G 4-1 Cold Neutron Two-Axis Diffractometer PYRRHIAS,

Type of instrument	Two-axis diffractometer
Beam tube	Cold neutron guide G 4
Monochromator	Pyrolytic graphite (002), vertical focusing
Take-off-angle	$42 < 2\theta_M (°) < 110$
Incident wavelength	$2.43 < \lambda$ (Å) < 5.5
Max. flux at specimen	4.10^6 n cm^{-2} s^{-1} (λ = 2.43 Å)
Max. beam size at specimen	10 x 50 mm^2
Detectors	Linear multidetector 800 cells (BF_3)
Minimum step size scan	0.02° (2θ)
Angular range	$3 < 2\theta (°) < 105$
Angular resolution	See figure
Data collection and Instrument control system	PC computer

Ancillary equipment

★ Cryofurnace 1.5 K < T < 550 K
★ Furnace T < 1000°C
★ High (hydrostatic) pressure cell : P < 23 Kbar
★ Vertical magnetic field : H < 1.5 T

G 4-1 is a two-axis powder diffractometer equipped with a vertical focusing pyrolytic graphite monochromator and a 800-cells multidetector covering a 80° -2θ range (step 0.1° between 2 cells).

The most frequently used wavelength is 2.43 Å but can occasionaly be varied between 2.43 and 5.5 Å. The accessible 2θ diffusion angle covers the range 3° - 105° ; in that range it is possible to perform diagrams with 0.02° step (2θ).

The instrumental resolution of the spectrometer being minimal at low 2θ diffusion angle (2θ < 60°), G 4-1 is particularly well adapted for magnetic structure determination.

The high acquisition rate of the multidetector allows to perform diffraction studies (structural or magnetic) as a function of external parameters (temperature, pressure…) and to follow in situ cinetic reactions or phase transitions ; the minimal acquisition time is of the order of one minute. With longer acquisition time (a few hours) it becomes possible to detect and quantify minority phases present in a multiphase compound, generally down to 0.1% (weight percentage).

Soon available :

• dilution cryostat down to 50 mK.

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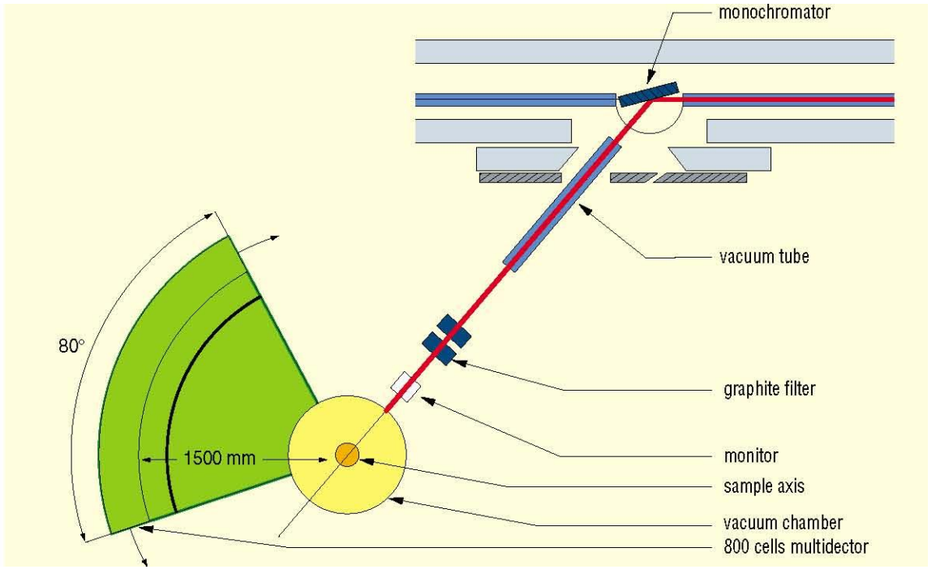
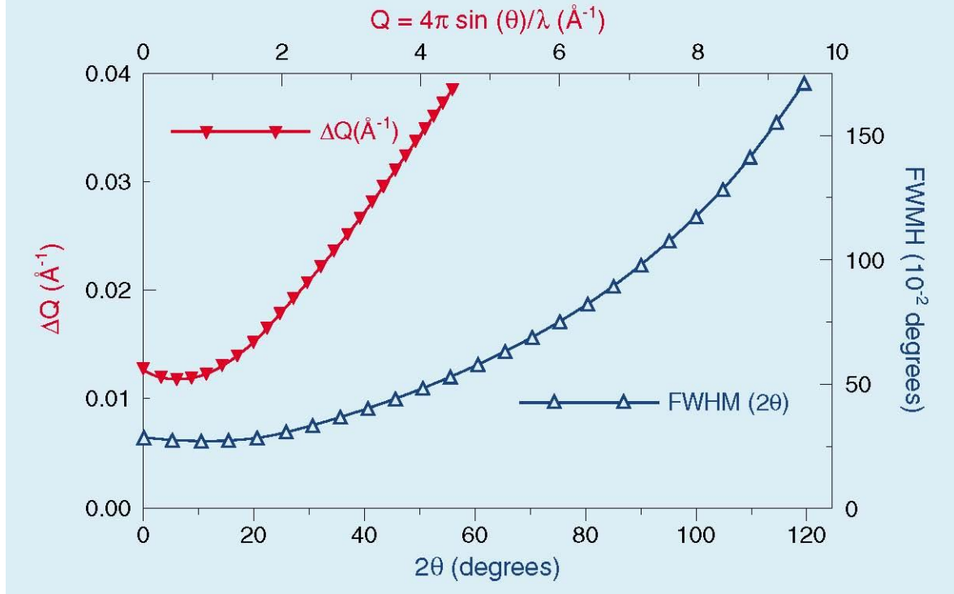


General layout of the cold neutron two axis diffractometer G 4-1.



Resolution curves : *Full width at half maximum (FWHM) versus 2θ ; Q variation of the resolution ΔQ (λ = 0.245 nm).*

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