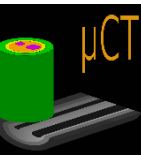


# How to Guide



**Acquisition**

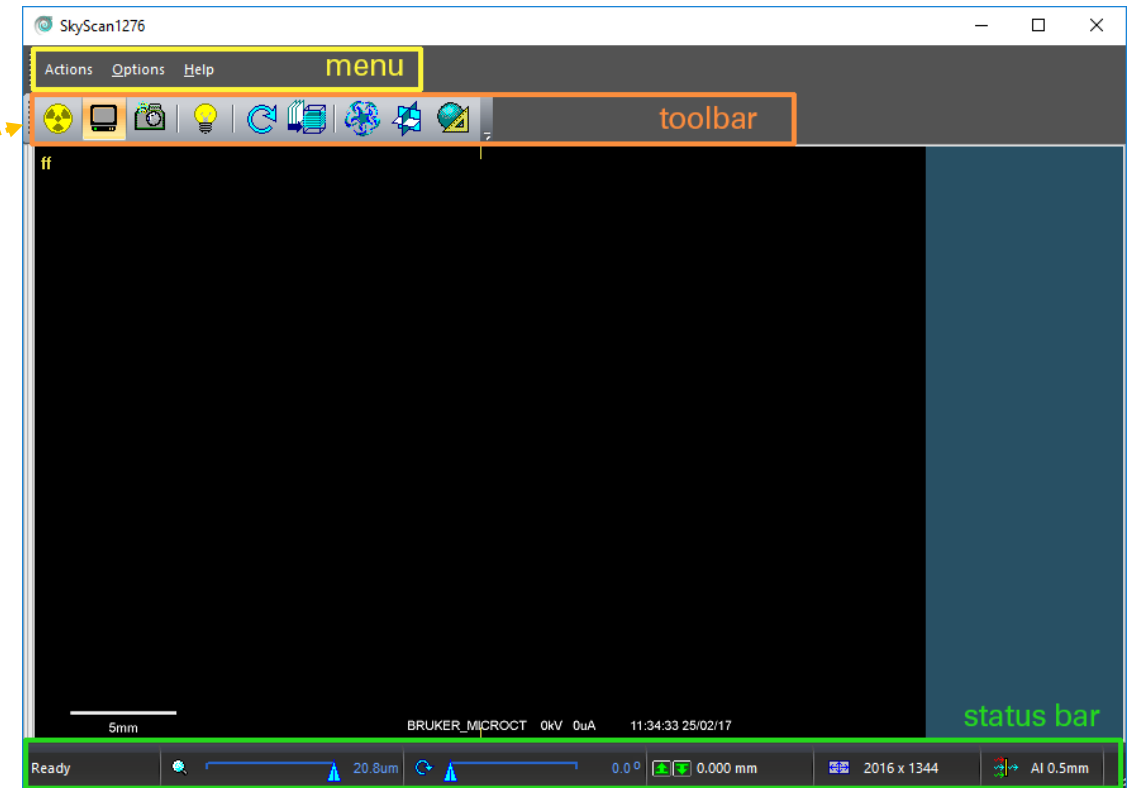
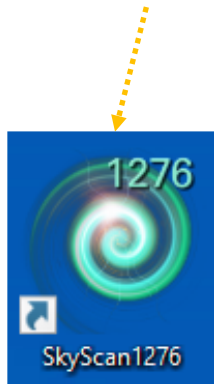
# Switching on the Instrument & Warm-up



Switch the PC on. No password needed.

Log into IRIS with your credentials.

Click on the SkyScan1276 icon you can find on the desktop and wait for the system (scanner included) to switch fully on.

