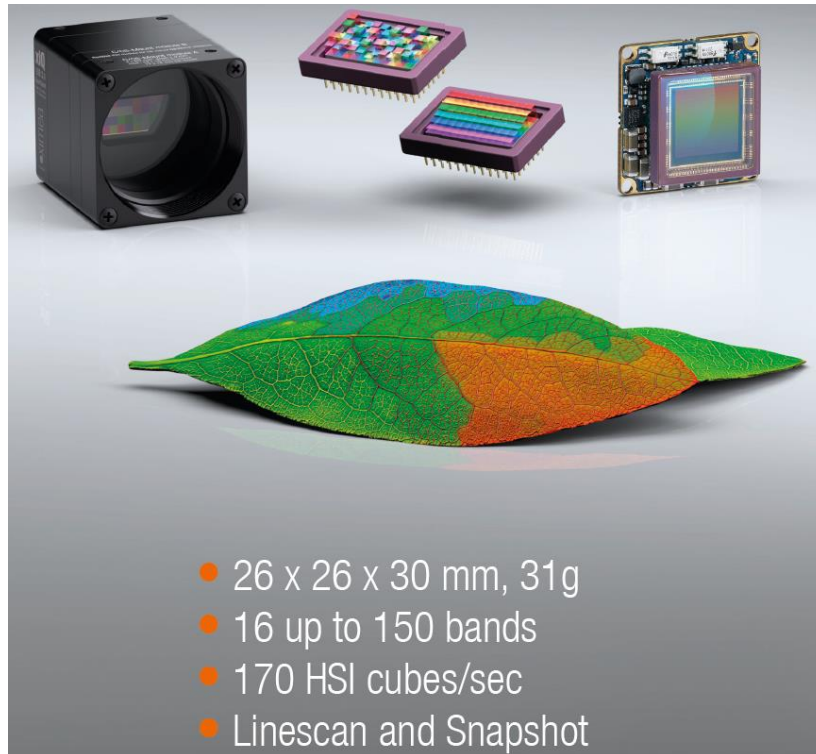


xiSpec

brief description - demo software xiSpec01 beta



Focus / Content

We will describe the steps to store images in ENVI file format for any further data analysis, e.g. using scyven or MATLAB.

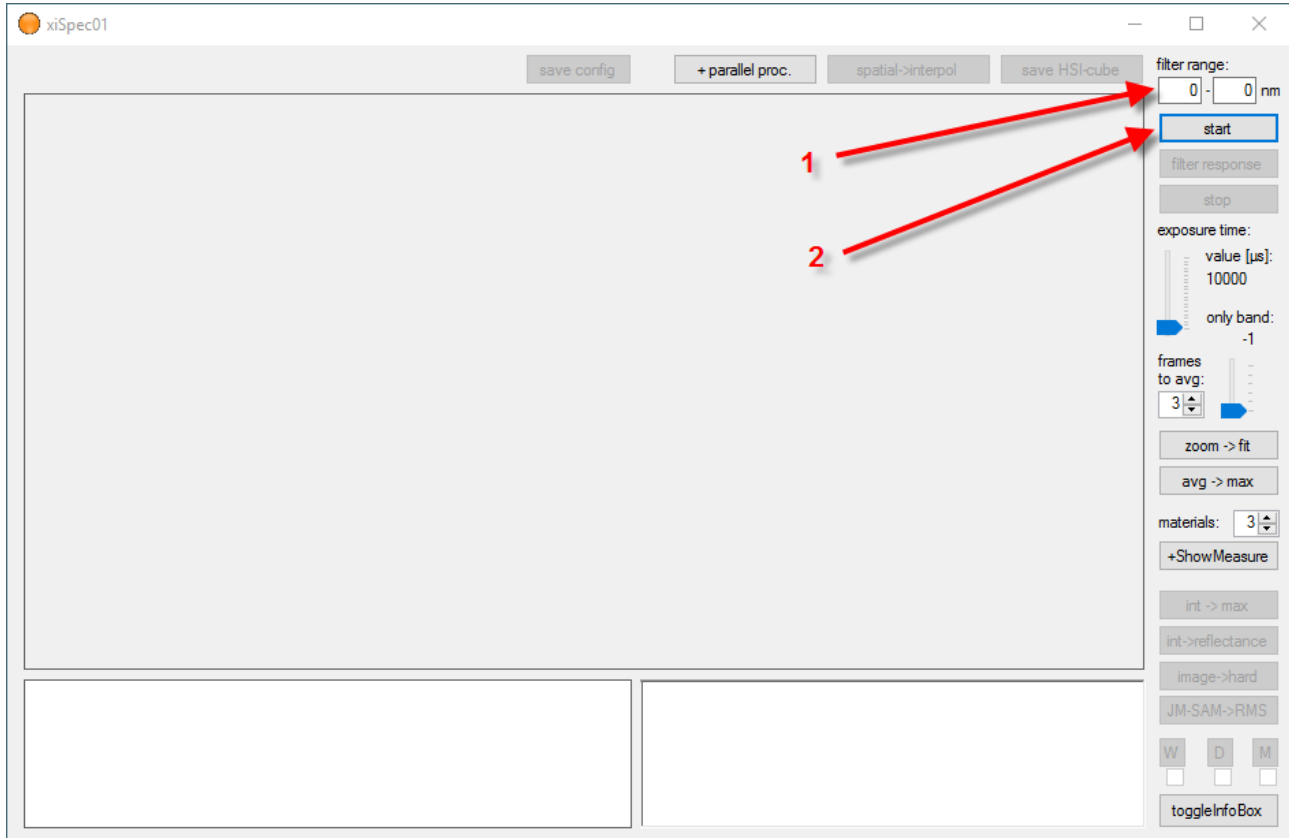
System requirements:

