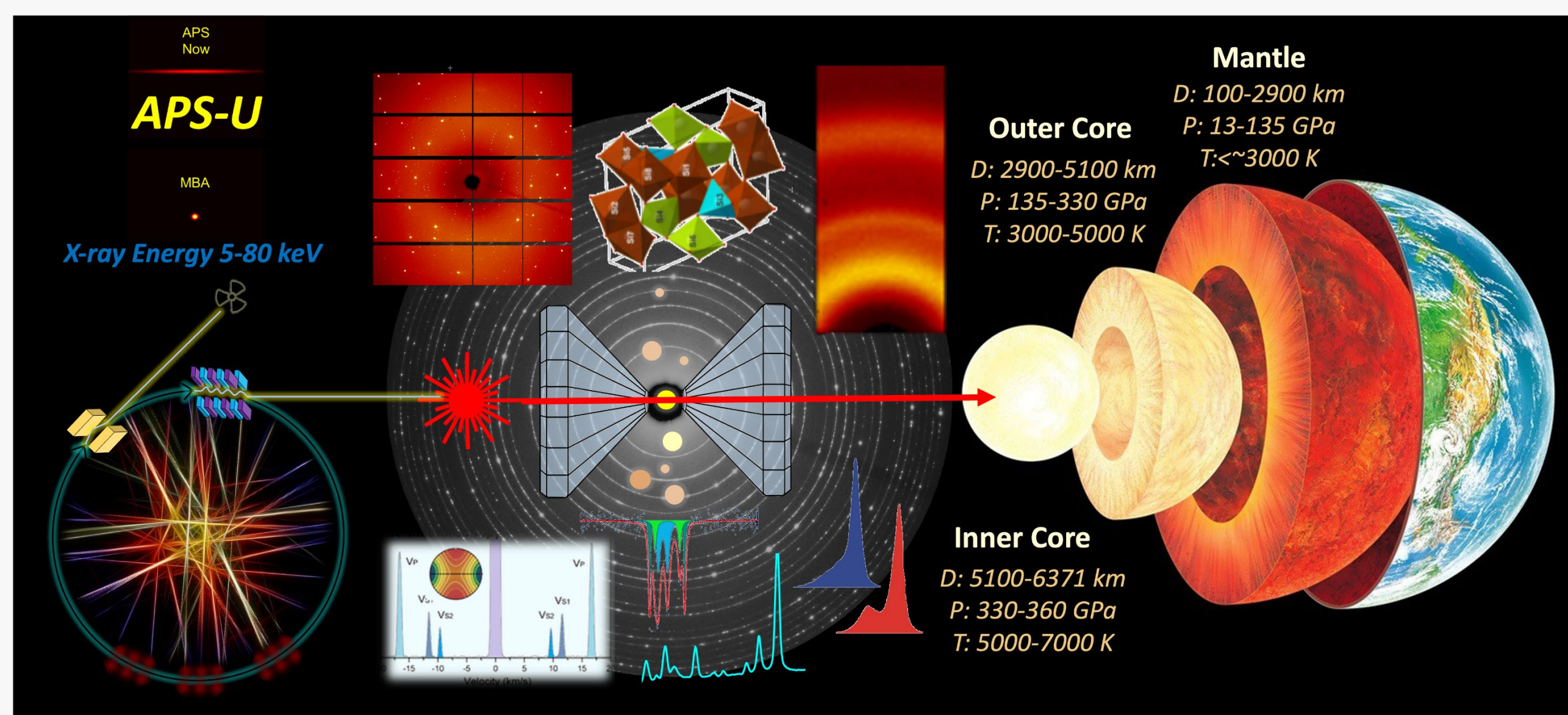


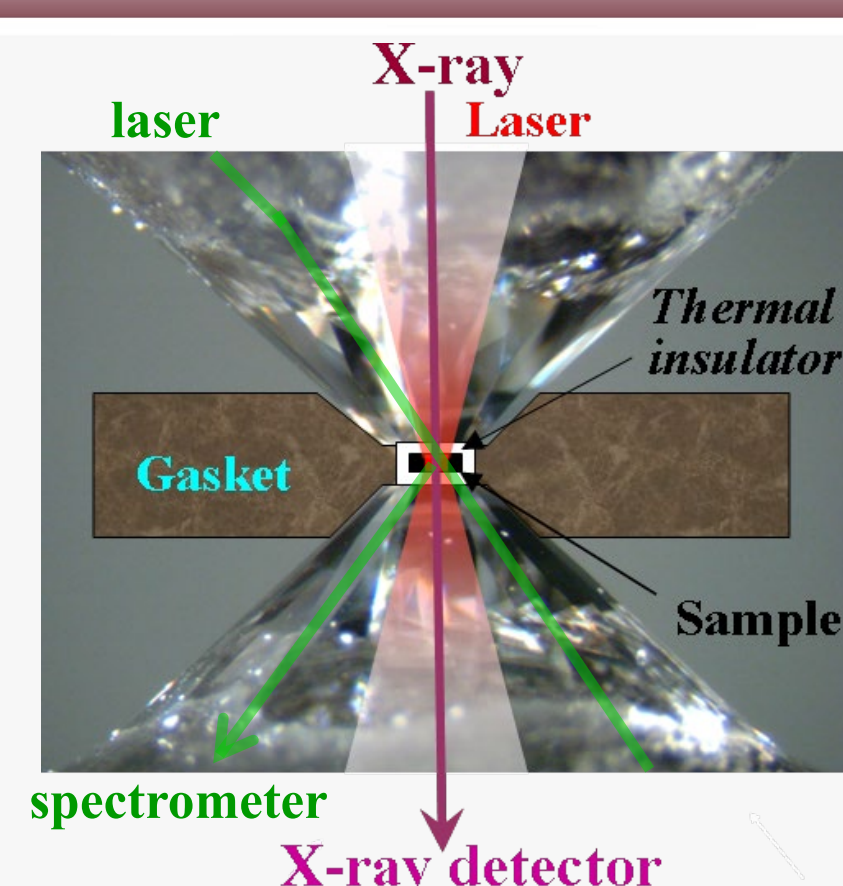
Understanding the complex nature of the deep interiors of the Earth and other planets requires the knowledge of the physical and chemical properties of their constituting elements and compounds at relevant conditions.

To provide new constraints on models for planetary evolution and origin, key properties (melting, structure, phase relation, chemical reactions and kinetics, transport, elastic, electronic and optical properties) of a wide range of minerals must be studied in-situ at extreme conditions of pressure and temperature.



Combination of X-ray, electrical and optical probes coupled with ex situ characterization of sample texture and composition provides a powerful approach for acquiring the kinds of multi-faceted data needed to develop realistic models of how the interior of Earth and other planets formed, evolved, and currently operates

