The end station available on MARS beamline for the second semester 2011

Two end stations on the MARS beamline are ready to accept proposals from external researchers on low radioactive samples during the second semester of 2011:

- the High Resolution powder X-ray Diffraction station (**station CX2**)
- the multi-purpose station for standard X-ray Absorption Spectroscopy and Transmission X-ray Diffraction (**station CX3**)

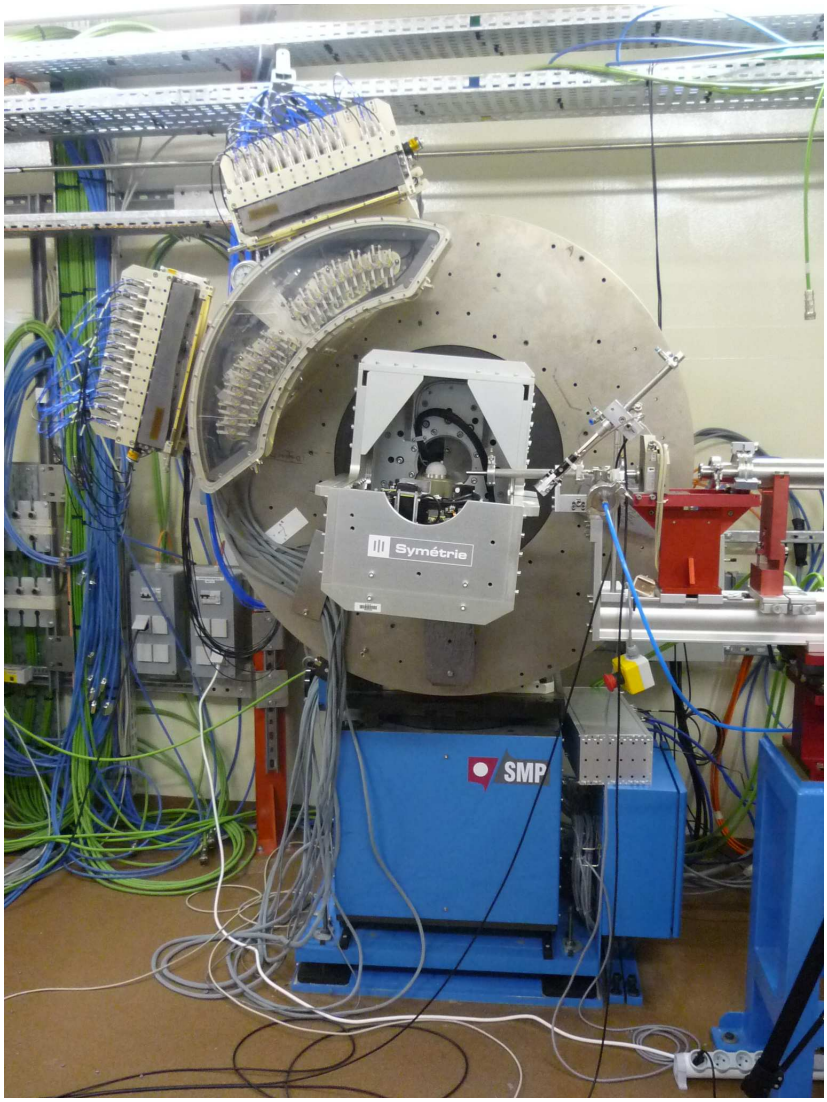
The X-ray energy ranges and beam size (FWHM) are the followings:

Selected crystals for the monochromator	Energy range (keV)	standard beam size H (µm) x V (µm)
Si(111)	5 - 20	300 x 300
Si(220)	8 - 35	300 x 300

Note that the crystal exchanges Si(111) to Si(220) and vice versa can be done in less than 30 min from our monochromator.

1) Station CX2: High Resolution XRD

This station is proposed for High Resolution X-ray Diffraction characterisations on powder samples.



For details on this station please contact beamline staff (in particular B. Sitaud or S. Schlutig).

2) Station CX3: XAS and Transmission XRD

This station is proposed for standard XAS characterisation (step by step) using transmission or fluorescence mode and for transmission XRD characterisation.