Operation system: Windows 7, 8, 8.1 and 10

XIMEA camera drivers in a compatible version is installed. An installation file will be distributed together with the xiSpec01 program.

Program start / preparation:

Start the program xiSpec01, the following windows will appear:



Step 1: Preparation: Type in the used filter range.

Correct values:

SM5X5-NIR camera:

- 600 – 975 nm: no additional filter used
- 600 – 875 nm: additional 875 nm long cut filter used
- 675 – 975 nm: additional 675 nm short cut filter used
- 0 – 0 nm: default: 675-975nm will be used

SM4X4-VIS camera:

- 450 – 650 nm: no additional filter used
- 0 – 0 nm: default: 450 – 650 nm

Step 2: start connecting the camera

Camera initialization



1: statistics window

A small window with some statistic info will displayed. If any error occurs (e.g. non compatible camera connected) error messages will be displayed and the image grabbing will be stopped:

```

numDevices (used) = 1
Starte Test-Thread 1
run Camera 1
MQ013MG-E2 #01300050 (User-ID=)
USB3.0 Bandwidth=3633 MBit/s
ID=50: No currently supported xiSpec camera model found!
Test-Thread 1 beendet
  
```

Using the button "toggleInfoBox" in the lower right corner, this statistics window can be disabled / enabled.

2. A grayscale image will be displayed in the main windows.

Basics

Image resolution modes:

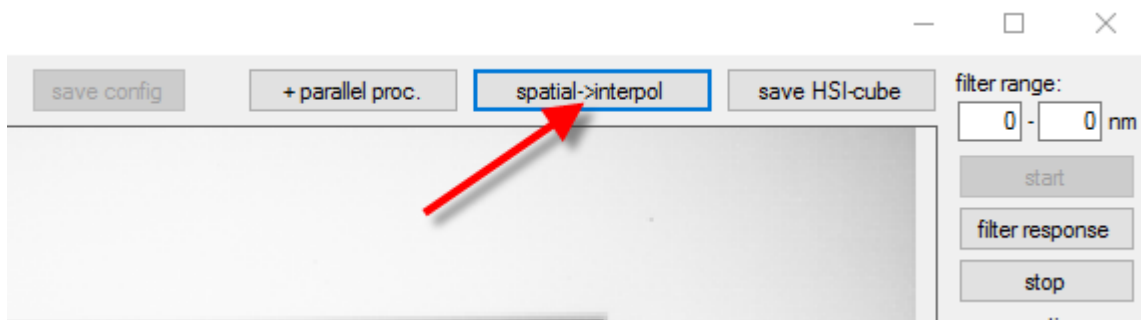
Several resolution modes are available:

- Spatial resolution
- Interpolated resolution
- RAW image

You can toggle through this modes:

spatial -> interpol(ated) -> RAW -> spatial

using this button:

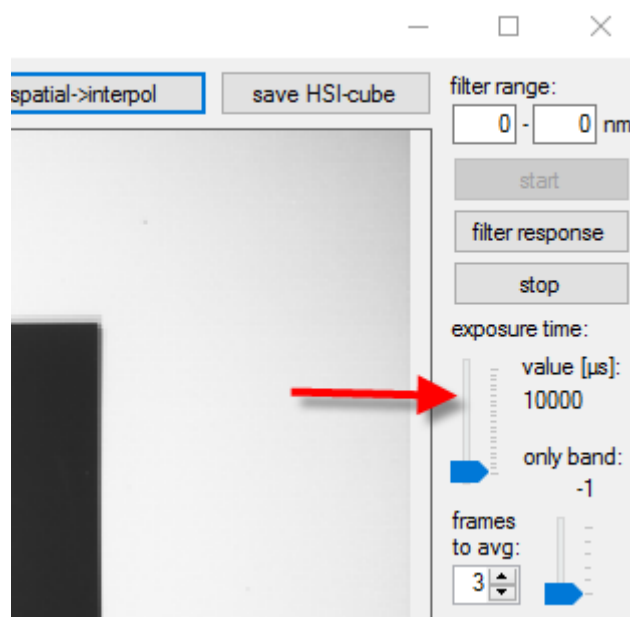


Button text:

Current mode -> next mode after pressing the button

Exposure time

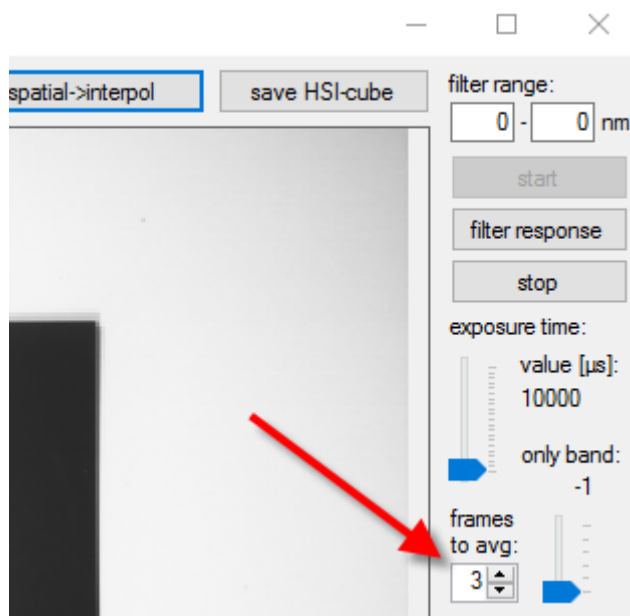
The exposure time (values in μs) can be changed using the slider “exposure time”:



After selecting this element (mouse click) the mouse, mouse wheel and the keys UP and DOWN on the keyboard can be used to adjust the exposure time.

Frames to average

Several frames can be used to calculate an average to reduce sensor noise or flickering illumination (e.g. halogen bulb lamps connected to 50 Hz electrical power line):



Display modes

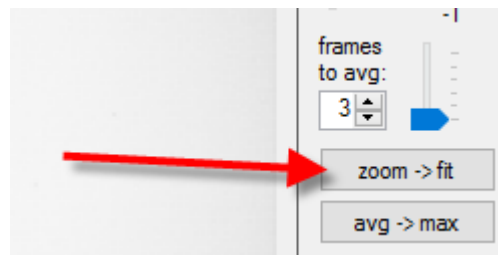
Two standard display modes are usable:

- Zoom
- Fit

Zoom: the mouse wheel can be used to zoom in and out.