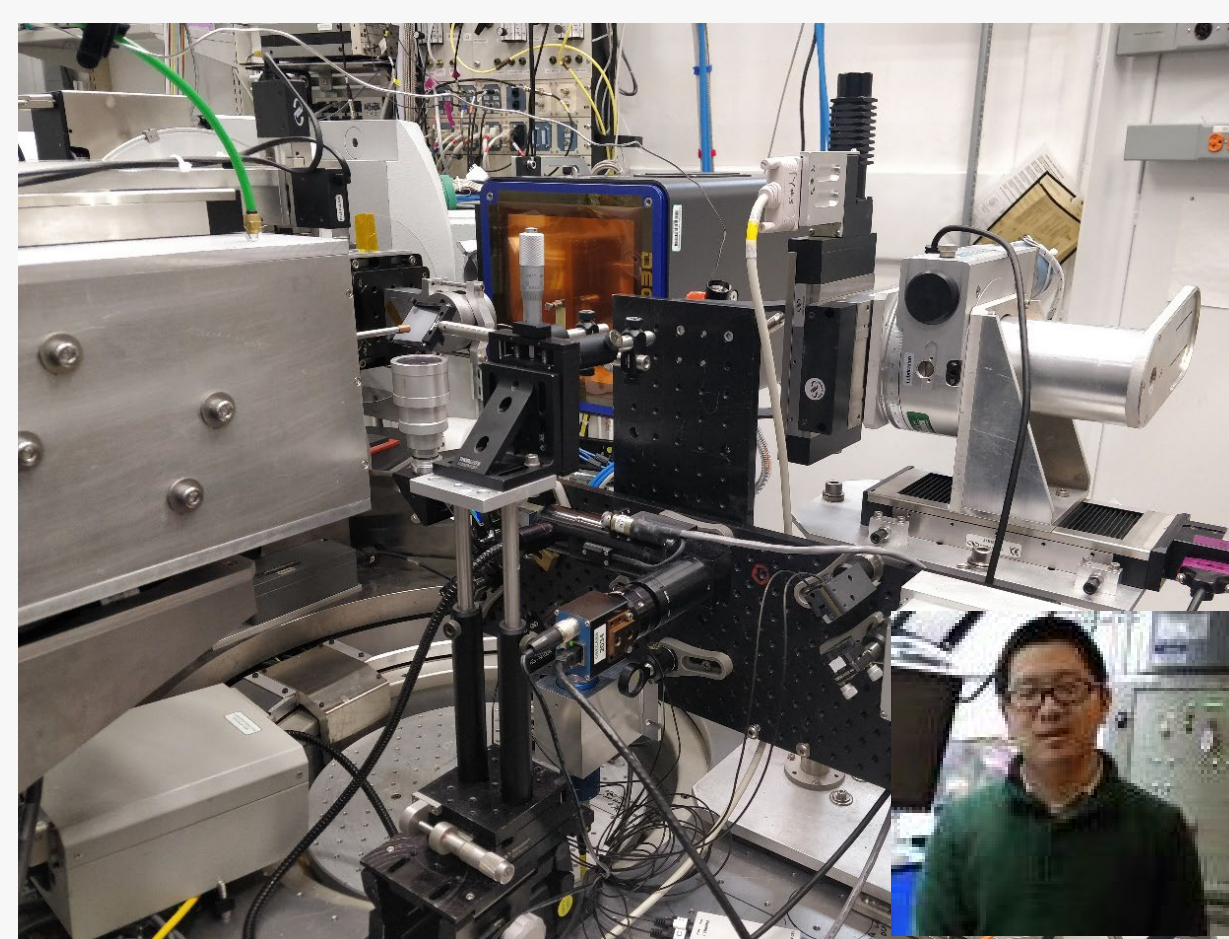
Multiple optical axes (X-ray, lasers, spectroscopy and imaging) should be aligned with sub-micron