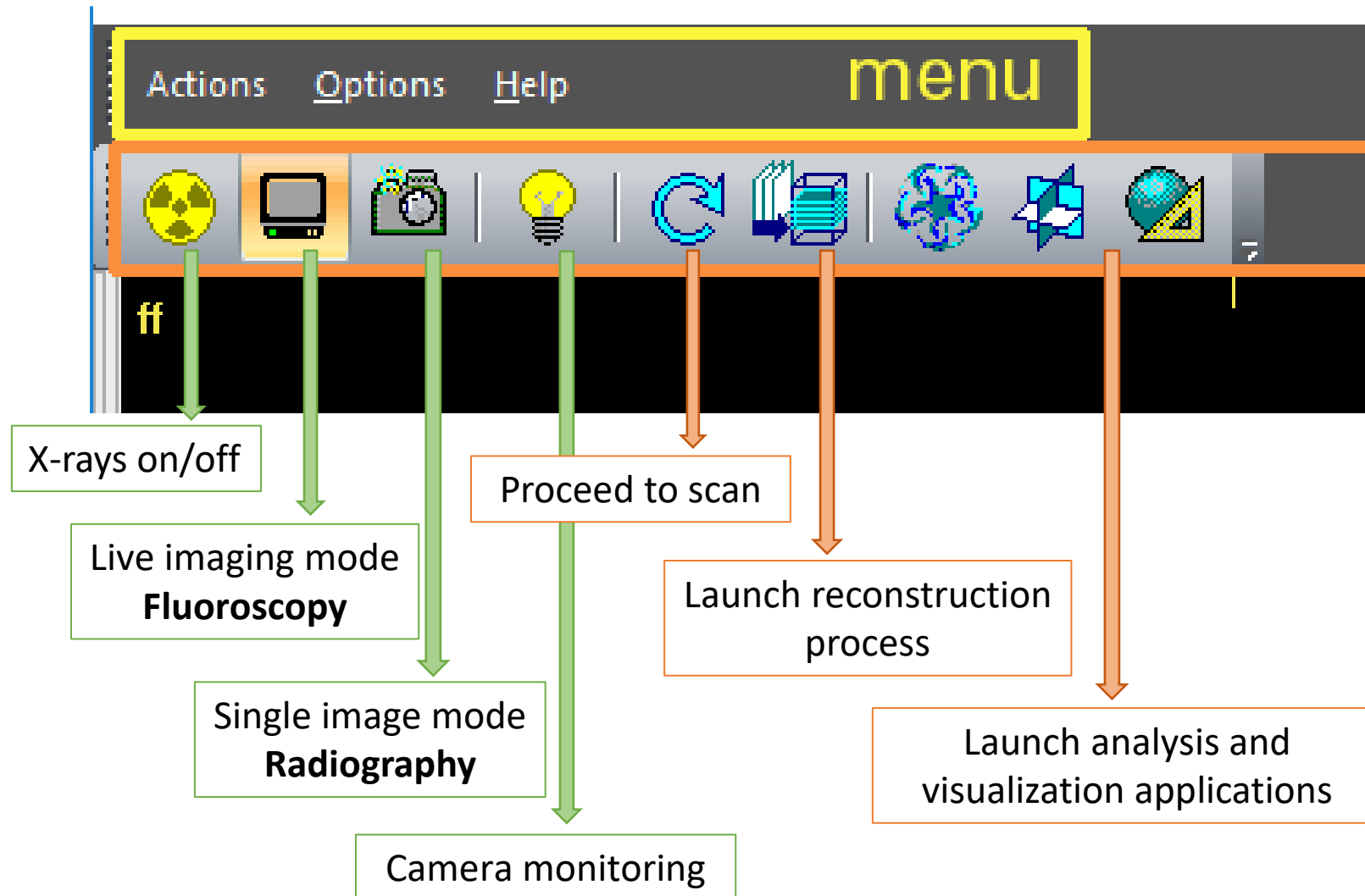


Then hit the X-ray button (top left).

If you are the first user of the day, the system will warm up and after usually 15 minutes you will be able to scan.