Fit: the image fits into the main image windows

You can toggle through this modes using the button:



Button text:

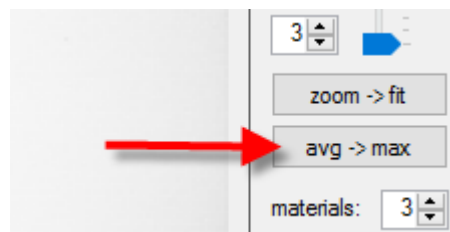
Current mode -> next mode after pressing the button

Displayed value modes

Three standard displayed value modes are usable:

- Avg (average)
- Max (maximum)
- Min (minimum)

You can toggle through this modes using the button:



Button text:

Current mode -> next mode after pressing the button

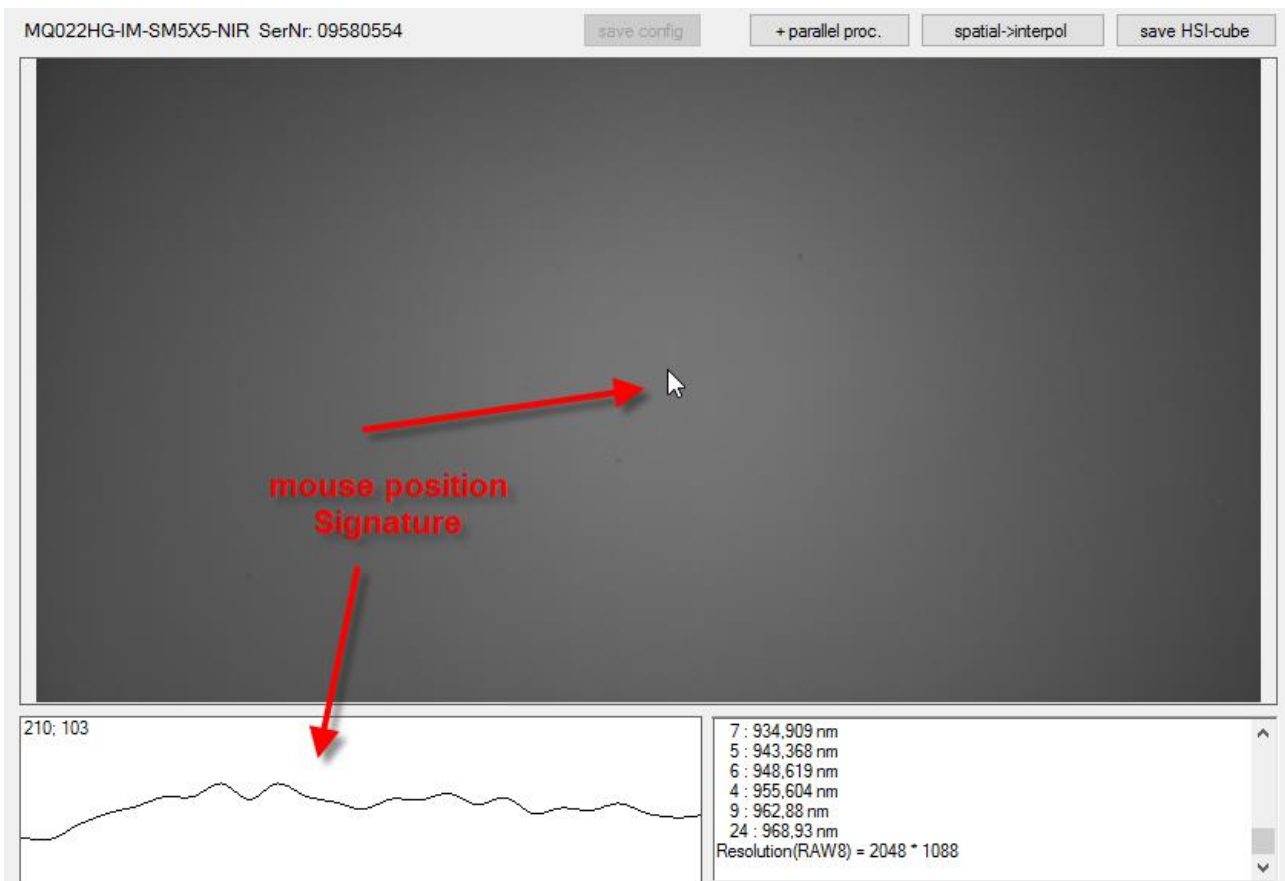
Each image-pixel represents a hyperspectral signature with 16 or 25 bands with the values (x_1, x_2, \dots, x_n) .