precision on the sample inside the diamond anvil cell.



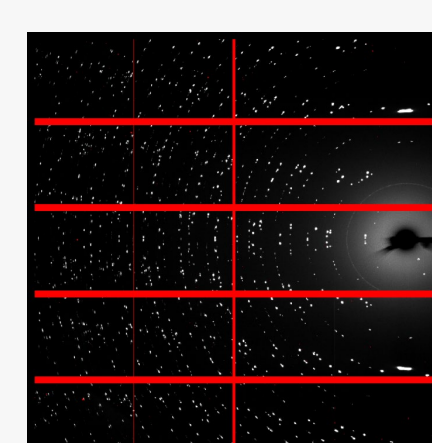
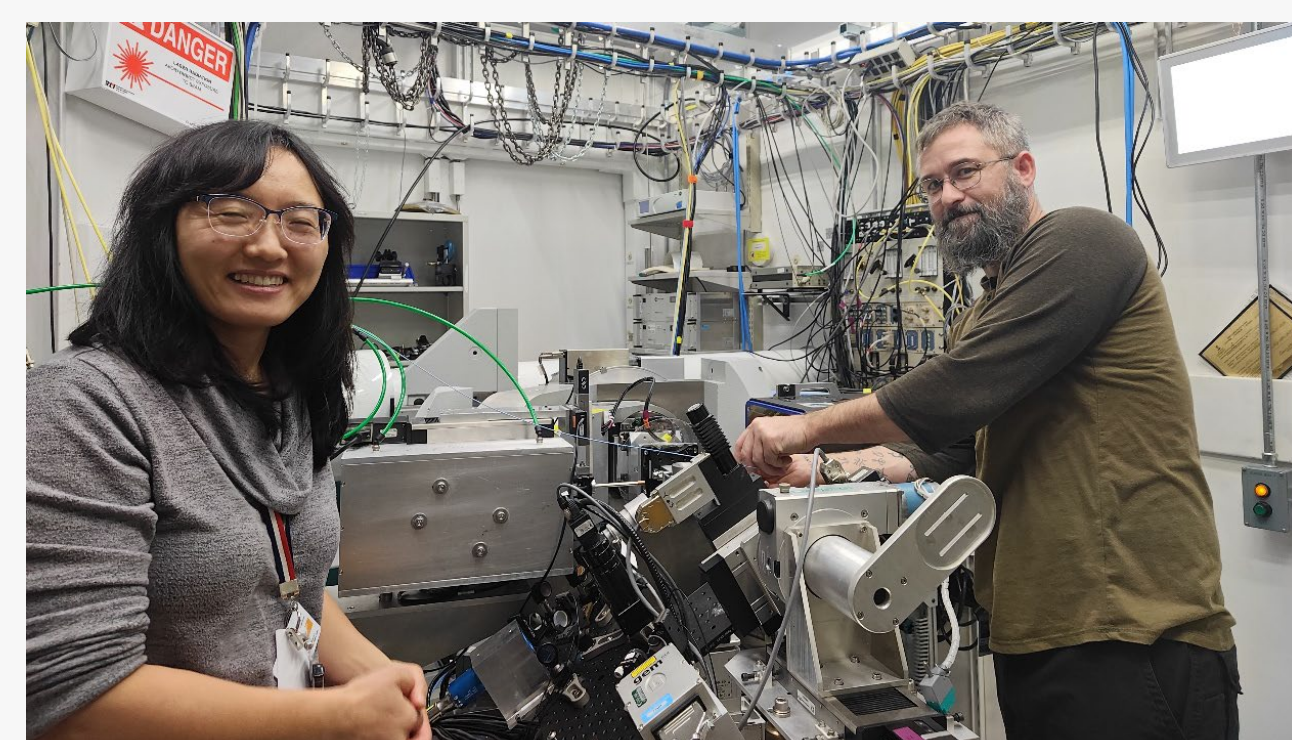
13-BMC

