

Calibration Procedure for HRPT

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I. Measurements

A Vanadium single crystal (8 mm) is mounted in the RT sample changer (rt). Make sure that there is at least one empty slot available in the sample changer. The following minimal Perl script performs the calibration:

```
# *--perl--*

hs_sch 'rt';           # Select RT sample changer
hsarot 'on';           # Enable sample rotation
sics 'radial start';   # Start radial collimator system
sics 'radial check 1'; # Enable radial check

$A4_calib = 5;          # Default A4 angle for calibration
calib(5, 2, '2_RC1');   # Arguments: V_position, BG_position, calibration name

sub calib {
    my ($v_pos, $bg_pos, $label) = @_;
    $v_pos  //='3';
    $bg_pos //='4';
    $label  //='';

    hs_lambda '1p89';      # Set wavelength
    hs_resol 'HI';         # Set high resolution
    hsarot 'off';          # Stop sample rotation

    my $a4 = $A4_calib // 5;
    hdp "a4 $a4";          # Set detector angle

    while () {
        # Collect Vanadium signal
        hcount 0, "calibr${label},Vsc8", $v_pos;
        sics 'count(m=4000000)' for 1..10;

        # Collect background
        hcount 0, "calibr${label},bgr,none", $bg_pos;
        sics 'count(m=4000000)' for 1..3;

        # Note: Background statistics should be approximately 3 times lower than
        Vanadium
    }
}

# *--perl--*
```

II. Creating the Calibration File

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Use the hlog command to generate the list of numors for Vanadium and background.
For example:

```
hlog 2024:878-940
```

Sample output:

```
Log of numbers 2024:878-940. Tue Apr  8 14:48:47 CEST 2025
```

Samples measured in alphabetic order

```
-----  
calibr_2std_HV_RC1,Vsc8,1p89,HI => 30 numors, 2024:902-911,915-924,928-937  
calibr_2std_HV_RC1,bgr,none,1p89,HI => 9 numors, 2024:912-914,925-927,938-940  
calibrstd_HV__RC1,Vsc8,1p89,HI => 20 numors, 2024:878-887,891-900  
calibrstd_HV__RC1,bgr,none,1p89,HI => 4 numors, 2024:888-890,901
```

Samples measured in chronological order

```
-----  
2024:878-887,891-900: calibrstd_HV__RC1,Vsc8  
2024:888-890,901: calibrstd_HV__RC1,bgr,none  
2024:902-911,915-924,928-937: calibr_2std_HV_RC1,Vsc8  
2024:912-914,925-927,938-940: calibr_2std_HV_RC1,bgr,none
```

Create a new directory for the calibration, cd into it, and run: makecalib.pl
See help text at the end of the file.

For example:

```
makecalib.pl -wl4 -l c3rl 902-911,915-924,928-937 912-914,925-927,938-940
```

and follow the instructions...

III. Copy Calibration Files

After generating the calibration files, copy them to the HRPT data directory.
First, cd to the desired directory, then run:

```
rsync -av /home/hrptlnsg/pomjakushin/2024/calib/*.txt .
```

IV. Optional: Zero Selected Detector Channels

Before copying, you may optionally zero specific channels using:

```
calib_zero.pl c3rl.txt c3rlz.txt 103,758,759,1137,1424  
calib_zero.pl c3rl_c.txt c3rlz_c.txt 103,758,759,1137,1424
```

Note: Two calibration files are typically produced: one native and one corrected.

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V. Edit calist.dat

Update the calist.dat file in the appropriate data directory.

Example (~hrpt/data/2025/calist.dat):

```
calist ! calibration file list. The file names are soft links to longer filenames.  
c3rlz3.txt is with zeroed spikes.  
1,unity.txt  
1,c3rlz3.txt
```

Help text for makecalib.pl:

This script creates a calibration file (in HRPT format) from Vanadium and background data (numors or raw files), and optionally creates detector efficiency calibration files using calib.pl.

Usage:

```
makecalib.pl [-c -f -m -r -w -l] V-numors BG-numors
```

Options:

-c calibname	name of the calibration file (e.g., -c unity.txt), default is uncalibrated (0)
-f rms	RMS threshold for spike removal, default is 5 (e.g., -f 10)
-m -r -w	parameters [muR], [V radius], [FWHM of RC], defaults are 0.31, 4, and 7
-l linkname	creates det_eff calibration files with symbolic links: linkname.txt native calibration linkname_c.txt corrected calibration (for semi-shadow from beamline slits)

NB: each command has help, which is printed if command run without parameters or with -h key. There is general help with the command hrpt_help