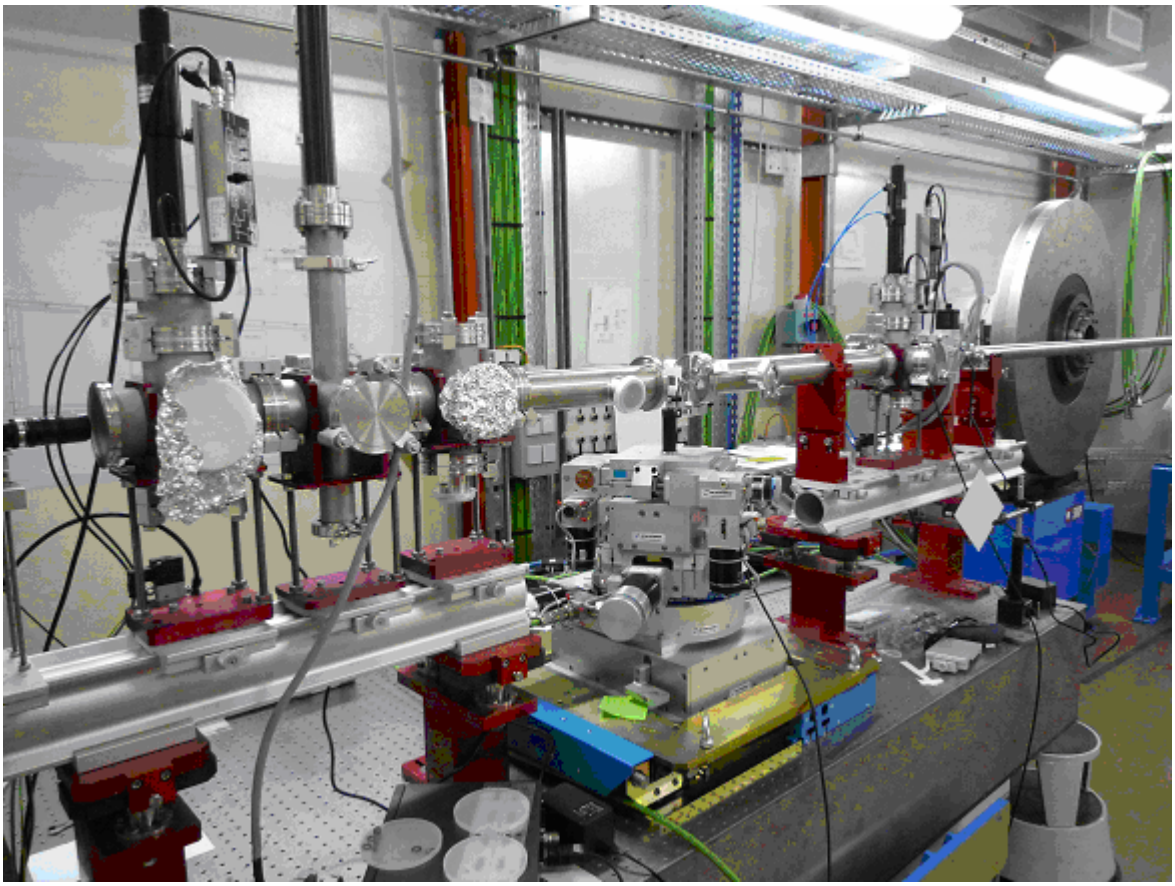
For transmission XAS, three intensity monitors are used. For fluorescence XAS or XRF a multi-element Ge detector or a single element SDD detector (provided by Detector group) can be used. For transmission XRD a 2D image plate detector is used.

The samples in their sample-holders can be fixed on a multi-axis manipulator. The upper part of the manipulator can be replaced by a specific stage for multi-position sample holders.

