



SOLARIS
NATIONAL SYNCHROTRON
RADIATION CENTRE

NEW MEASUREMENT OPPORTUNITIES FOR METROLOGY AT THE SOLARIS SYNCHROTRON

Edyta Beyer on behalf of the SOLARIS Team

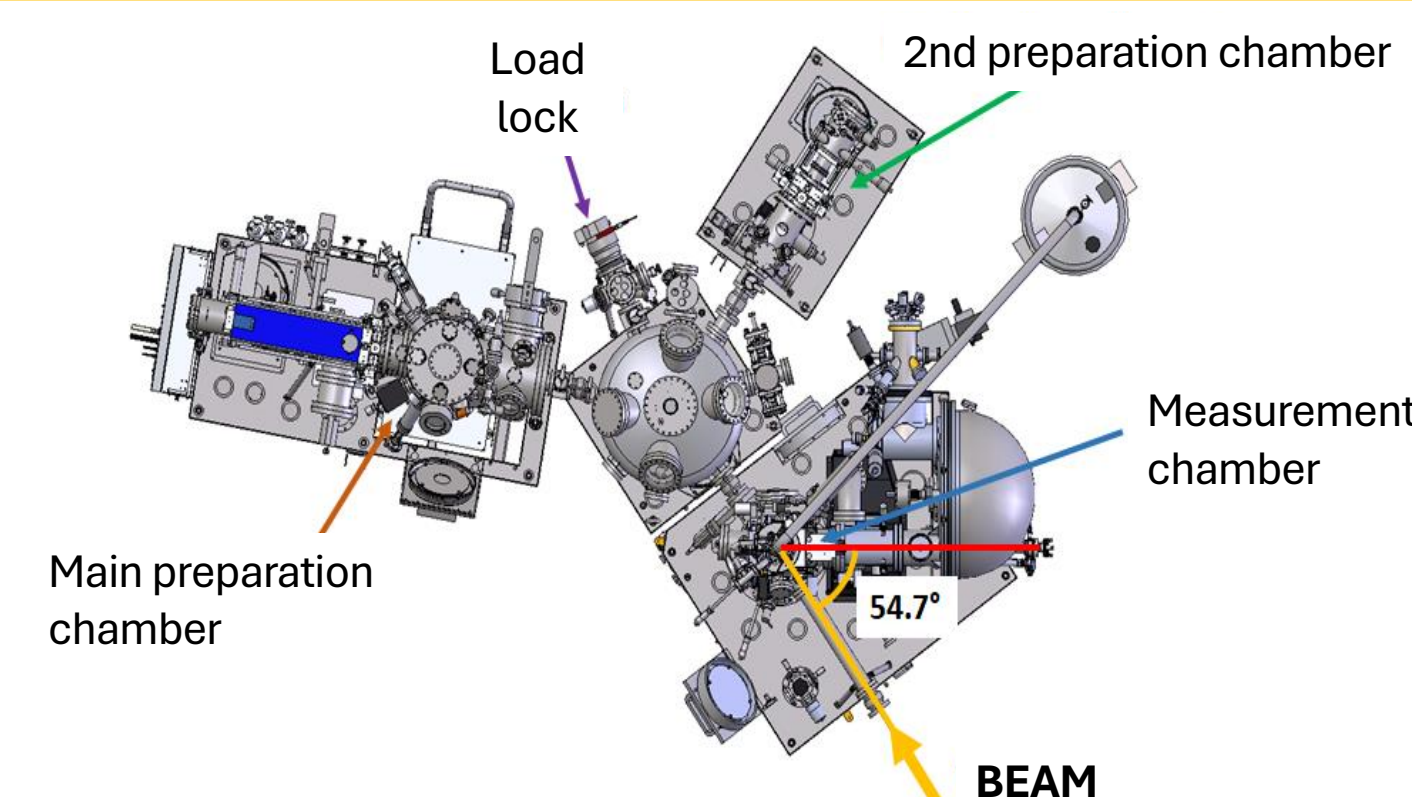
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**JAGIELLONIAN
UNIVERSITY
IN KRAKOW**

PHELIX – A SOFT X-RAY SPECTROSCOPY BEAMLINE

Radiation source	elliptically polarizing undulator (EPU), APPLE II
Energy range	50–2000 eV for horizontal polarization
Resolving power	10 000
Beam size on sample	60x120 μm^2