# Main functionalities in the Toolbar

Here is a short description of the buttons you can find in the toolbar menu



When scanning in vivo animals do not forget to:

- switch on the live camera
- monitor and register the delivered dose
- turn off the X-rays at the end of each scan and whenever not strictly necessary

# Main functionalities in the Toolbar

At the bottom of the screen you can find the toolbar shown below

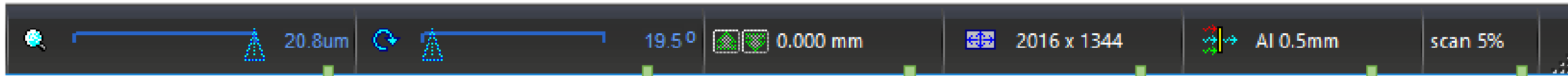


Image **resolution**. Defined by the detector binning and the source to detector distance. This slider will change the latter.

Gantry **rotation** position. Useful to monitor the detector to sample distance.

**Animal bed position.**

**Binning** (image matrix size). Allows for better resolution but will influence SNR.

**Energy filter** currently. Can be useful to reduce radiation dose or beam hardening artefacts.

**Progress indicator.**

# Setting up the scan

While you wait for the warm-up to complete, you can:

1. Load the appropriate Configuration file from :

Options → Configurations → either Load or Retrieve from log

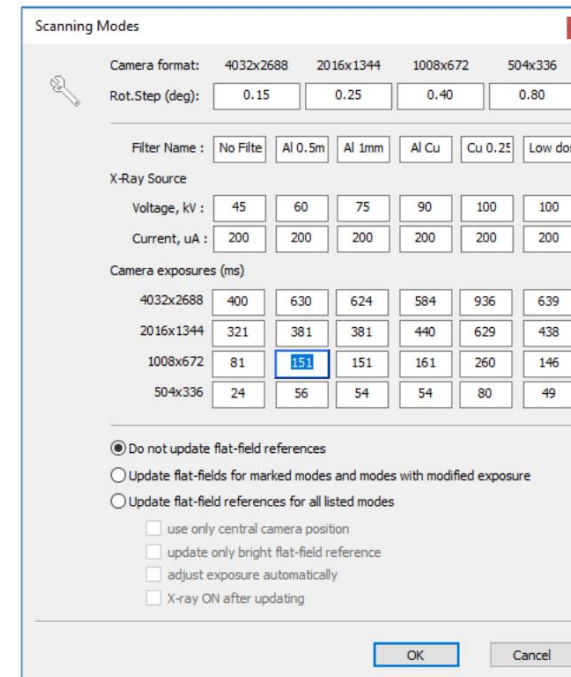
Several predefined options are available in

**D:\Protocols&Settings**

You can also retrieve all settings from a previous scan by loading the corresponding log file.

You are also free to create your configuration to better suit your study.

To visualize and modify the configuration file, hit **alt+ctrl+shift+s** and go to **Options → Scanning modes** the window on the right will appear and it will be possible to change mA, kV, exposures, etc....



Scanning Modes

Camera format: 4032x2688 2016x1344 1008x672 504x336

Rot.Step (deg): 0.15 0.25 0.40 0.80

Filter Name : No Filte Al 0.5m Al 1mm Al Cu Cu 0.2! Low dot

X-Ray Source

Voltage, kV : 45 60 75 90 100 100

Current, uA : 200 200 200 200 200 200

Camera exposures (ms)

4032x2688	400	630	624	584	936	639
2016x1344	321	381	381	440	629	438
1008x672	81	151	151	161	260	146
504x336	24	56	54	54	80	49

Do not update flat-field references  
 Update flat-fields for marked modes and modes with modified exposure  
 Update flat-field references for all listed modes

use only central camera position  
 update only bright flat-field reference  
 adjust exposure automatically  
 X-ray ON after updating

OK Cancel

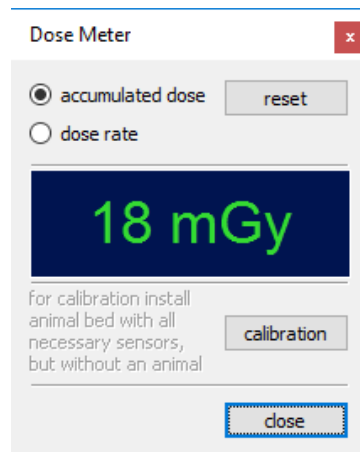
2. Prepare all output folders for your data: you should create a folder in your name in your PI's folder. Then create a folder for each sample/animal you plan to scan and ideally include the date in its name.