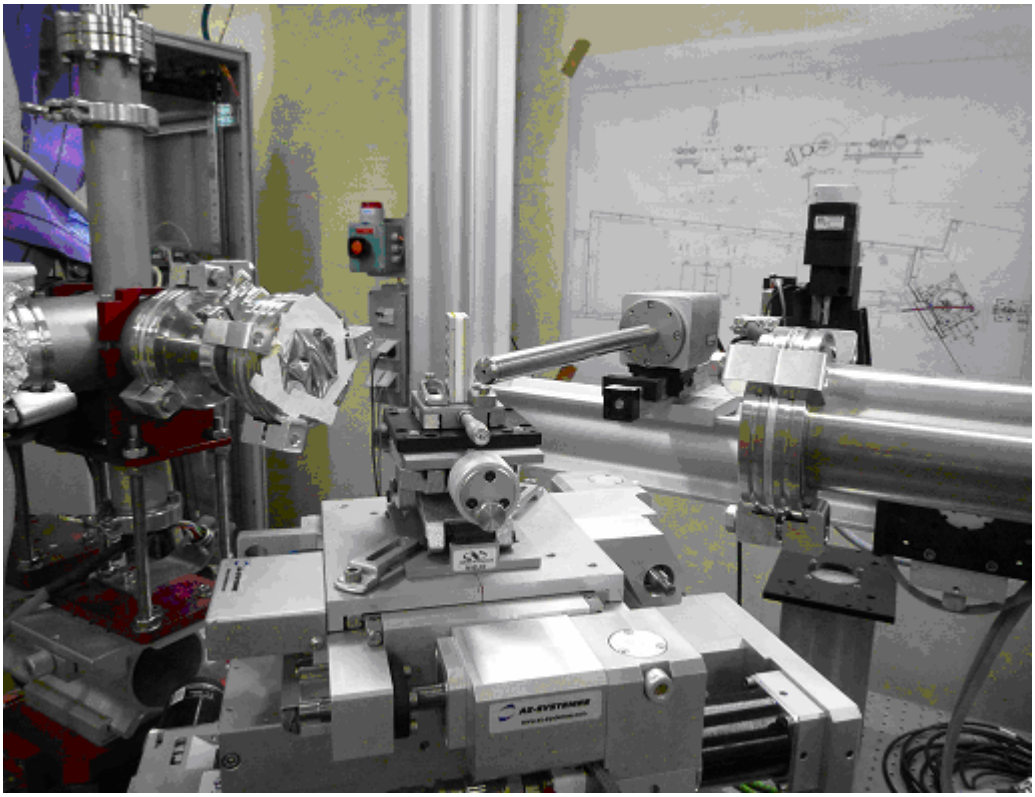
A liquid helium cryostat is available for measurements on non radioactive samples.

Views of the end station

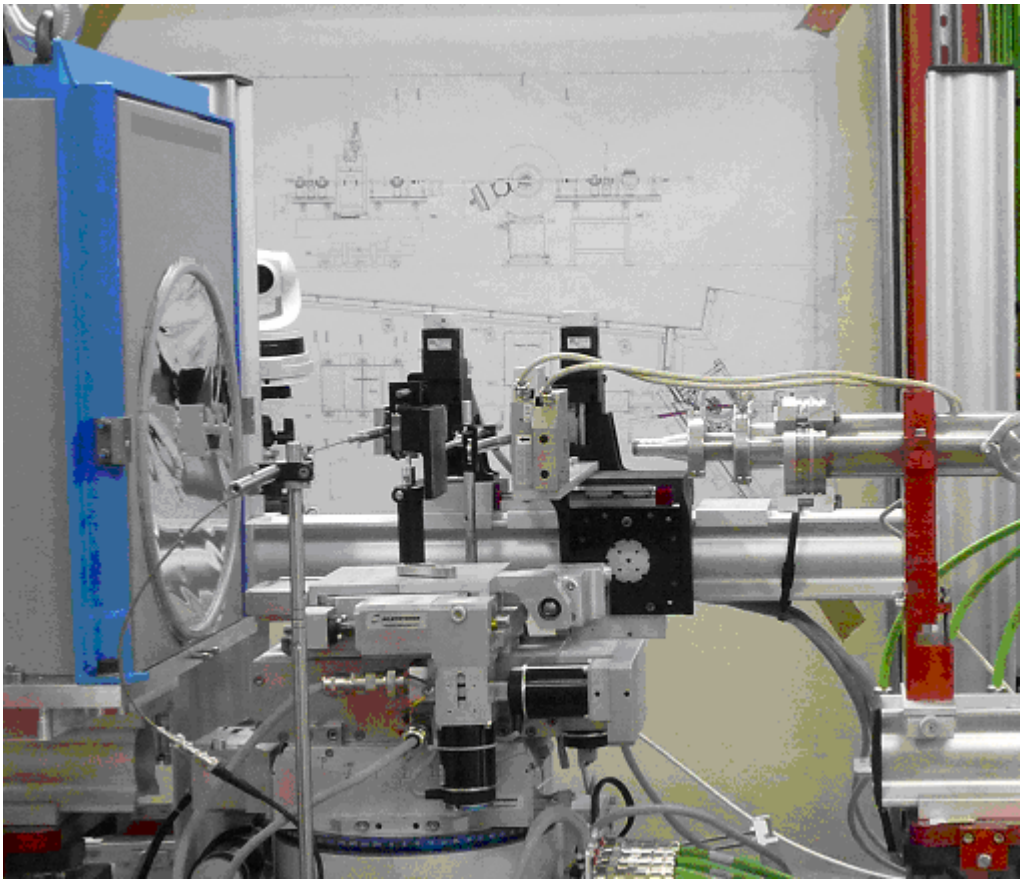
XAS set up : transmission mode



XAS set up : fluorescence mode (here with a single element SDD)



