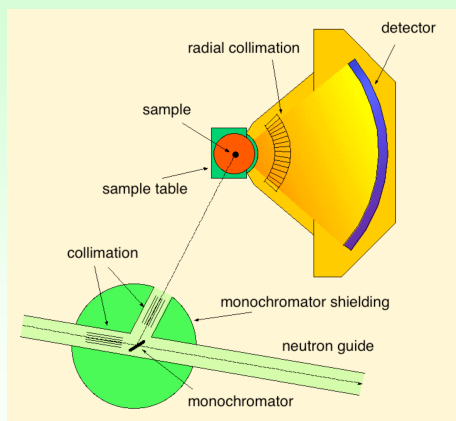


# DMC: Cold Neutron Powder Diffractometer

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## Instrument Layout

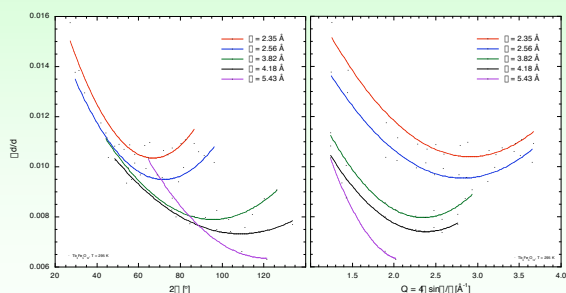


## Summary

- The cold neutron powder diffractometer DMC is a flexible instrument for efficient neutron powder diffraction studies in the fields of crystallography, solid state physics, magnetism, chemistry and material science, in particular for the determination of weak magnetic intensities and its temperature dependences.
- The main application is the investigation of phase transition, e.g. temperature evolution of magnetic structures.
- DMC is complementary to the high-resolution thermal neutron diffractometer HRPT. DMC is designed for high intensity performance.
- A recent improvement is the new sample table shielding: very low, flat and stable background
- Future options:
  - high-resolution mode with a vertically focusing Ge monochromator and high monochromator take-off angle
  - automated slit system between monochromator and sample

## Resolution Functions

Experimental resolution curves  $\Delta d/d$  as a function of  $2\theta$  (left picture) and  $Q$  (right), using the PG monochromator. No primary or secondary collimation, sample diameter 10 mm.



## Technical Specification

### Position

- Guide hall, at the cold neutron guide RNR12, supermirrorguide ( $m=2$ , height 12 cm, width 2cm)

### Monochromators

- Pyrolythic Graphite (002), vertically focusing, 5 crystals of 2.5 cm height
- Germanium (311, 511), vertically focusing, 9 crystals of 1.4 cm height

### Wavelengths

- Any wavelength between 2.3 Å and 6 Å is possible, standard wavelengths are 2.56 Å and 4.2 Å (PG monochromator)

### Collimations

- Optional primary and secondary collimation (Gd-O Soller collimators)
- Oscillating collimator system between sample and detector: 73 Cd coated steel plates of 0.02 cm thickness, angular distance 1.2°

### Detector system

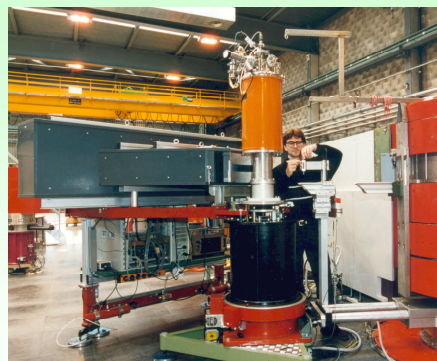
- "Banana" type multidetector, linear position-sensitive  $\text{BF}_3$  counter (LCC 400CP, Thompson-CSF)
- 400 detectors with angular separation of 0.2°, covering simultaneously a scattering angle range of 79.8°, radius 1.5 m.

### Instrument software

- SICS (SINQ Instrument Control Software) for control of the measurement
- TECS (Temperature Control Software) for control of sample environment
- FIT, FULLPROF, ... for data analysis

### Sample environment

- $^3\text{He}/^4\text{He}$  dilution refrigerator,  $T_{\text{min}} = 110$  mK
- He cryostats,  $1.4 \text{ K} \leq T \leq 325 \text{ K}$
- Cryo-Furnace,  $2 \text{ K} \leq T \leq 600 \text{ K}$
- Closed-cycle cooling machines,  $15 \text{ K} \leq T \leq 475 \text{ K}$
- Cryo-Magnet, 4 T vertical,  $4 \text{ K} \leq T \leq 100 \text{ K}$
- Furnaces,  $T_{\text{max}} = 1400 \text{ K}$
- Pressure cells,  $P_{\text{max}} = 15 \text{ kbar}$ ,  $2 \text{ K} \leq T \leq 300 \text{ K}$



## Contact

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<http://sinq.web.psi.ch/sinq/instr/dmc/dmc.html>  
[http://sinq.web.psi.ch/sinq/instr/diffraction/diffraction\\_links.htm](http://sinq.web.psi.ch/sinq/instr/diffraction/diffraction_links.htm)  
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