X-ray energy 28.6 keV, beam size ~10 μm
SCXRD, radiography, on-line laser heating, Raman and VIS spectroscopy

- ✓ High energy X-ray efficient Pilatus3 1 M CdTe detector will be available for most DAC experiments
- ✓ Fast shutter-less gated optical detector PI-MAX3 will be installed for radiometric temperature measurements above 1000 K with optional synchronization with laser heating pulses
- ✓ Updated enclosure for precise high temperature experiments with resistive heating DAC up to 1400 K
- ✓ Compact cryostat for low temperature DAC experiments with rotation capabilities for SCXRD measurements
- ✓ Rowland circle monochromator upgrade: adding another Si crystal to enable energy >35 keV.

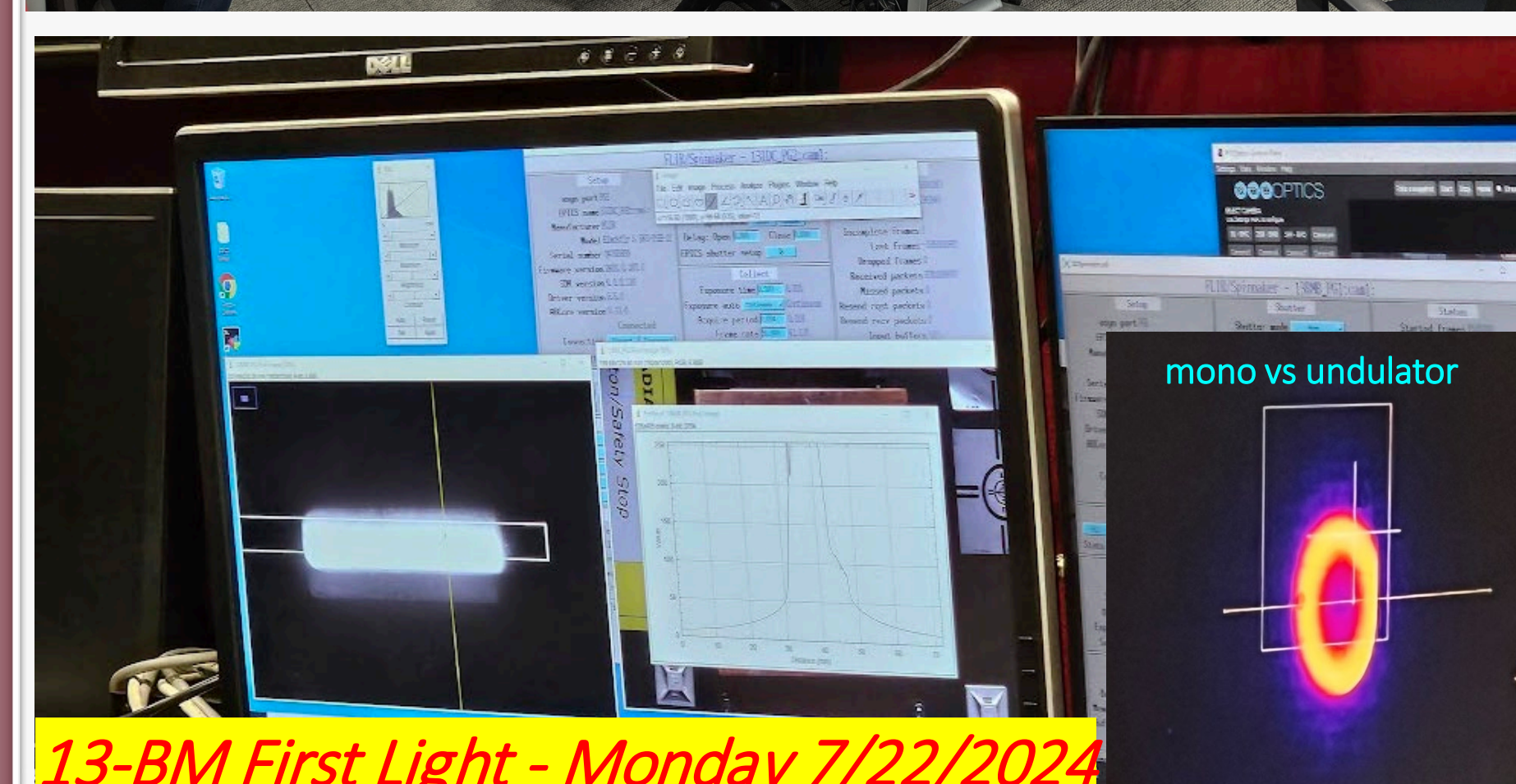


BMC welcomes first scientific commissioning users:
W. Bi and J. Petri from, U Alabama