## Setting up the scan

Once the warm up is completed, mount your sample (more info on that at the end of this booklet) and move it in the camera FOV.

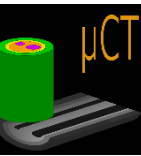
Switch on the camera to monitor your sample/animal and verify the detector position.

If you are scanning in-vivo, you should now switch on the dose monitor:



Options -> Dose Meter SHOW/HIDE  
shows or hides the Dose Meter window

## Setting up the scan



**Take a screen shot or a scout to visualize your sample.**

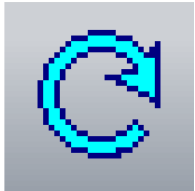
**Optimize resolution by adapting binning and detector-to-source distance.**

**It is preferable to reduce the latter and keep a larger binning (to increase SNR). Reducing the binning will also increase your matrix size (larger and heavier data).**

**Verify if the transmission is correct (minimum between 10 and 50%, average around 30%). If not, modify scanning parameters (kV and filters).**

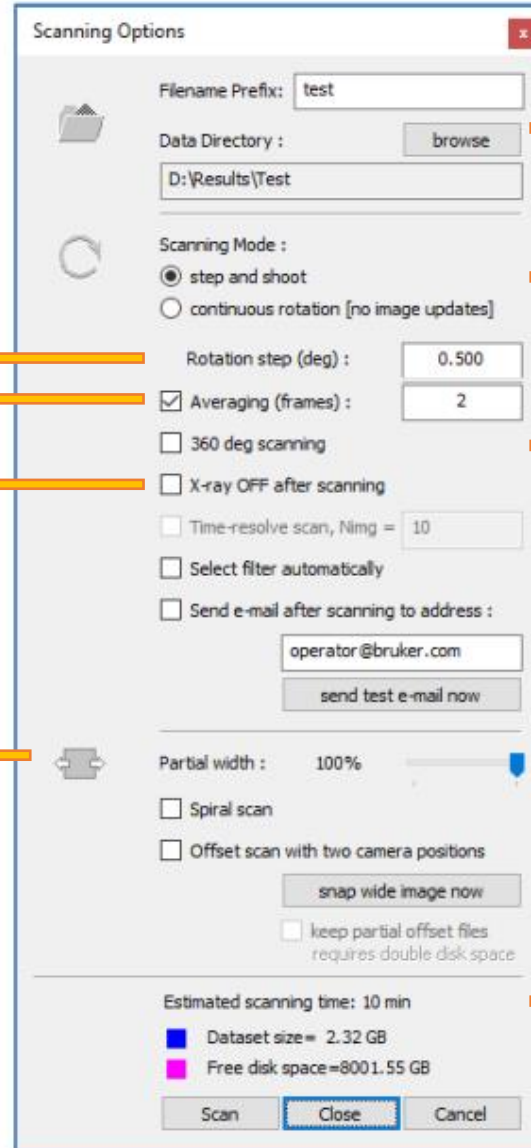
**At this point it might be necessary to update the flat field calibration. The scanner will know when this is necessary and will ask you to validate the procedure. The process might take a few minutes and the bed will be removed from the FOV (no irradiation). Flat field calibration should be done as the last step before scanning since any further parameter modification will require another flat field calibration.**

# Scan



Hit the scanning button.

This window will appear:



The 'Scanning Options' dialog box contains the following fields and controls:

- Filename Prefix: test
- Data Directory: D:\Results\Test (with a 'browse' button)
- Scanning Mode:  step and shoot,  continuous rotation [no image updates]
- Rotation step (deg): 0.500
- Averaging (frames): 2 (checked)
- 360 deg scanning:
- X-ray OFF after scanning:
- Time-resolve scan, Nimg = 10:
- Select filter automatically:
- Send e-mail after scanning to address: operator@bruker.com (with a 'send test e-mail now' button)
- Partial width: 100% (with a slider and a 'snap wide image now' button)
- Spiral scan:
- Offset scan with two camera positions:
- keep partial offset files requires double disk space:
- Estimated scanning time: 10 min
- Dataset size = 2.32 GB
- Free disk space = 8001.55 GB
- Buttons: Scan, Close, Cancel

Scan parameters that influence resolution and SNR. They also determine the scanning time (and the dose to the animal).

