

# Spin- and angle-resolved photoemission spectroscopy Beamline 9 B (BL-9 B)

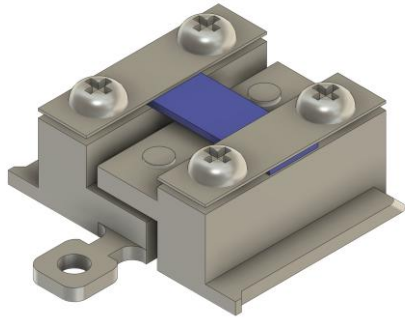


- ❑ Photon energy:  $h\nu \sim 14 \text{ eV} - 120 \text{ eV}$
- ❑ Undulator: APPLE-II (s-pol., p-pol., circular-pol.)
- ❑ Analyzer: DA30L with a deflector mode
- ❑ Spin detector: Double VLEED spin detector
- ❑ Total  $\Delta E$ :  $\sim 20 \text{ meV}$  with spin-ARPES ( $h\nu = 20 \text{ eV}$ )
- ❑ Temperature: 7 K – 450 K
- ❑ Sample holder: Omicron type
- ❑ Surface treatment: Ar-sputtering, annealing etc.
- ❑ LEED/Auger is available
- ❑ 6-axis sample manipulator
  - Azimuth: +90 deg ~ -90 deg
  - Polar: -30deg ~ +60 deg
  - Tilt: -25 deg ~ +35 deg

**For measurements of the spin-resolved  
electronic structure of solids!**

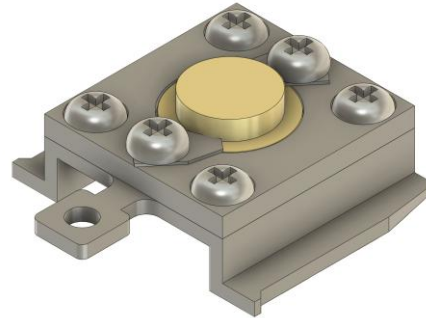
# Various sample holders: Omicron type

Direct heating type



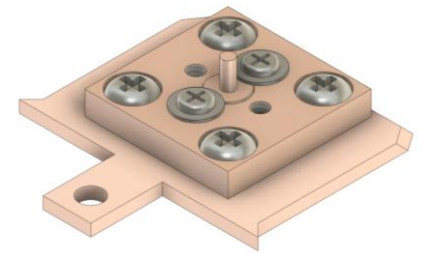
Sample size : 3-6mm(W)x6-14mm(V)

Electron-bombardment type



Sample size :  $\Phi$ 3-10mm

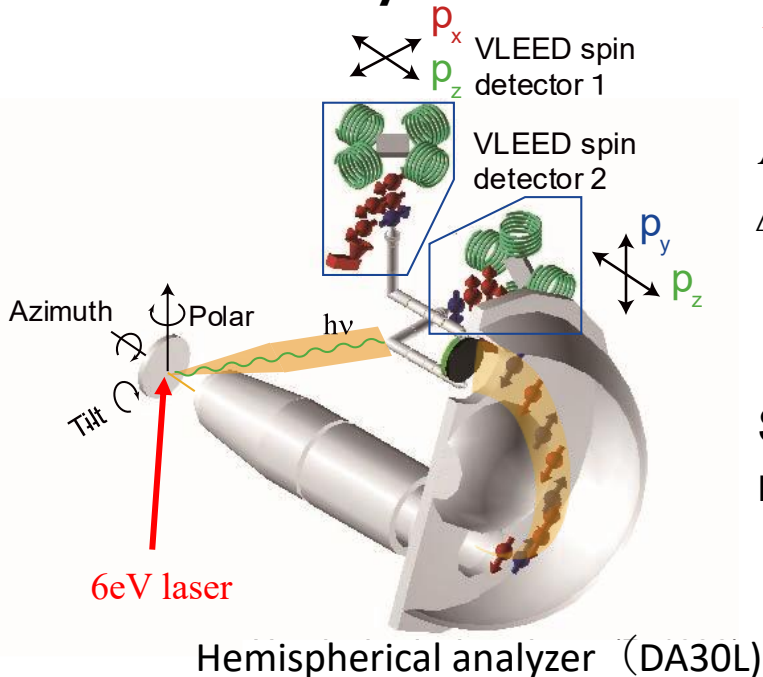
cleave type



Sample size :  $\Phi$ 0.6-4mm

The load lock at BL-9B can stock up to five holders.

## Measurement system



### Double VLEED spin detector

⇒ 3D spin vectoral analysis

#### ARPES

$\Delta E \sim 10 \text{ meV} (@ \text{ hv} \sim 20 \text{ eV})$

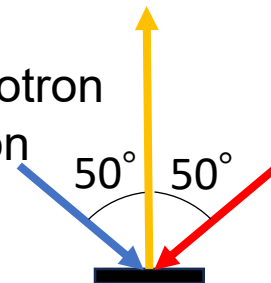
$\Delta \theta \sim 0.3^\circ$

#### Spin-ARPES

$\Delta E \sim 20 \text{ meV} (@ \text{ hv} \sim 20 \text{ eV})$

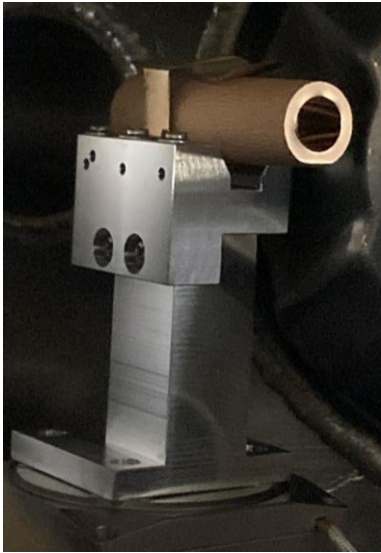
$\Delta \theta \sim 0.375^\circ$  (opt.)  
 $0.75^\circ - 1.5^\circ$  (comm.)

Synchrotron radiation

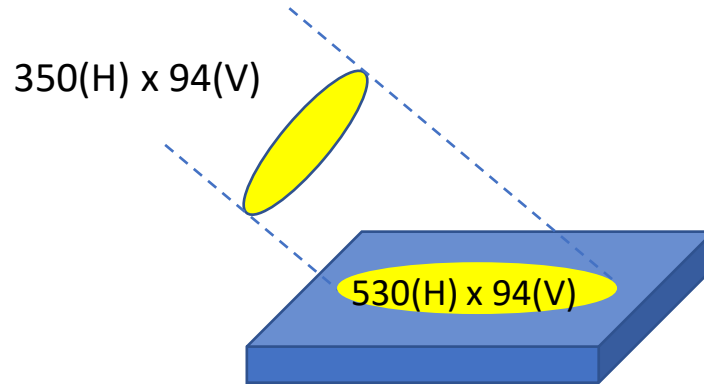


Sample

**Beam size: 530(H)x94(V)  $\mu\text{m}$**



← Focusing optics (natsume optical corporation) is installed in the main chamber



## **$\mu$ -Laser Spin-ARPES (Under construction)**

- ❑ We also use the VUV laser source, mode-locked Ti: sapphire laser and a harmonic generator.
- ❑ We can tune the photon energy between 191 nm (6.49 eV) and 210 nm (5.90 eV), with repetition rates ( $>80$  MHz), pulse duration ( $> 10$  ps), high intensity ( $> 10^{14}$  photons/sec) and ultra-high energy resolution achievable.
- ❑ The beam size is 5-10  $\mu\text{m}$ .

