

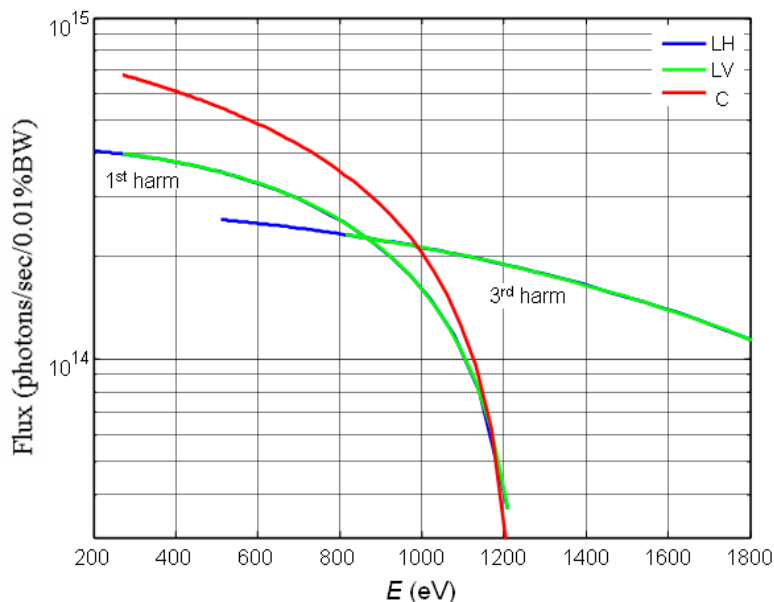
SX-ARPES User Notes

BEAMLINE

• Beamline control from the LINUX-PC:

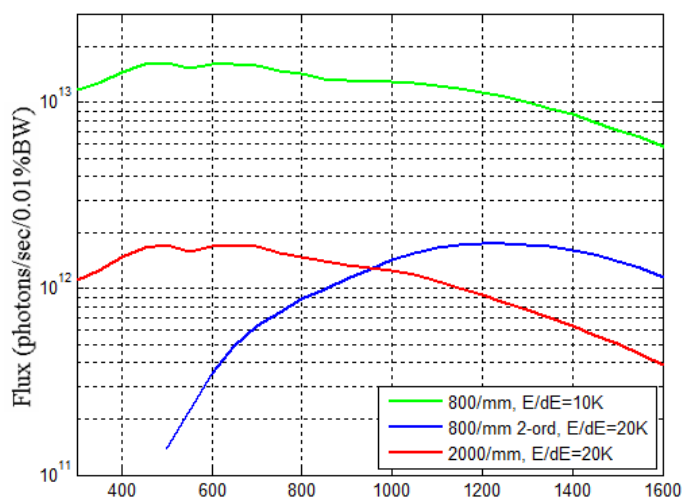
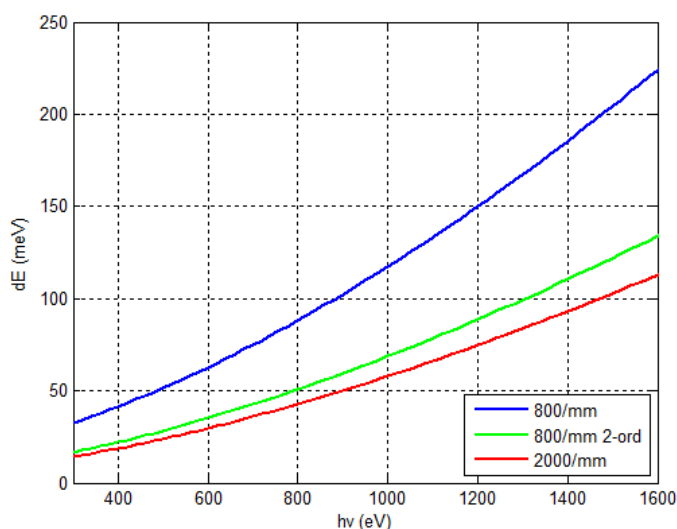
- Log on with with username = `gac-x03ma`, psw = `SLS_user`
- If not running, start **Launcher** from the command line (type `launcher &`)
- Start **Machine Info** from Launcher (User section)
- Start **Beamline GUI** from Launcher (User section)

• **ID:** Theoretical flux curves for different polarizations. Only 1st harmonic is available for C+/C-. Crossover between the 1st and 3rd harmonic is ~1025 eV for LV and ~1200 eV for LH (automatic in **Auto** mode). The polarization do not affect the beam position on the sample.



• **Front End:** Normally 1.8x1.8 mm²

• **Mono:** The mono works in the hi-flux mode (**800/mm blazed grating, 1st diff. order/ C_{ff}=2.15**) or in the hi-res mode (**2000/mm lamellar grating, 1st order/ C_{ff}=3**). Optionally, the 800/mm can operate in the 2-order mode (**800/mm, 2nd order/ C_{ff}=3.0**) with its best efficiency at high energies.



