

Beam tube .....	Tangential on thermal source channel 2 T : 5 x 12 cm <sup>2</sup>
Monochromator .....	Option unpolarized neutrons : 1) PG 002, $\eta \sim 0.6^\circ$ 15 x 13 cm <sup>2</sup> 2) Cu 111, $\eta \sim 0.8^\circ$ 15 x 13 cm <sup>2</sup>
Monochromator .....	Option polarized neutrons : Heusler, $\eta \sim 0.5^\circ$ 14 x 13 cm <sup>2</sup> All monochromators have a vertical curvature automatically adapted to the incident neutron energy
Analyzer .....	Option unpolarized neutrons PG 002, $\eta \sim 0.6^\circ$ 11 x 9 cm <sup>2</sup>
Analyzer .....	Option polarized neutrons Heusler, $\eta \sim 0.5^\circ$ 11 x 10 cm <sup>2</sup> Both analyzers have an horizontal curvature automatically adapted to the final neutron energy. The PG 002 has additionally a vertical curvature which can be manually changed
Beam size at specimen .....	3 x 4 cm <sup>2</sup>
Incident energy .....	8 - 140 meV (unpolarized neutrons) 8 - 70 meV (polarized neutrons)
Momentum transfer .....	0 - 8 Å <sup>-1</sup>
Energy transfer .....	0 - 100 meV (unpolarized neutrons) 0 - 55 meV (polarized neutrons)
Detector .....	<sup>3</sup> He
Typical energy resolution : .....	$\delta\omega \approx 0.8$ meV at $k_f = 2.662$ Å <sup>-1</sup> ( $E_f = 14.7$ meV) $\delta\omega \approx 3.5$ meV at $k_f = 4.1$ Å <sup>-1</sup> ( $E_f = 35$ meV)
Collimation : .....	10' to 60'
Range of scattering angle : .....	0° ≤ 2θ <sub>s</sub> ≤ 360° (± 20° double goniometer)
Ancillary equipment	★ "Triple Axis Equipment Pool" (see on front of this chapter)

This spectrometer has been built to study inelastic scattering from condensed matter. This corresponds to collective excitations either from the lattice (phonons) or from magnetically ordered systems (magnons). The triple axis spectrometer can be also used to study the dynamics in more disordered samples such as amorphous systems and spin-glass as it fully measures the scattering function  $S(Q, \omega)$  over a wide energy range and at any position in the reciprocal space. For instance, in strongly correlated electron systems such as high-T<sub>c</sub> superconductors, one can fully determine the generalized spin susceptibility. By selecting the neutron polarization one can further separate magnetic scattering from lattice contributions. A polarized option can be used on 2 T.