XRD set up (Image Plate MAR345 detector)



Technical details about the multi axis sample manipulator

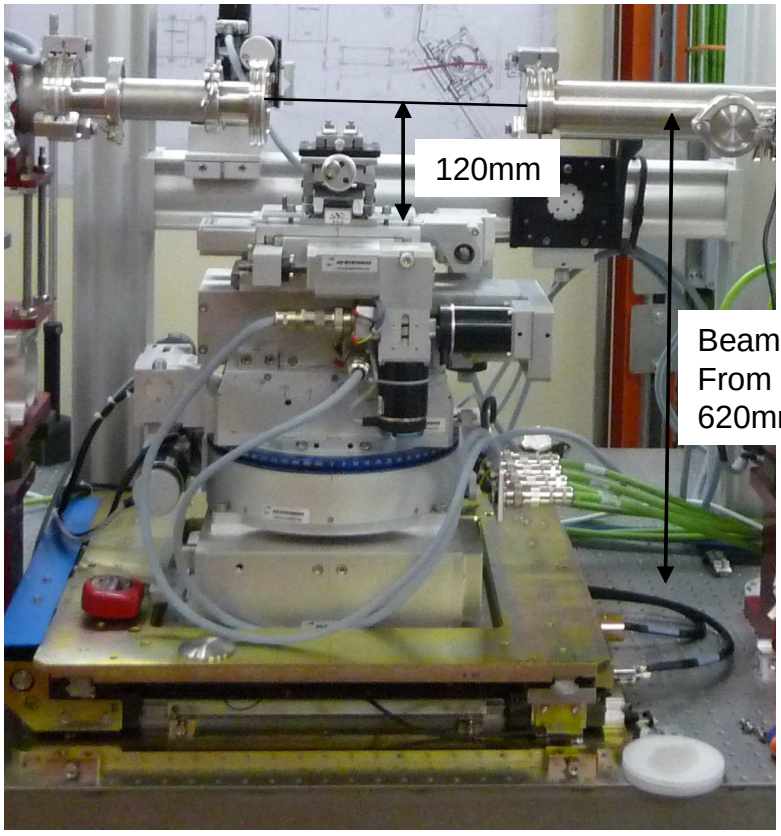
The multi axis manipulator is designed for sample alignment or displacements along the X-ray beam. The motions can be done easily and with a high accuracy using individual stage controllers or from a software sequence developed with the “PASSERELLE” application. In this later case, the sequence has to be written by the local contact before the experiments.

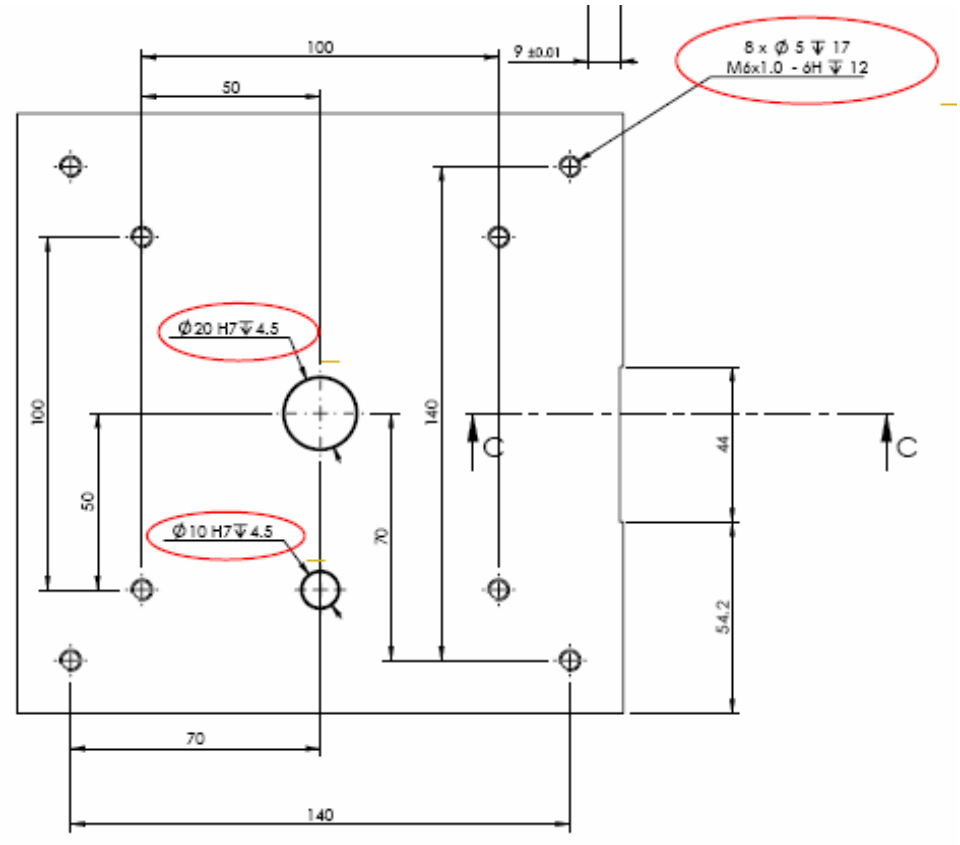
The sample manipulator consists of 8 complementary motorized stages. Starting at the base of the assembly, we find the following motorized stages:

1) a horizontal translation stage perpendicular to the X-ray beam (Tx)
2) a horizontal translation stage parallel to the X-ray beam (Ts)
3) a vertical translation stage (Tz)
4) a rotation stage with its axis vertical (Rz)
5) a rotation stage with its axis horizontal (Rx)
6) a second a vertical translation stage (Tz2)
7) a second horizontal translation stage parallel to the X-ray beam (Ts2)
8) a second horizontal translation stage perpendicular to the X-ray beam (Tx2)

axis	load capacity	Accuracy along the full operating range	Resolution	bidirectional repeatability
Tx	250 kg	5 µm over 40 mm	0,5 µm	1 µm
Ts	250 kg	5 µm over 40 mm	0,5 µm	1 µm
Tz	50 kg	2 µm over 20 mm	0,5 µm	1 µm
Rz	50 kg	range 360°	0,001°	0,005°
Rx	50 kg	range ±15°	0,005°	0,01°
Tz2	25 kg	2 µm over 20 mm	0,05 µm	0,2 µm
Ts2	25 kg	2 µm over 20 mm	0,05 µm	0,2 µm
Tx2	25 kg	2 µm over 20 mm	0,05 µm	0,2 µm

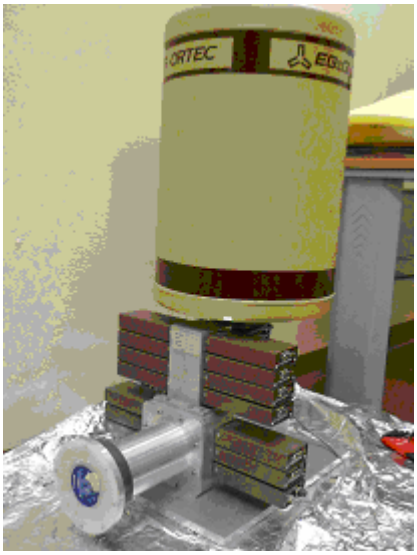
Different sample holders can be easily fixed directly on the top of the manipulator from several threads (M6) as shown on the drawing of the interface plate X-S (see below). Also you have to note that the standard distance between the top of the goniometer and the synchrotron beam is equal to 120 mm. Also to adjust rapidly your sample on the centre of the interface plate X-S (or along the axis of rotation Rz), you can use the normalized drilling Ø20 H7. Note that its deepness is limited to 4.5 mm.

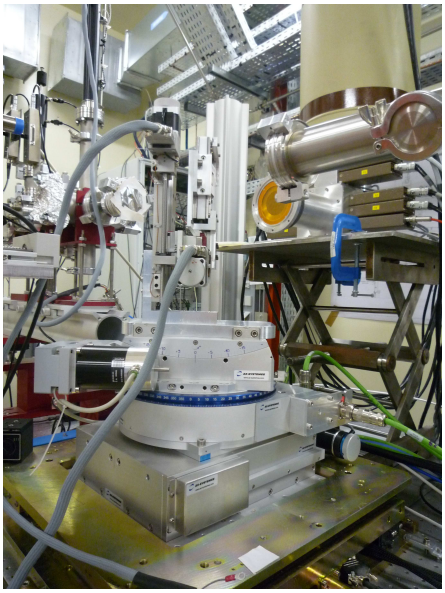

120mm
Beam height
From table
620mm


100
50
9 ±0.01
8 x Ø 5 ↧ 17
M6x1.0 - 6H ↧ 12
Ø20 H7↧4.5
Ø10 H7↧4.5
100
50
140
70
C
C
44
54.2
70
140

Additional equipment

A multi-element HP Germanium detector (Ortec) is available for fluorescence measurents in combination with digital electronics (XIA). (besides SDD detector provided by Detectors Group).





A motorised stage for multi-samples cell is available in replacement of the upper part of the multi-axis manipulator.