Always tick for in-vivo measurements or if you are leaving the scanning station (overnight or long scans)

If the object is thinner than FOV, reducing the image width can save disk space.

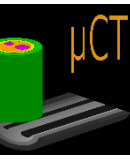
For most applications, continuous scanning is preferable

360° is normally not necessary. Reduces artifacts from dense matter.

Always monitor the scanning time. It is a good indicator of dose, resolution, SNR.



# Switching off the instrument

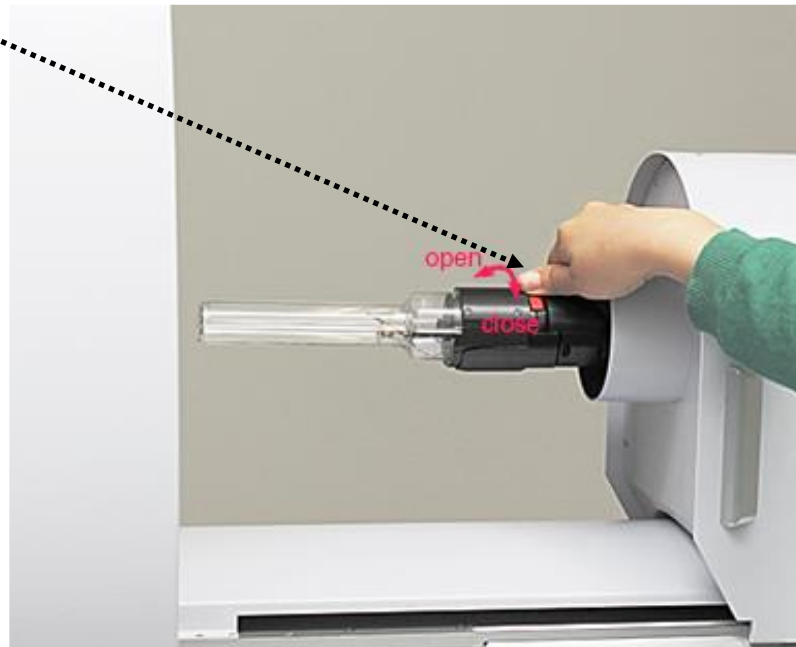


**Simply close the Skyscan1276 software program.**

**End your session and log out from IRIS.**

## Animal bed

When X-rays are off, the skyscan top cover can be pulled out by hand using the handle. The animal bed holder will then automatically move and an easy installation of the animal bed will be possible. Any animal bed can be installed by pushing the bed black connector into the animal transport system (ATS) socket. The bed must be locked by moving the red lever to close position. Move the lever to open position to release the animal bed.



Several beds are available (next page). Always chose the smallest option for your sample/animal. Try to have the sample/animal well centered with the respect to the scanner main axis.

# Accessories Toolkit

Large diameter carbon-fiber bed

Small mouse cassette

Big rat cassette



Large cylindrical sample holder  
(medium magnification)

Big mouse cassette

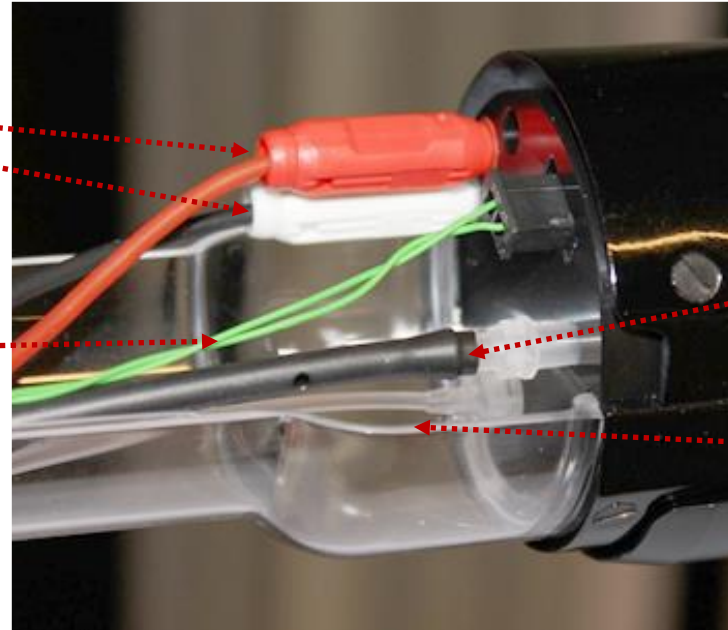
Small cylindrical sample holder  
(high magnification)