ENDSTATION FOR COMPLEMENTARY PHOTOEMISSION EXPERIMENTS

Photoelectron Spectroscopy

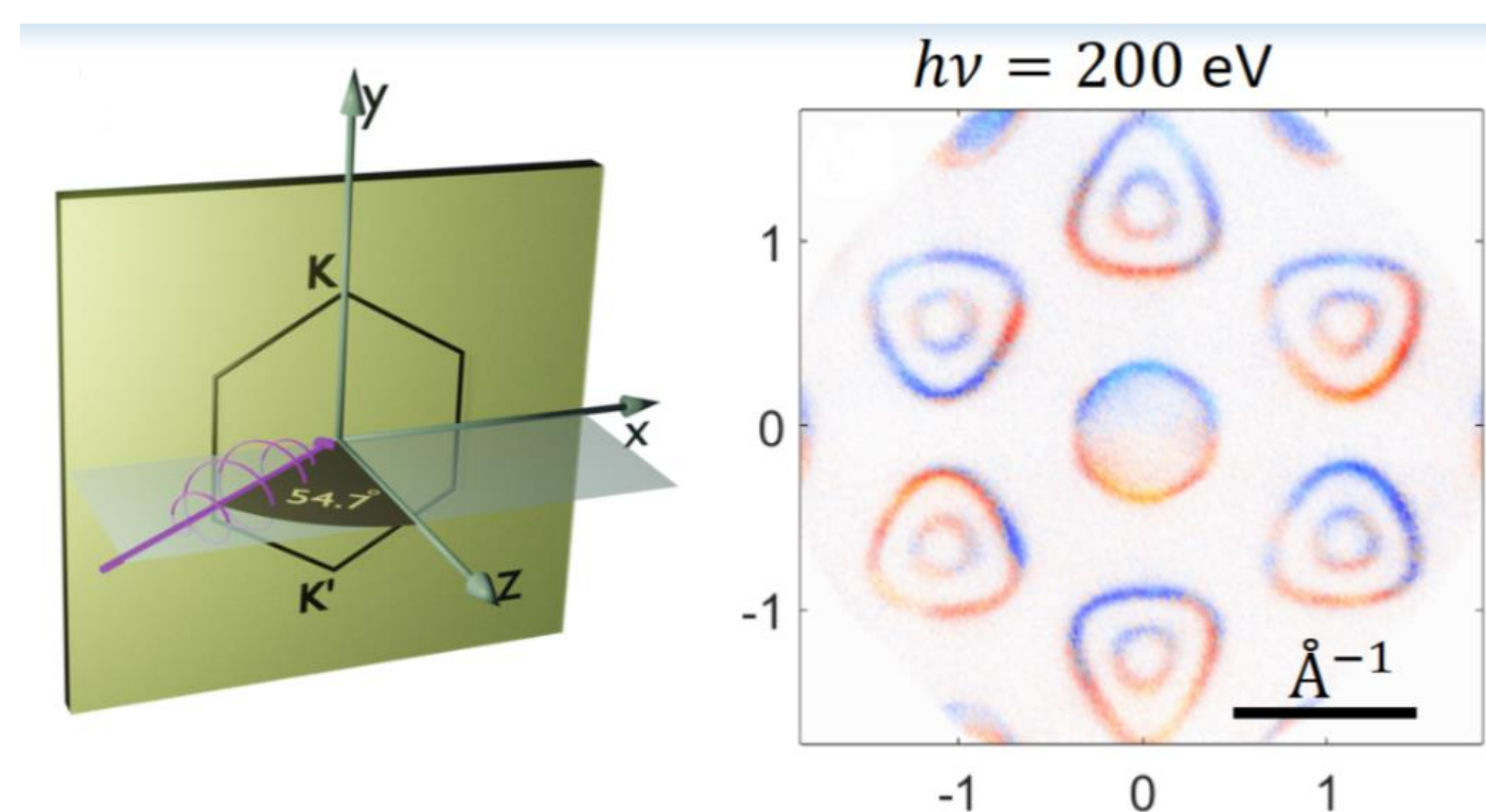
- **ARPES** Angle Resolved Photoelectron Spectroscopy
- **Spin-ARPES** Spin-resolved ARPES
- **CD-ARPES** Circular dichroism ARPES
- **XPS** X-ray Photoelectron Spectroscopy
- **ResPES** Resonant Photoemission Spectroscopy

