

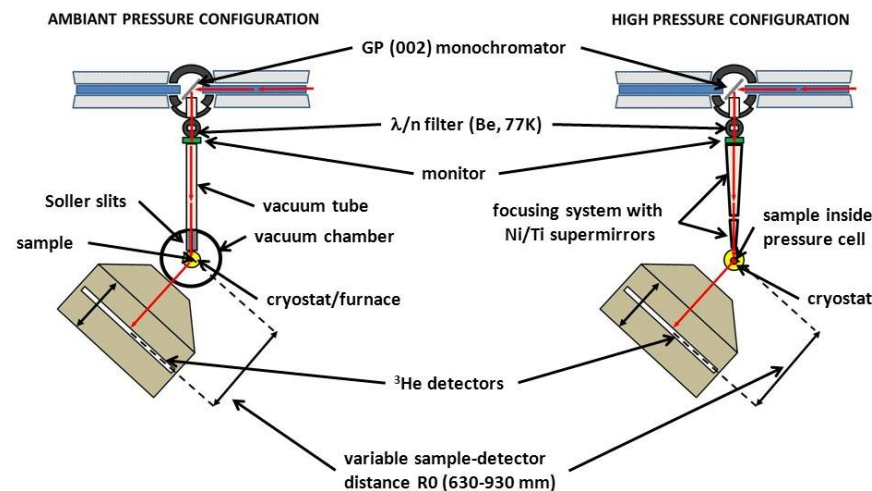
G6.1 Cold neutrons, two axes Diffractometer MICRO

Type of instrument	Cold, two-axis diffractometer
Beam tube	Cold guide G6 (30 x 80 mm ²)
Monochromator	Pyrolytic graphite (002) Vertical focusing
Incident wavelength .	$\lambda=4.749 \text{ \AA}$ ($\lambda/2$ suppressed by a Beryllium filter)
Maximum flux at the sample	3.10 ⁶ n.cm ⁻² .s ⁻¹ (Ambient version) 2.10 ⁷ n.cm ⁻² .s ⁻¹ (High pressure version)
Maximum beam size at sample	10 x 30 mm ²
Detector	16 horizontal ³ He position sensitive detectors (flat detector 480x390 mm(pixel size 6x24 mm)) Variable (sample-detector) distance R0 : 620→940 mm
Angular range (Typ. step)	2 θ < 150° (0.05° 2D frame integration param.)
Typical acquisition time ΔT	15 mn < ΔT < 6h per frame
Typical Cagliotti parameters	U=0.000 V=1.982 V=1.986 (R0 = 630 mm)
Ancillary equipments	Low – medium temperatures : <i>Orange cryostat (1.5 K - 270 K)</i> <i>Displex with hot stick (5 K – 500 K)</i> High temperatures : <i>Furnace (T < 1300 K, P ~10⁻⁴ mbar)</i> Pressure (Low – medium temperatures only) : <i>Clamp cells P < 10 GPa</i> <i>Sapphire anvil cells P < 10 GPa</i> <i>Diamond anvil cells P < 50 GPa</i> No Magnetic field option Polarized neutron beam not available

G 6-1 is a two-axis powder diffractometer installed on a cold neutron guide. It is a high-intensity, long wavelength instrument used to study magnetic structures, long-periodicity mesoscopic structures and diffuse scattering at ambient and high pressures. The wavelength is selected by a graphite monochromator. The typical value is 4.749 Å and can be exceptionally changed between 4 and 6 Å. The contamination of the λ/n harmonics ($\lambda/2$, $\lambda/3$,...) is suppressed by a beryllium filter cooled down with liquid N₂ in the incident beam path. The detector has an original geometry and consists of 16 long (l=800mm) horizontal ³He position sensitive counters, with a distance R0 to the sample that can be selected at will (630 < R0 < 930 mm) by the users. The detector can rotate around the sample axis from 0 to 110°. This setting allows the measurement of 2D frames with variable resolution, from 2 θ ~2° (detector in the direct beam, R0 maximum) to 2 θ = ~150° (detector at 110° of the direct beam, R0 minimum) The 2D frames can be converted to classical 2 θ -I(2 θ) or q-I(q) with ad-hoc 2 θ /q step.

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G6.1



The spectrometer operates in two different versions:

- **Ambient pressure version**
In this version, the incident neutron path, the sample, collimator and beam catcher are under vacuum. The sample environments available are an ILL-type cryostat (1.5 < T < 300 K), a cryogenerator with hot-stick option (5 < T < 500 K) and furnaces (T < 1300 C). This setting offers the best Δq resolution in the range $0.15 < q < 2.5 \text{ \AA}^{-1}$ accessible on G6.1. It is well adapted to the study of structural and magnetic phase transitions, diffuse scattering, specific features at low q in amorphous and liquid states, adsorbed layers, etc...
- **High pressure version**
In this version, the diffractometer is used to study magnetic order, phase transitions, mesoscopic structures (nanomaterials, polymers,...) in a wide range of pressures. The diffractometer is equipped with various high-pressure cells, from clamp cells with continuous loading, to sapphire and diamond anvils cell (sapphire and diamond anvil cells are available only for experienced users). The cells can be combined with a special double-stages focusing system with Ni-Ti supermirrors, installed along the incident beam path, enhancing the flux by a factor of 7. The maximal pressures attain some tens of GPa (hundreds of Kbar) for strongly scattering samples and few GPa (tens of Kbar) for an average scattering samples. All the cells can be used at low temperature (1.5K-300K)

Instrument responsible:
Technical support

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