**Attention! The small cylindrical sample holder is very fragile.  
Be very careful in removing it from the accessory box and  
during usage for sample scanning.**

# Bed Connections

ECG electrodes

Temperature probe



Warm air heating system

Anesthesia tube

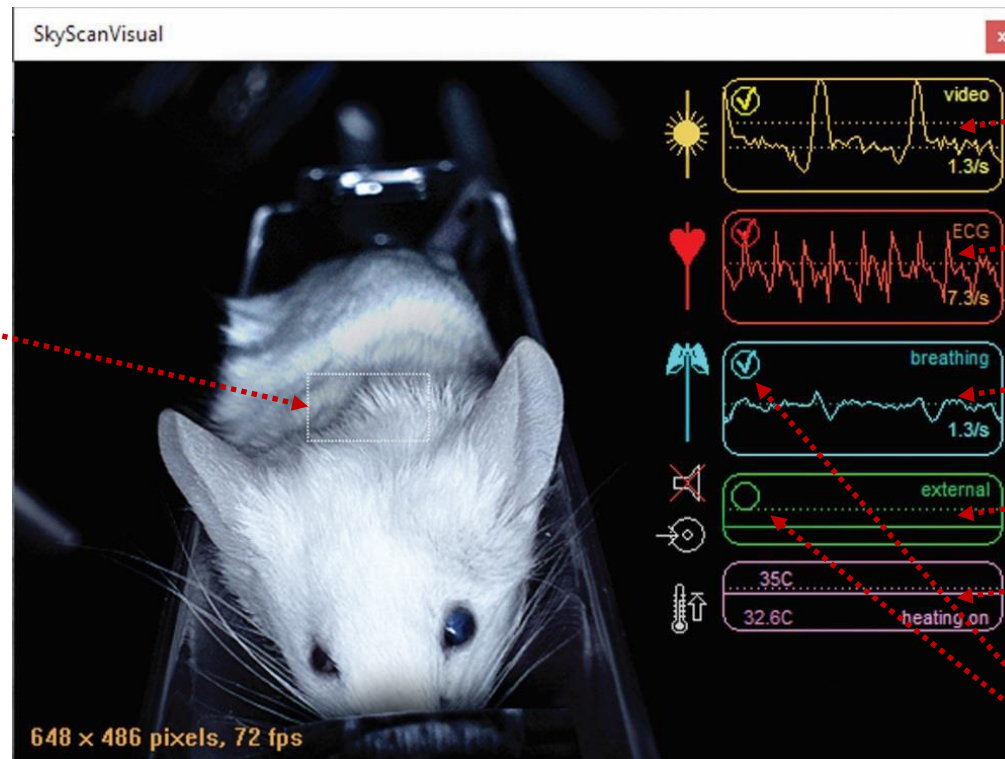
The face mask  
can be installed  
at the front or at  
the back of every  
animal cassette



# Physiological monitoring

**Region of interest  
(repositionable and resizable)**

The region of interest should be positioned in the place where body movements can be seen with largest amplitude and/or larger contrast. It can be useful to place some tape (white for black fur and vice versa) to highlight respiratory movements.



**Movement detection curve**

**ECG signal**

**Breathing signal**

**External trigger signal**

**Temperature measurement**

**Each round checkbox allows for the choice of the signals to be recorded.**