In spatial and interpolated resolution modes this mode has the following effect: the brightness of the image pixel is calculated:

- Average: $(x_1 + x_2 + \dots + x_n) / n$
- Maximum: $\max(x_i)$
- Minimum: $\min(x_i)$

Spectral response / signature

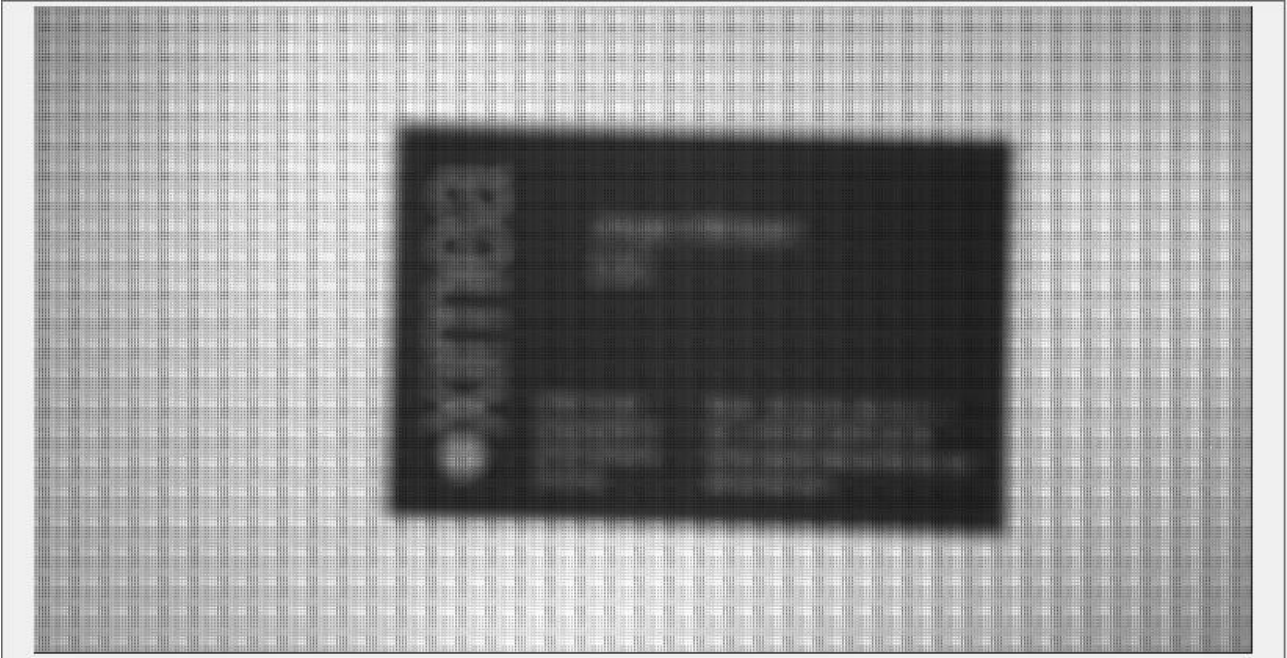
In spatial and interpolated resolution modes the spectral signature of the pixel at the mouse position will displayed in the lower left windows:



White image / vignetting calibration

Please focus the image. The fastest way is to use the RAW image resolution mode. Please adjust the exposure time if needed:

Before:



After:

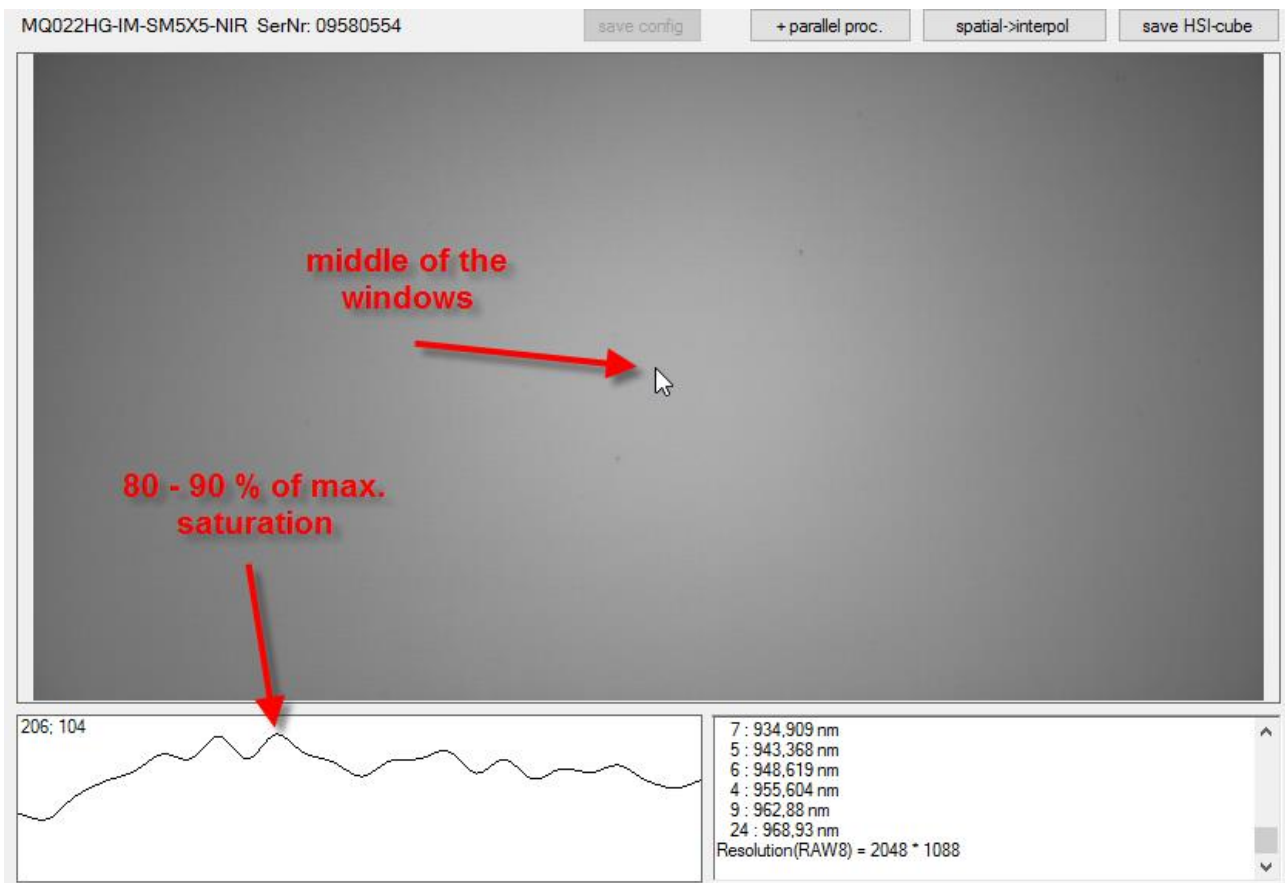


Switch to the spatial resolution mode and please place the white calibration target in the field of view.

Please adjust the exposure time. The easiest way is:

- Activate the exposure time slider (mouse click)
- Move the mouse in the middle of the image windows
- Use the keys UP and DOWN to change the values in 500 μ s steps
- Use the mouse wheel for fine tuning

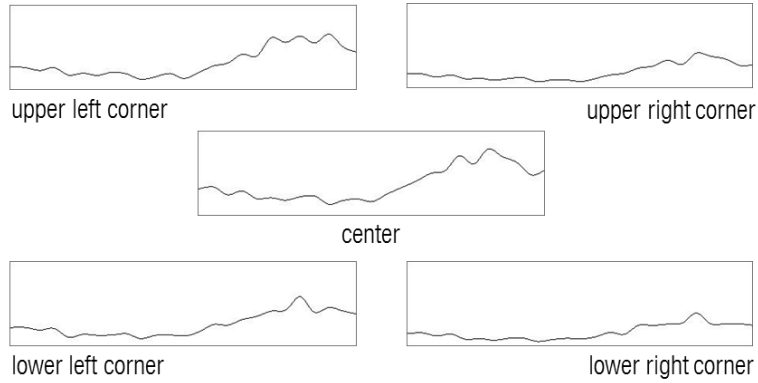
Please select an exposure time the max. value of the signature have a value between 80 – 90 % of the saturation level (max value).