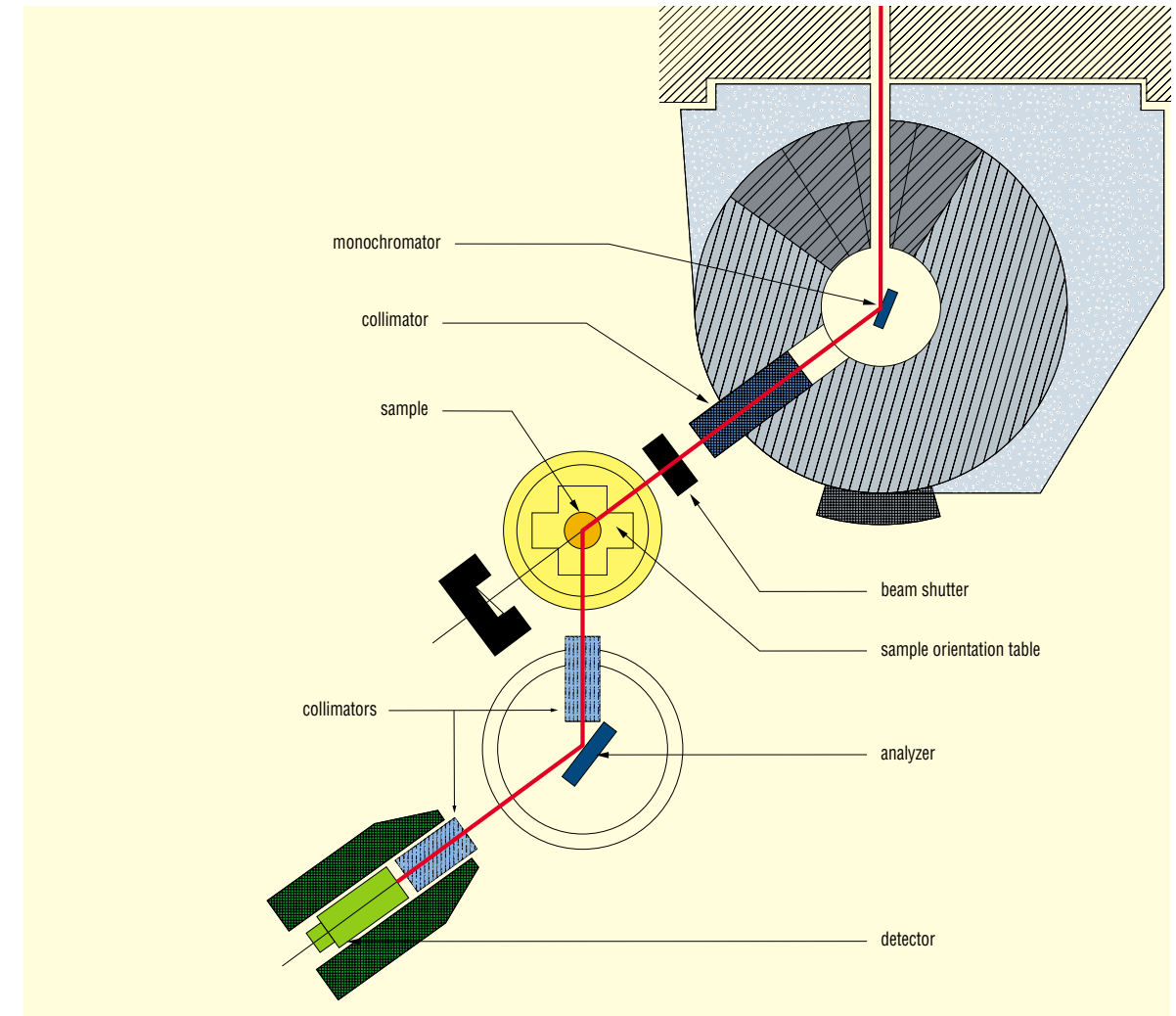
The spectrometer is composed of 3 elements, each rocking around an axis :

- 1) The first axis is a monochromator to select neutrons with specific incident energy. This part is inside a mobile concrete block (called drum).
- 2) The second axis is related to the sample to be studied which can be oriented in any direction.

- 3) The third axis is an analyzer allowing to determine the final neutron energy. After being selected by the analyzer, the neutrons are finally measured by a <sup>3</sup>He detector located in a closed block in order to reduce the background level.

With the polarized option, the neutron polarization is selected by a monochromator and an analyzer, both made of an Heusler alloy which allows to select only neutrons with a specific spin state. A coil flipper is used to reverse the neutron spin state and select each component of the neutron cross-section.

Horizontal guide fields are installed in the monochromator drum up to the sample position and vertical guide fields between sample to the analyzer. A small field (~ 15 Oe) of arbitrary orientation can be applied at the sample position using an Helmholtz coils system consisting of three coils on a cylinder surface and two circular coils.



General layout of the spectrometer 2 T1.

On different segments of the neutron path (reactor-monochromator, sample-analyzer, analyzer-detector), Soller collimations can be placed to choose the angular divergence and improve the spectrometer resolution. All equipment of the triple axis pool can be installed at the sample position on the goniometers system (Cryostat (with dilution insert), Close-cycle refrigerator, Vertical Magnetic coil, Furnaces, Pressure cell...).

Due to its implementation on a thermal neutron beam, this spectrometer is well adapted for studying excitations over a wide energy range 1.5 to 100 meV (0.3 to 25 THz) which covers the typical range of phonon and magnon branches in single crystals.

All triple-axis measurements can be fitted on line by an homemade fitting programme. This programme performs a convolution product of all standard neutron cross-sections by the spectrometer resolution function.

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