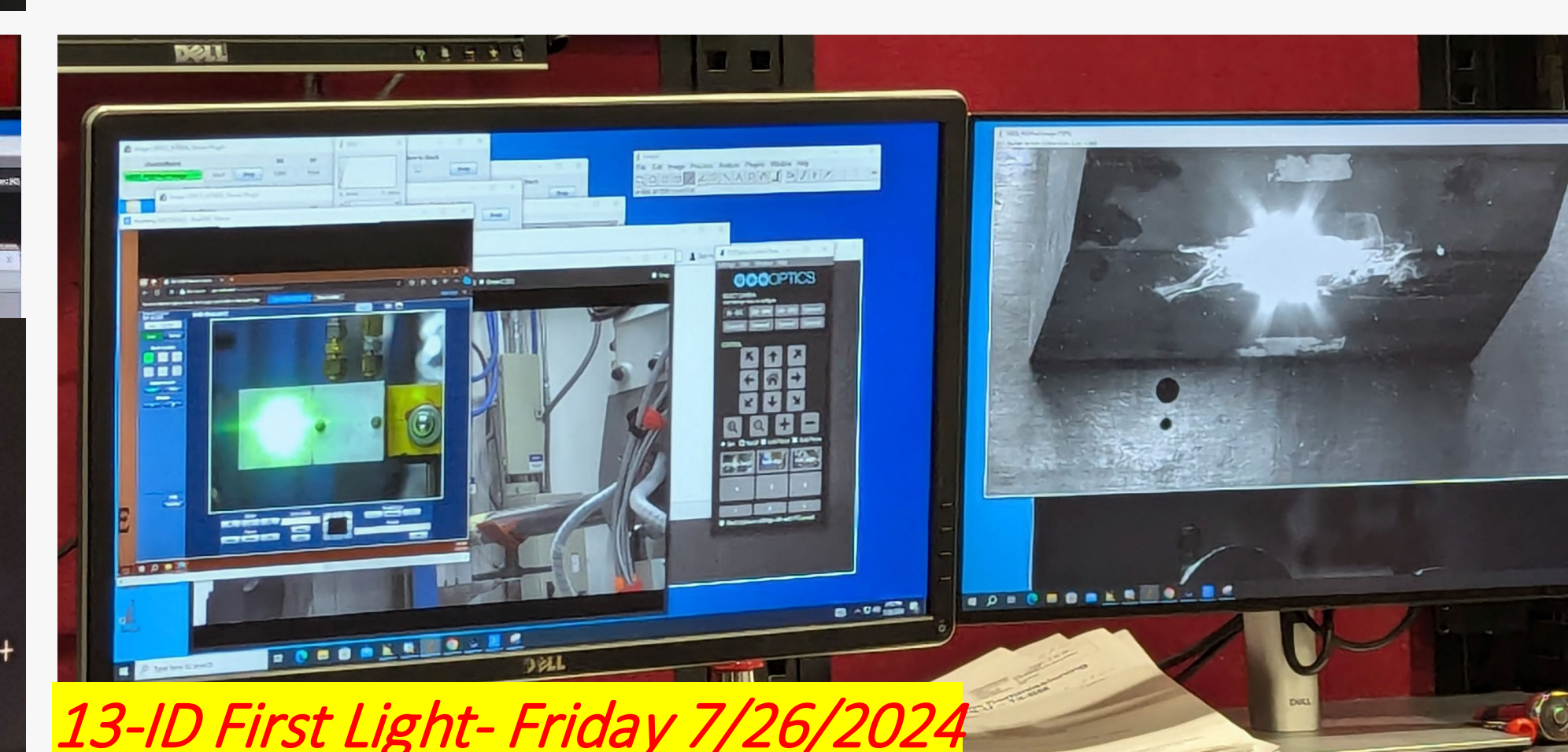


GSECARS- 7/26/2024

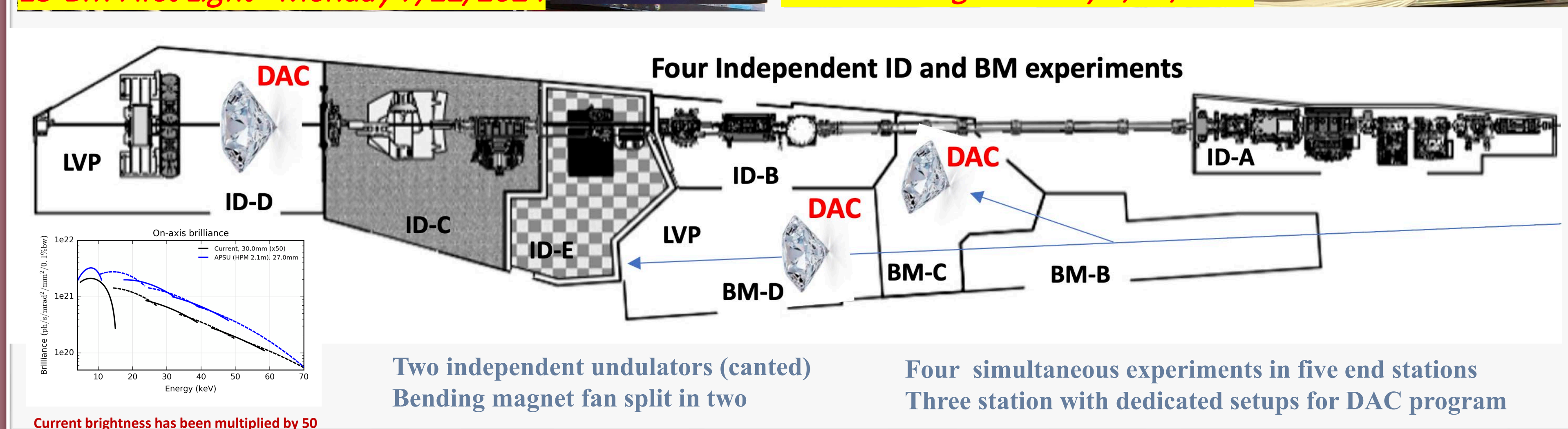
June 17, 2024



13-BM First Light - Monday 7/22/2024



13-ID First Light- Friday 7/26/2024



13-IDD

X-ray energy 5 - 55 keV, beam size 300 nm
XRD, SCXRD, XES, on-line laser heating, Raman and VIS-IR spectroscopy