X-ray Absorption Spectroscopy

- **TFY / PFY** Total / Partial Fluorescence Yield
- **TEY** Total Electron Yield
- **6-Axis Manipulator** (cryogenic)
- **3 component spin detection** with rotator
- **Variety of in-situ preparation opportunities**

HIGHLIGHTS AND PERFORMANCE

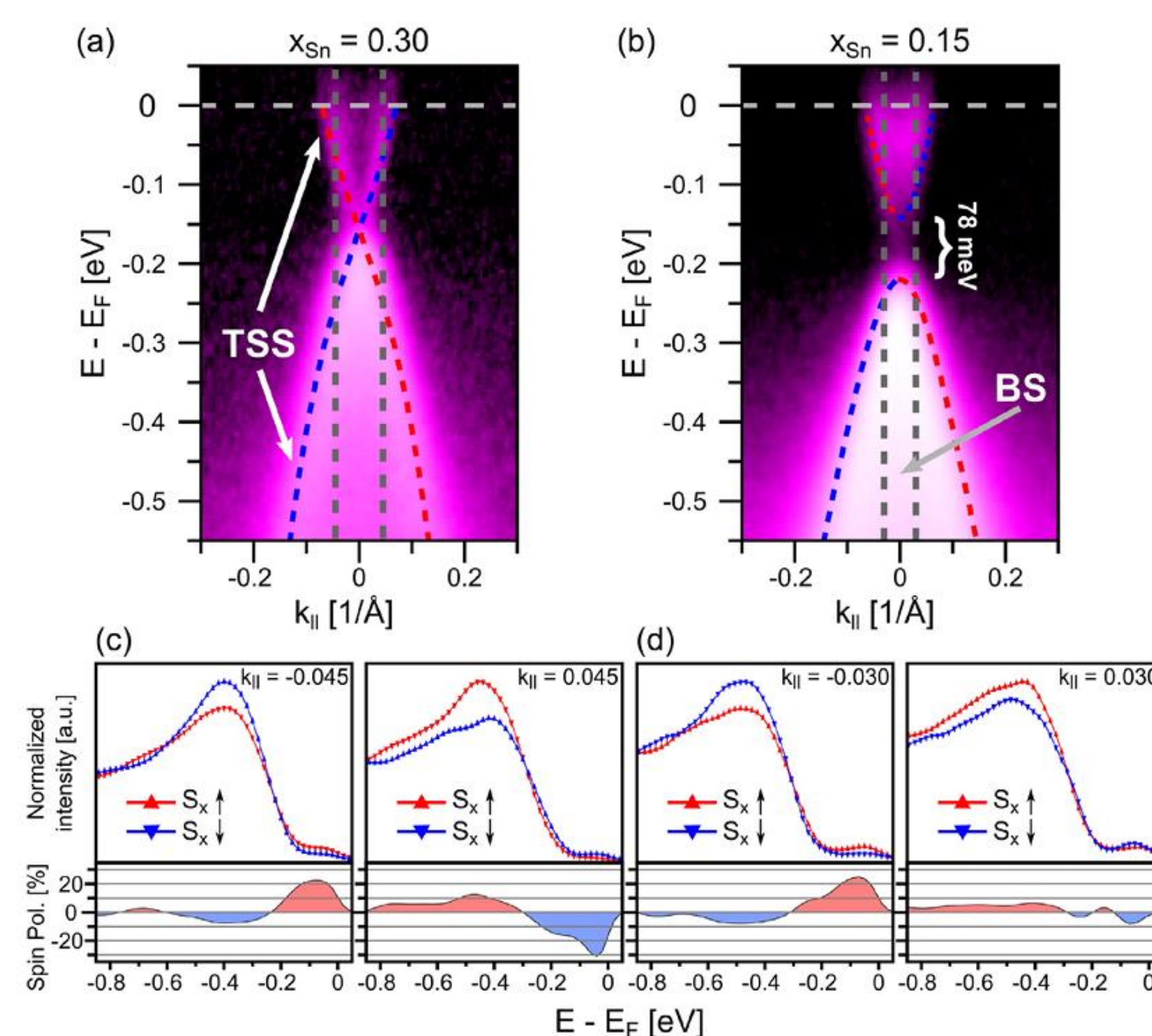
Circular Dichroism-ARPES on WSe₂



Experimental CD-ARPES for WSe₂. Experimental setup and the CD-ARPES map for WSe₂ taken at $h\nu = 200$ eV and $\theta_{hv} = 54.7^\circ$. The constant energy cut is at 0.725 eV below the valence band maximum at K/K' points.

