## Procedure for the calibration of motor Y2

Why do we have to calibrate the motor Y2?

As the beam energy decreases below 4000 eV, the beam position shifts off-centre, leading to a weakening of the beam. To re-center the beam, it is required to calibrate motor Y2 to maintain the beam integrity at lower energies. Outlined below is the calibration procedure for aligning the beam based on how the beam energy is changed:

# From low beam energy (< 4000 eV) to high beam energy (> 4000 eV)

a. Click on "Beam Off"

atus		
		Click
Beam	is OFF	Here
Beam	is OFF	
		_

b. Click on "Home -" under the Calibration section on the Motor Y2 screen

(	Calibration			In progress	0
	Start Ca	libration		Calibrated	0
	Home +	Home -	Go Home	Calib posn	0.000
F	rogress:				
	Home active s	stati Click Here	LOW	HIGH	

c. Wait until STATUS shows "AT LIMIT".

Common/maxvMotor_2	_0.edl				
SMTR1606-4-B10-12					
	Mono Y2				
Setpoint mm	30.0000	30.3354 22.8393			
Move Relative mm	-0.1000				
Velocity mm/s	0.300	0.0000 0.3000			
Velocity base mm/s	0.0000	0.0000			
Accel. mm/s/s	0.300	0.3000			
Set position mm	30.3354	Offset mm 30.3354			
Step setpoint	1410274	0 1335313			
Move Relative	0	1			
Velocity	3000	0 3000			
Velocity base	0	0			
Acceleration	3000	3000			
Load encoder/step	-3				
Load step	1652837	STOP KILL			
OTATIO					
		ING STOPPED			
POWER/BACKLASH	CALIBRATI	ON PARAMETERS			
BRAKE/HOLD MODE	CLOSED LO	SERVO MOTOR			
Calib PV S					
Conversion	step	encoder 1 000 - 00 mm/cour			
stope	1.00008-04	1.000e-03 mm/cour			
onset	-141.027	0.000			
Calibration		In progress			
Start Calibration	on	Calibrated			
Home + Home	e - Go Home	e Calib posn 0.000			
Progress:					
Home active state	LOW	HIGH			

d. Type **22.5** at "Set position mm" and hit Enter.

	SMTR1606-4-B10-12					
Mono Y2						
	Setpoint mm	23.5278	2	2.5000	23.5278	
1	Move Relative mm	-0.1000				
	Velocity mm/s	0.300		0.0000	0.3000	
V	elocity base mm/s	0.0000 🧹	Type Horo		0.0000	
	Accel. mm/s/s	0.300	nere		0.3000	
	Set position mm	22.5000	Of	fset mm	22.5000	

e. Change beam energy (>4000 eV)

Energy			
7130.00			
Cancel	Ok		

e. Once the motors stop running (eV color is green), click the "Beam On".

Beam On	Beam Off	
Energy		Green "eV" indicates that the Mono motors have
7130.0	02 eV	stoped moving.

### From high beam energy (> 4000 eV) to low beam energy (< 4000 eV)

1. Click on "Beam Off"

detation Solid State				
iustation. Sona State				
Beamline status ———				
Beam On	Beam is Ol	FF Bea	Click Here m Off	
Beam On		Bea	m	Off

2. Change the beam energy (<4000 eV)



\*The most common energies/elements are listed in the reference table in this document. (For example, for scanning the S K-edge, use the beam energy of 2482 eV to calibrate Y2) 3. Once the motors stop running (eV color is green), click the "Beam On".

dstation: Solid State	
Beamline status	
Click	💴 💼
Here	n is OFF
lere Bear	n is OFF

4. If not already, make sure the element of interest is selected for the detector in use. The element should be the first row of the ROI table. (S Ka1 in this example)

SXRM	4BAcquamar	.2024.02.02.lssu	e4059	
	Name	Lower Bound	Upper Bound	Value
	S Kal	2242 eV 🚔	2374 eV 🛓	655143 counts
	P Kal	1952 eV 🔺	2075 eV 🛓	3502810 count
	Ru Lal	2489 eV	2628 eV 🛓	681573 counts
	In La1	3208 eV 🔺	3366 eV 🔺	3753638 count

5. Go to the position of the sample of interest.

6. Open Flux Calibration window from the General menu, select the detector, and click on "calibrate".



### From low beam energy (< 4000 eV) to low beam energy (< 4000 eV)

(For example, from 2152 eV for Phosphorus K-edge scans to 2482 eV for Sulfur K edge scans)

Go through the steps: a -> b -> c -> d -> 2 -> 3 -> 4 -> 5 -> 6

Element for energy scan	Beam energy for calibration (eV)	Theoretical value shown at setpoint and typed at set position	Reduced value at setpoint for maximum counts
S K-edge	2482	38.0053	~36.4
P K-edge	2152	59.1241	~55.2
Nb L <sub>3</sub> -edge	2390	40.9934	~38.5934
Pd L <sub>3</sub> -edge	3175.30	29.1203	~28.5
Ru L <sub>3</sub> -edge	2858	31.6366	~29.8366
Ag L <sub>3</sub> -edge	3360	28.1517	~27.3
Si K-edge	1843	53.1639	~50.1
Zr L <sub>3</sub> -edge	2240	49.3152	~46.3
Cl K-edge	2828	31.9609	~31.10
Mo L <sub>3</sub> -edge	2525	36.9034	~35.80

#### **Refrence Table**