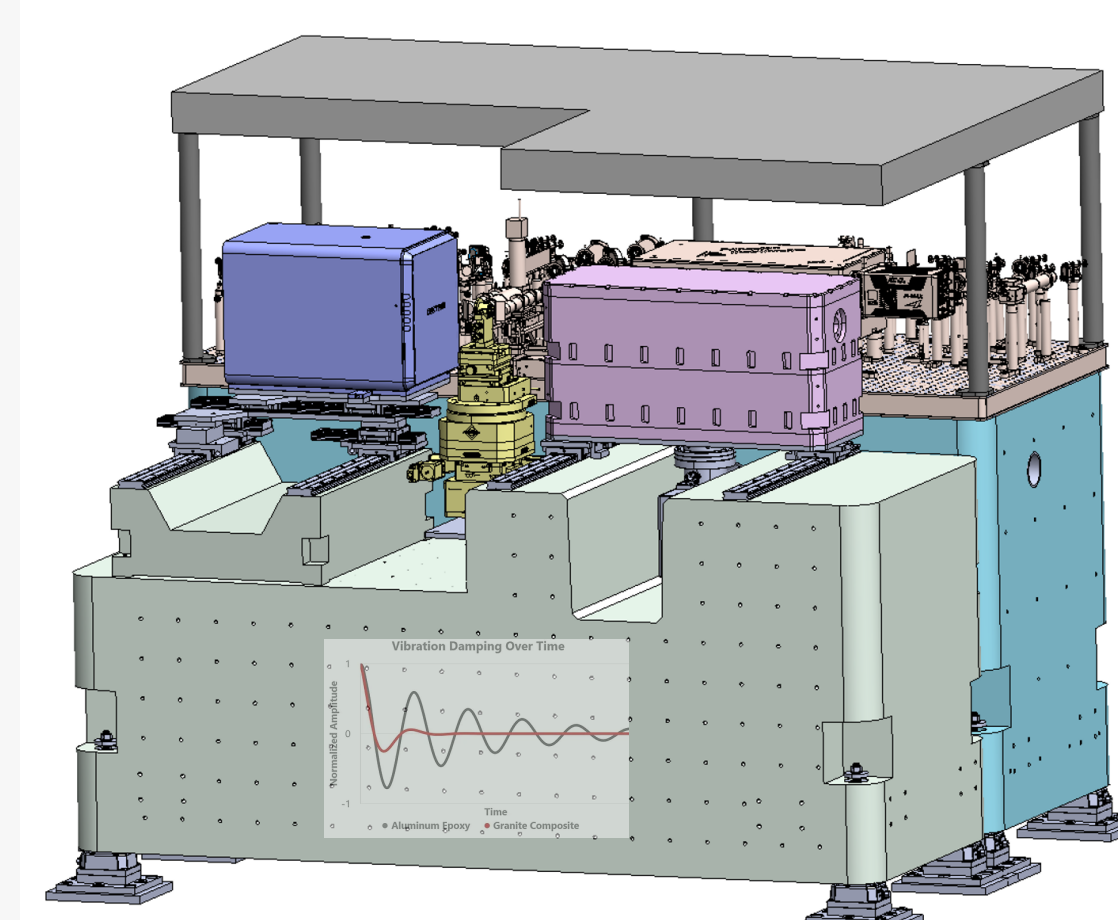


- ✓ 10-100 times more photons
- ✓ 300 nm X-ray focal spot
- ✓ Vibration free granite table
- ✓ Air-bearing rotary stage
- ✓ 9M Eiger CdTe detector
- ✓ Supercontinuum laser
- ✓ X-ray scan across LH spot