H. Boban et al. *Physical Review B* 111 (2025), 115127

ARPES and spin-resolved measurements



ARPES spectra of TCI $\text{Pb}_{1-x}\text{Sn}_x\text{Se}$ (111) epilayers a), b) and (c), (d) corresponding SR measurements taken at 200 K with a photon energy of 70 eV in the vicinity of the Γ point.

B. Turowski et al. *Applied Surface Science* 610 (2023) 155434

URANOS – A VUV SPECTROSCOPY BEAMLINE

Radiation source	elliptically polarizing undulator (EPU), APPLE II type with permanent magnets
Energy range	8–500 eV total (8-30 eV with NIM and 14-500 eV with PGM)
Resolving power	20 000
Beam size on sample	60x60 μm^2

EXPERIMENTAL METHODS

Photoelectron Spectroscopy

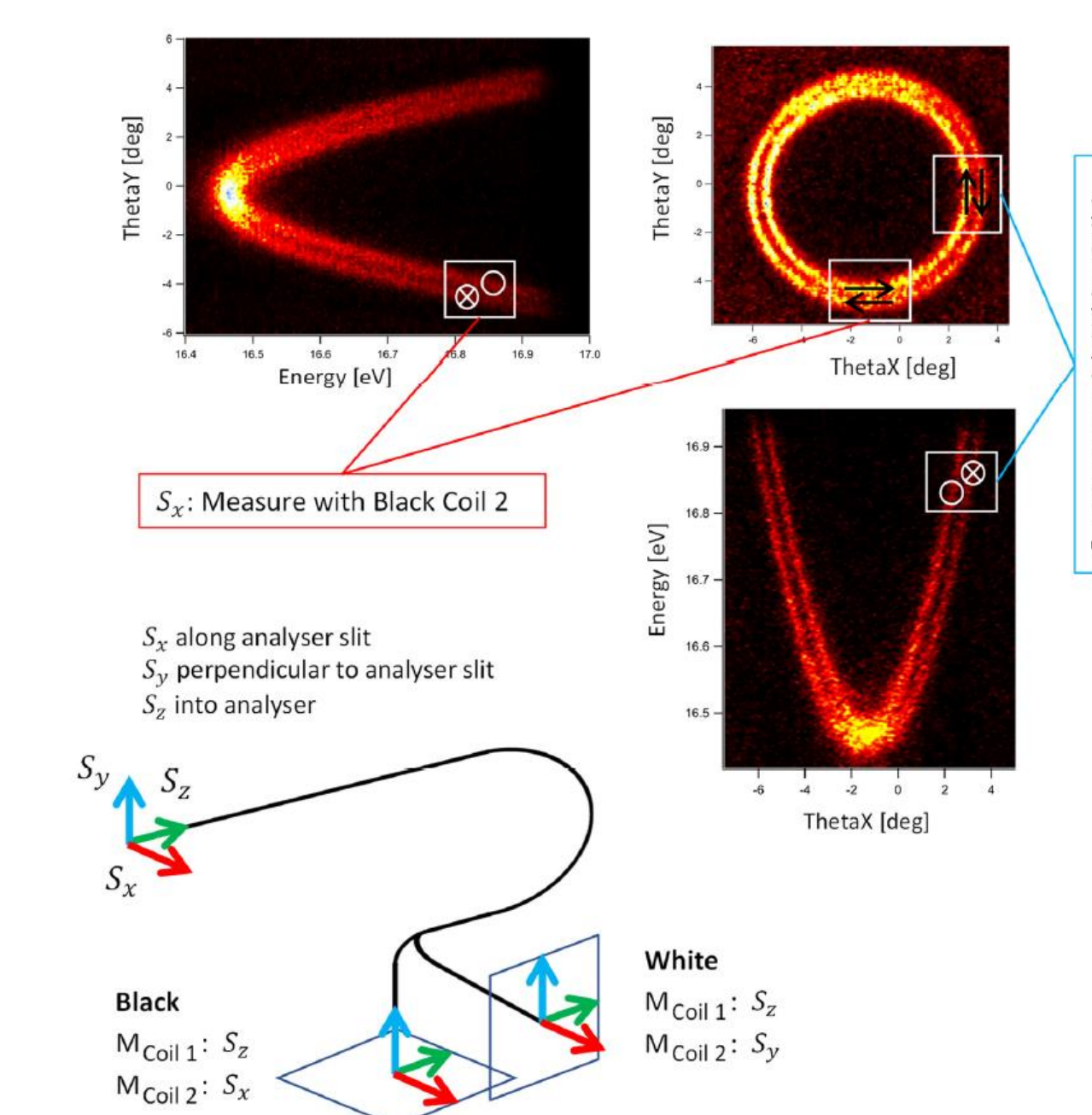
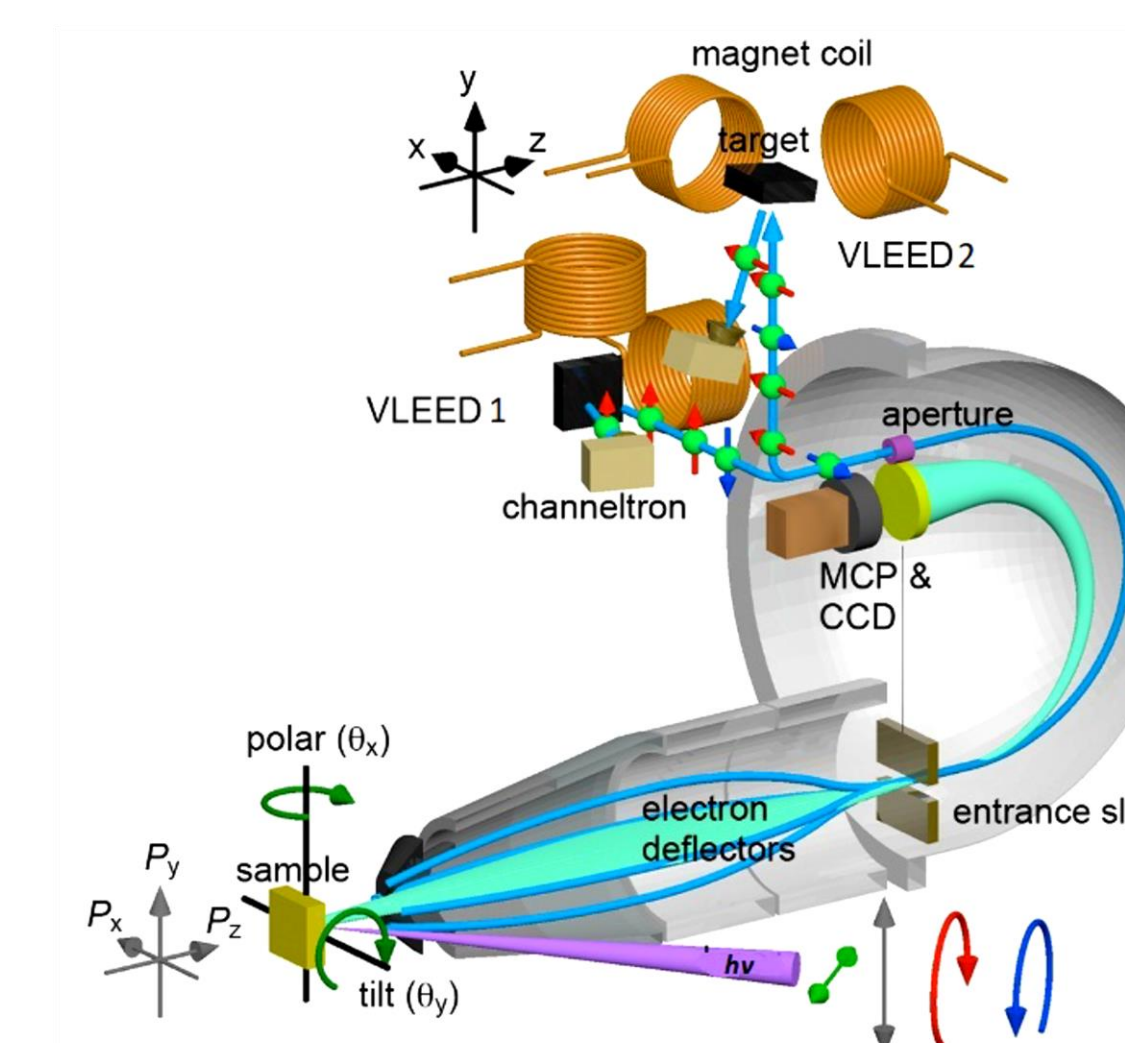
- **ARPES**
- **Spin-ARPES**
- **CD-ARPES**
- **XPS**
- **ResPES**

