

HRXS – a new High Resolution X-ray Spectrometer of LMJ

C. Reverdin¹, B. Vauzour¹, Q. Alexandre¹, P. Prunet², S. Rovillon², S. Diop¹, M. Sozet²,
T. Fonseca², C. Baccou¹, D. Bernardino¹, C. Blancard¹, M. Bonneau¹, C. Bowen¹, M. Briat¹, A. Chaleil¹,
F. Chermette¹, T. Chirac¹, O. Dubos¹, S. Ferré¹, F. Gilleron¹, D. Gontier¹, P. Gruning¹, A. Lejars¹,
L. Jacquet¹, J.C. Pain¹, M. Prat¹, P. Rathouit¹, P. Renaudin¹, A. Rousseau¹, G. Soullie¹, B. Vilette²

¹CEA DAM, DIF, F-91297, ArpajonFrance

²CEA DAM, CESTA, F-33116 Le Barp, France

HRXS (High Resolution X-ray Spectrometer) is a new crystal spectrometer recently implemented on the LMJ facility. Its spectral range is from one keV to twenty keV. It is dedicated to atomic physics and more specifically to NLTE spectroscopy and opacity measurements.

This diagnostic consists in ten measurement channels implemented in three different boxes. The central box contains four measurement channels associated to a framing camera for time-resolved spectra. Each of the two lateral boxes contains a set of three channels and a CCD camera to record time-integrated spectra.

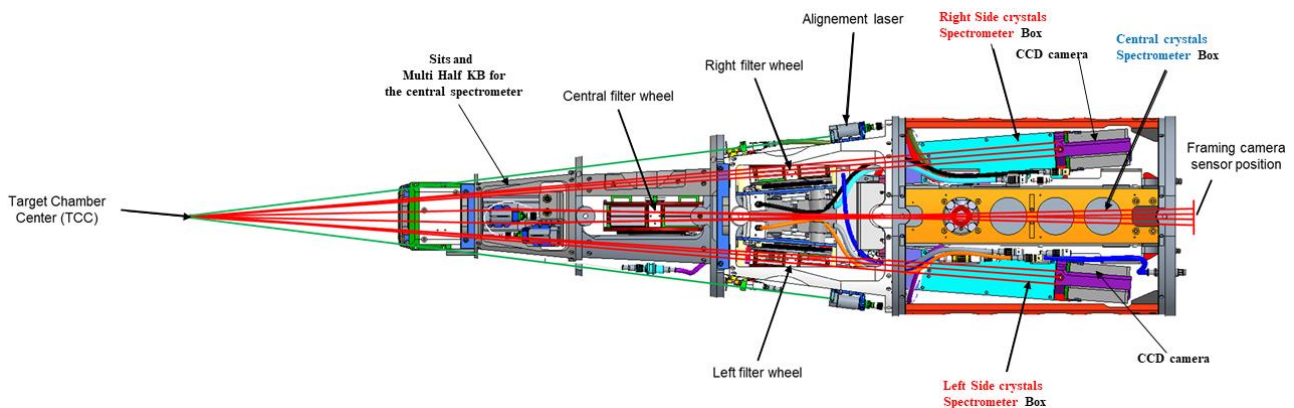


Figure 1. Layout of the ten channels of HRXS, the new x-ray crystal spectrometer of LMJ

Each channel is equipped with a cylindrical Bragg crystal in either reflection or transmission geometry, an adjustable shot-to-shot filter (thanks to a four-position filter wheel), and a slit for spatial resolution and is dedicated to a specific spectral range. The channels are fully customizable, allowing both spectral range and spectral resolution to be adapted to experimental needs. The slits positions can also be easily changed between experimental campaigns to adjust the magnification and thus the field of view along the spatial dimension.

Opacity measurements can be performed by combining each of the four central channels with a grazing incidence spherical mirror (half-KB). This allows the beam to be angularly split and to record on two channels the direct signal and on the two other channels the signal transmitted through the sample on the detector.

HRXS is also equipped with a tungsten alloy collimator at the front end and a debris shield consisting of three successive rolls of aluminized Mylar filters to protect the crystals and detectors.

The first HRXS qualification campaigns took place at the end of last year. Initial results are very promising for future experiments.

* E-mail: charles.reverdin@cea.fr