2024

2025

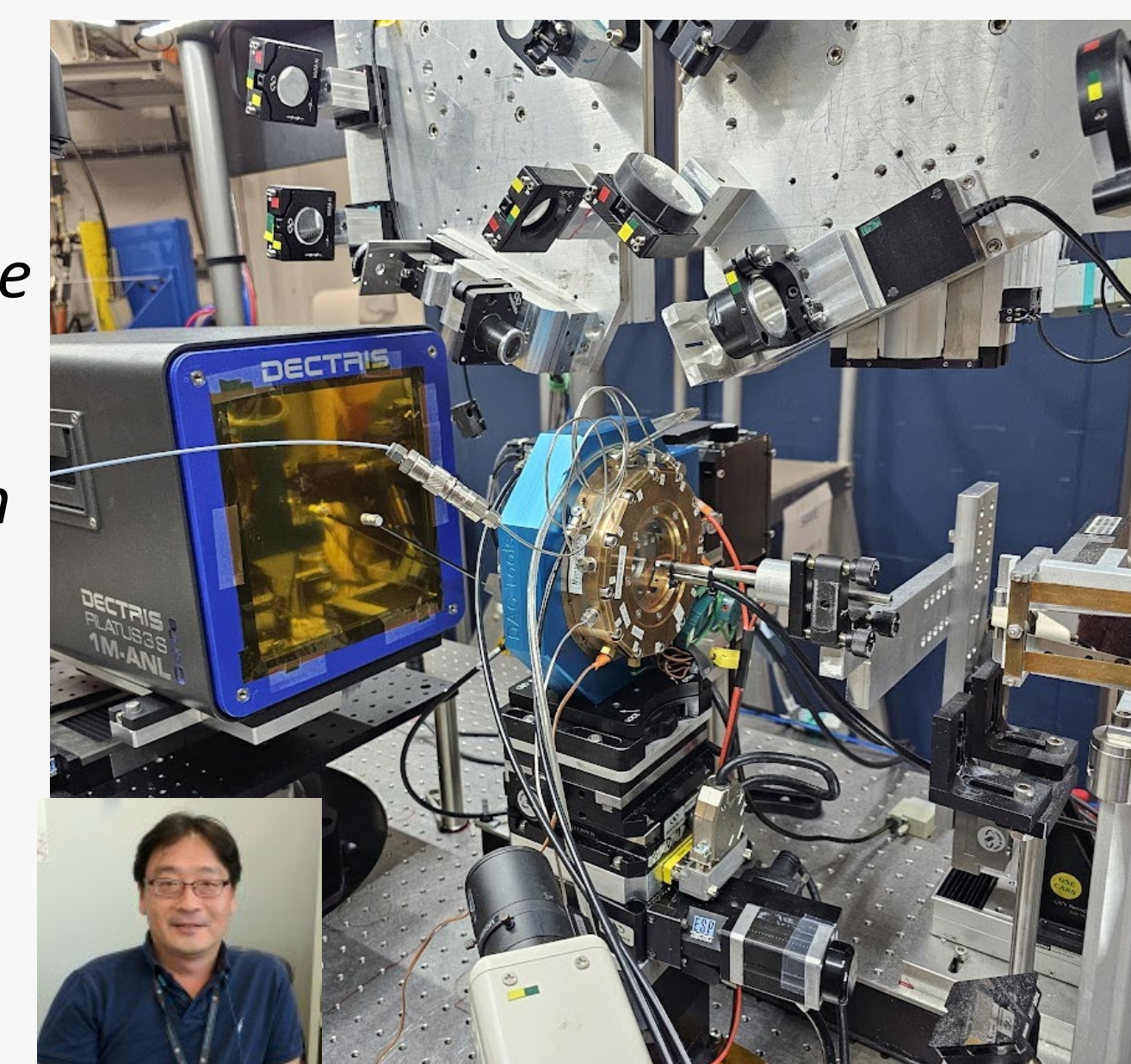
See more details on poster #MR31B-297 presented by Stella Chariton



13-BMD

X-ray energy 5 - 80 keV, beam size 2 x 10 μm
XRD, SCXRD, 3D tomography with SCXRD, on-line Brillouin, Raman and VIS-IR spectroscopy

- ✓ High resolution (spatial and spectral) Raman spectroscopy in backscattering geometry with dedicated optical path
- ✓ High precision motorized stages for 12x zoom microscope to improve sample imaging, alignment and reproducibility
- ✓ Modification of the focusing and collecting platforms in the Brillouin system to fit new large high temperature enclosure for externally heated DAC with custom designed rotation stage. The system has been developed in collaboration with DACTools and Hanyang Univ
- ✓ Combination of 3D computer tomography with tightly focused XRD (single-crystal or powder) to study micro-inclusions inside bulky matrix



First experiment at BMD

BMD welcomes first scientific commissioning users: H Sim, S Yun and B Go (Yonsei U)

Young Jay Ryu, The University of Chicago
horizontal focus 2 μm, vertical slitted 40 μm