Update to 6-Axis cryogenic Manipulator

3 component spin detection with 2 VLEED detectors

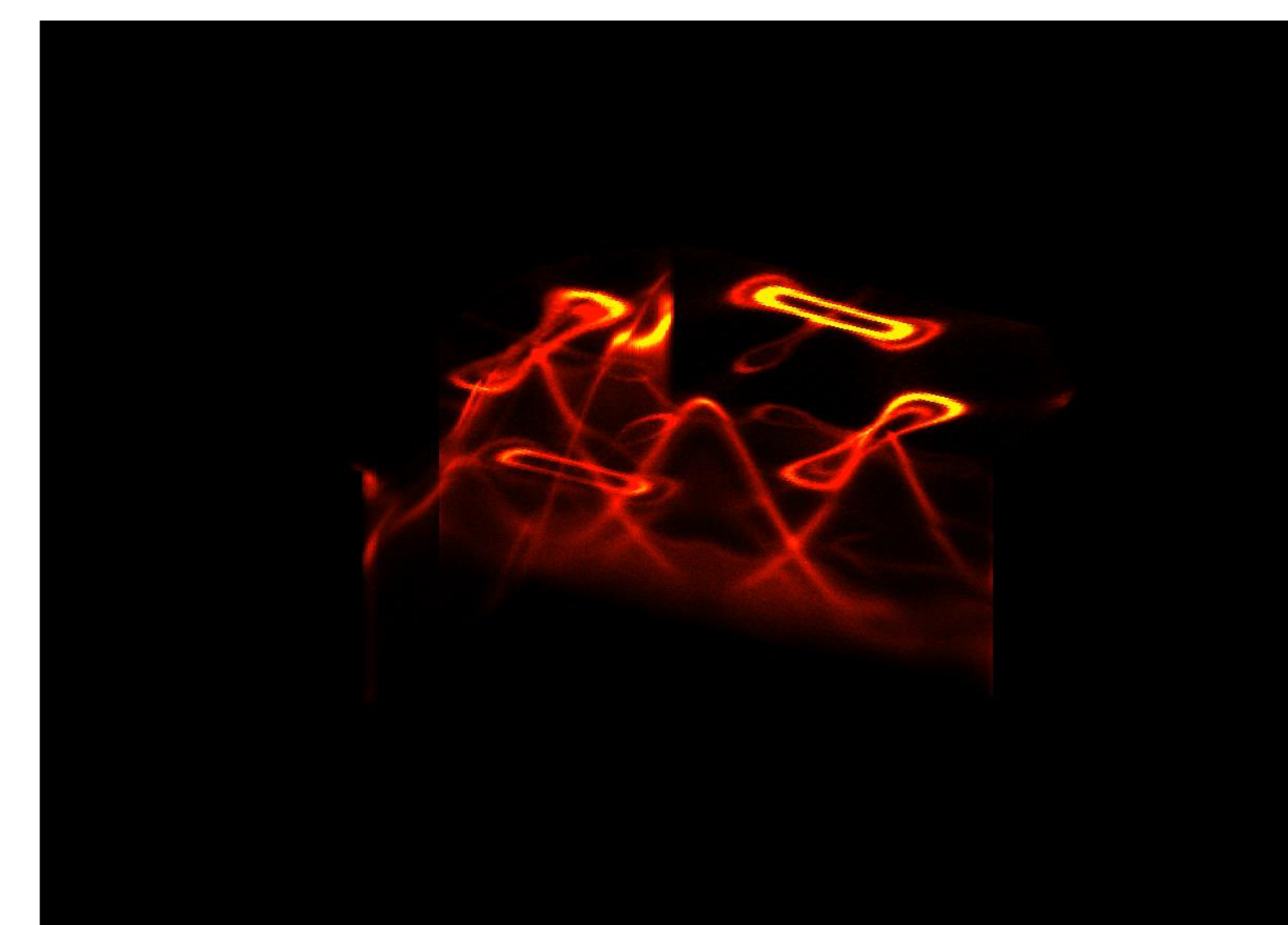
Sample preparation:

- cleaving in situ
- annealing up to 2000 K
- bombardment with Ar⁺ ions



HIGHLIGHTS AND PERFORMANCE

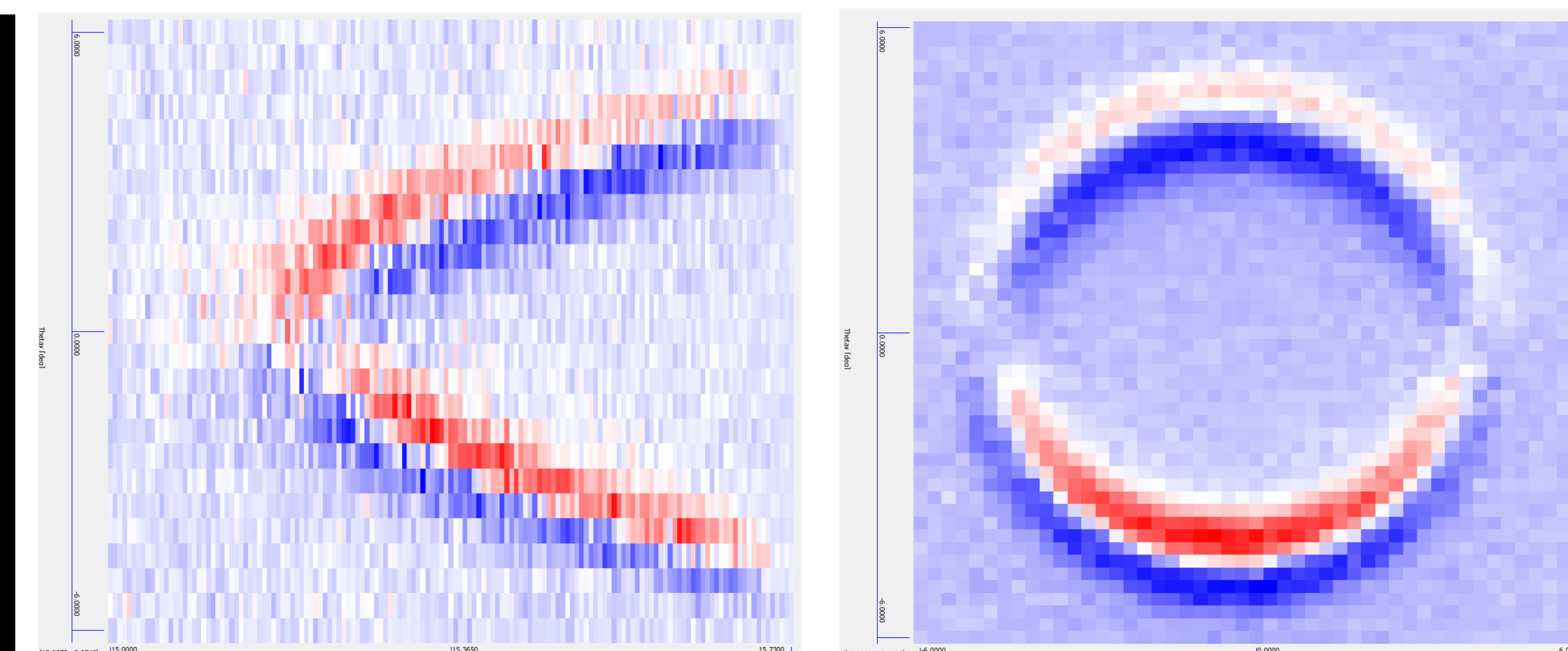
High-Resolution ARPES



Band structure of a NbP Weyl semimetal measured at an excitation energy of 92 eV with visible Fermi arcs

G. Grabecki et al. *Physical Review B* 101 (2020), 085113

Spin-Resolved ARPES with 3D VLEED



3D VLEED measurement of Rashba state on Au (111)
Acquisition time ~ 45 min