To change the grating, (1) In terminal window, disable PGM energy stabilization: `caput X03MA-PGM:STS 0`; (2) Launcher→PGM→Expert Control Panel, click 'Select Grating' and 'Change Grating'; (3) In the same panel, set energy and C_{ff}; (4) Enable energy stabilization: `caput X03MA-PGM:STS 1`; (5) Adjust the energy scale with the grating offset: `caput X03MA-PGM:BETAOFF2.A` (800/mm grating) and `B` (2000/mm).

• **Slit:** The resolution vs flux optimal slit setting is 15-20 μm. The actual resolution can be found with **Resolution Calculator** in the Beamline GUI.

ENDSTATION

- **Endstation control from the Windows-PC:**

- Log on with with username = [gac-x03ma](#), psw = [SLS_user](#)

- **Acquisition software** (under **Start** button at the ARPES-PC):

- **SmartMan**: Manipulator control (soft-axis option for tilt rotation)
- **SpecsLab Prodigy Server**: Analyzer control server. Make sure the field Allow Remote Connections is checked
- **SmartGUI**: Client of the analyzer server for automatic/real time acquisition of ARPES data
- **ARPESView**: ARPES data viewer with basic processing like FS mapping
- **EasyXAS**: XAS measurements
- **KNavi**: Momentum calculations
- **ARPES Cam/ LEED Cam**: Corresponding CCD cameras

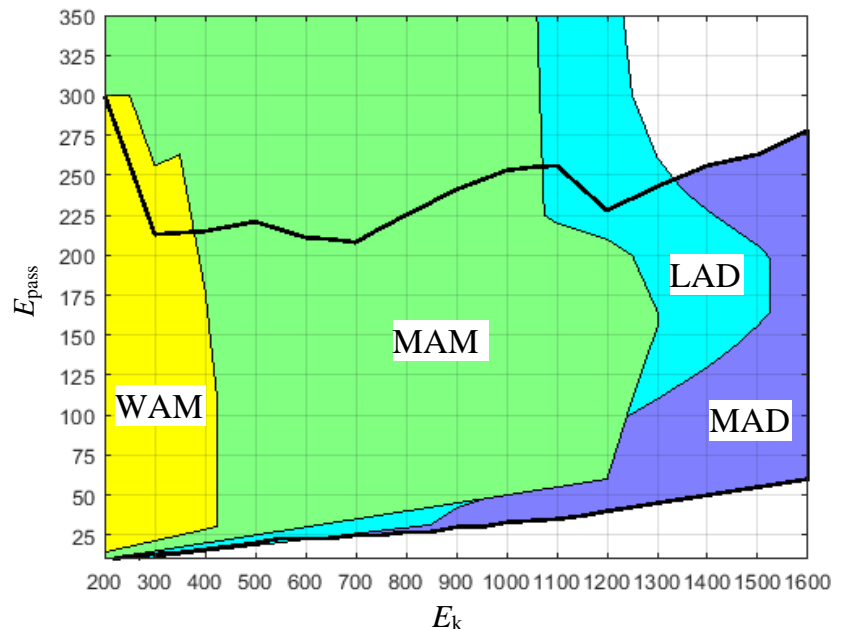
- **Sample temperature control** (under **Launcher** → **ARPES Endstation** at the LINUX-PC):

- **Sample Temperature**: Sample temperature readout and control
- **Flow meter**: Start cooling at 30 l/min and then reduce to ~20 l/min

- **Angle-resolving modes:**

- **WAM** (Wide-Angle Mode) $\pm 13^\circ$
 - **MAM** (Medium-Angle Mode) $\pm 9^\circ$
 - **LAD** (Low Angle Dispersion) $\pm 6^\circ$
 - **MAD** (Medium Angle Dispersion) $\pm 4^\circ$
- Angular resolution $\sim 0.07^\circ$ in all modes.

Figure: E_k vs E_{pass} operational regions of the modes (inclusively). The more the angular acceptance, the narrower the operational region. Max retarding ratio E_k/E_p : ~ 10 for WAM, ~ 20 for MAM, ~ 30 for LAD.



- **Analyser resolution:** Calculated as

ΔE (meV) $\sim 0.9 * E_{\text{pass}}$ (eV) for the 0.2-mm analyzer slit, and $\sim 0.5 * E_{\text{pass}}$ (eV) for the 0.1-mm slit. A reasonable ΔE setting is about half of the beamline resolution.

- **Cryostat:**

- He flow control: **Launcher** → **ARPES Endstation (User section)** → **Flow Control**
- For initial cooling down, open the cryostat to 2-3 turns and set He flow to the maximal 30 l/min. When cooled, close to $\sim 1/4$ of the turn and set ~ 15 l/min. Normal sample temperature is ~ 12 K (the lowest 10.7K).
- To stabilize a higher T using the the cryostat controller: **Setpoint** – dial numerical T value – **Enter; Heater range** – Low/Medium/High by ΔV buttons – **Enter**. To switch heating off: **Heater Off**. Try to stay on the heating range Low, maximum Medium, and reduce the He flow. Normally the feedback signal is the channel A (cryostat); to change to B (sample): **Control Setup**.

- **Data access**

- From the control PC, the data can be accessed at the network drive mapped as X:\
- From any other PC over the network, use Windows Explorer to map the disk [\\x03ma\x03maop\Data1\ARPES](#) as the drive X:\ with username = [gac-x03ma](#), psw = [SLS_user](#)