Change the value of frames to average if needed.

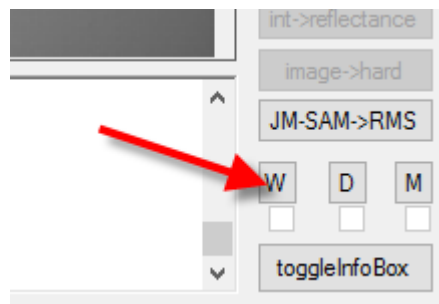
You will see different brightness levels in the middle and the edges of the image (see above).

If you have a look to the signatures in the middle and the edges different signatures will be visible:

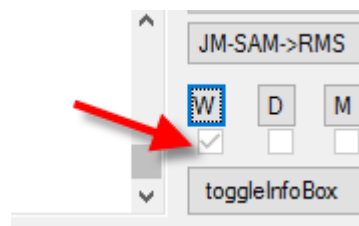


Both effects (brightness differences and different signatures) can be corrected.

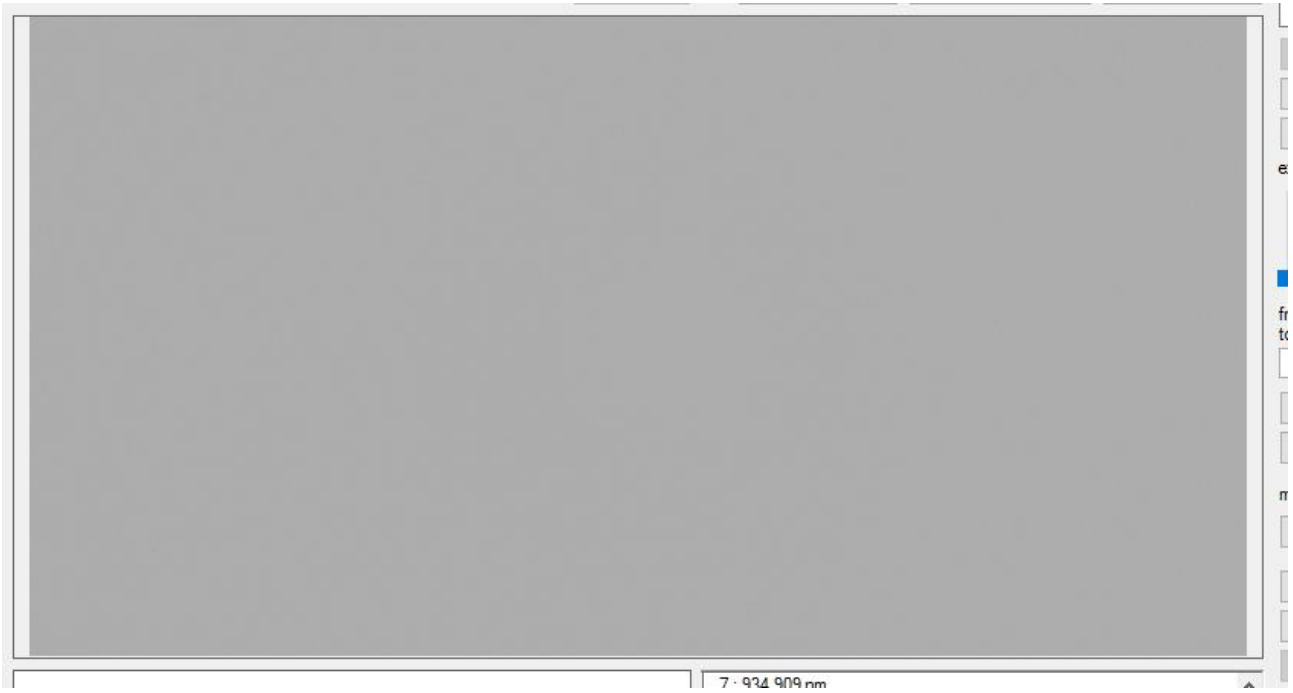
Please use the White calibration button:



The check box below will change the status:



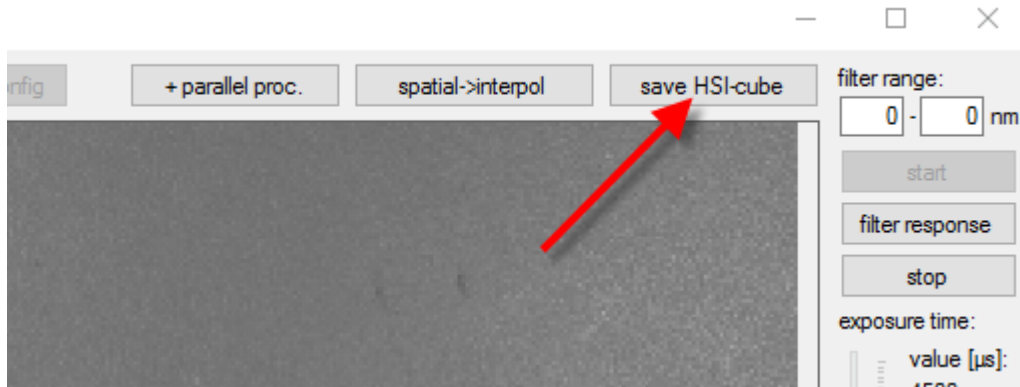
and the effects mentioned above are corrected:



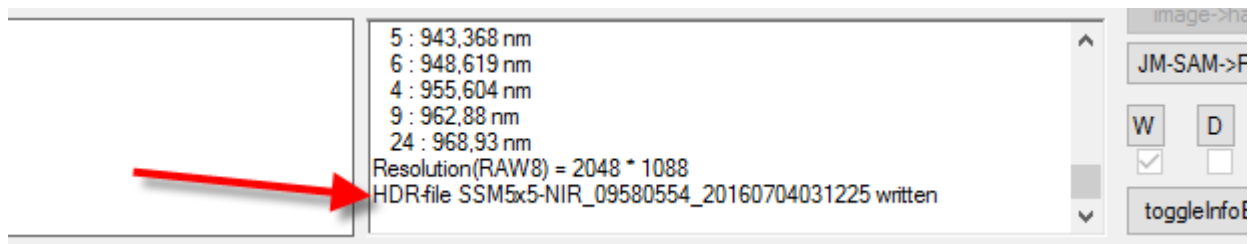
Please remove the white calibration target and store it safely.

Store HSI cubes in ENVI file format




Images can be stored in ENVI file format HDR/BSQ using the button “save HSI-cube”:



An additional line will be displayed in the statistics windows after storing an HSI-cube:



Three files will be stored in the subfolder “images”:

| Name | Datum | Typ | Größe |
|--|------------------|-----------|----------|
|  SSM5x5-NIR_09580554_20160704031225.tif | 04.07.2016 03:12 | TIF-Datei | 2.177 KB |
|  SSM5x5-NIR_09580554_20160704031225.bsq | 04.07.2016 03:12 | BSQ-Datei | 4.294 KB |
|  SSM5x5-NIR_09580554_20160704031225.hdr | 04.07.2016 03:12 | HDR-Datei | 1 KB |

File names:

<Model>_<SerNr>_<Date><Time>.<Extension>

Model:

One of this values:

SM5x5-NIR

SM4x4-VIS

SerNr:

Camera serial number

Date:

YYYYMMDD

Time:

HHMMSS

Extension:

TIF RAW images after white image correction

HDR part of the ENVI files: text description

BSQ part of the ENVI files: binary data

Stop / quit the program

Please stop the image acquisition before quit the program:

