

# Super D2B - high resolution powder diffractometer

---

- D2B is 15 years old, and was part of the 1984 Zieme souffle with D19 and D20
- D2B is often the most demanded of ILL machines (number of users & papers)
- D2B has produced the most cited papers (zeolites, superconductors, GMR materials...)
- We propose an order of magnitude gain in intensity, and corresponding higher resolution



# Super D2B - high resolution powder diffractometer

Number of citations to ILL publications (most = 646 compared with average ~10)

- **646** (D2B) Cava, R. J et al (1990) Physica C. 165, 419.  
**Structural anomalies oxygen ordering and superconductivity in oxygen deficient Ba<sub>2</sub>YCu<sub>3</sub>O<sub>x</sub>.**
- **466** (D1A) Capponi, J. J. et al. (1987) Europhysics Letters. 3, 1301.  
**Structure of the 100K superconductor Ba<sub>2</sub>YCu<sub>3</sub>O<sub>7</sub> between 5-300K by neutron powder diffraction.**
- **218** (D2B) Hwang, H. Y. et al (1995) Physical Review Letters. 75, 914.  
**Lattice effects on the magnetoresistance in doped LaMnO<sub>3</sub>.**
- **195** (D1A) Fitch, A. N et al (1986) Journal of Physical Chemistry. 90, 1311.  
**Localization of benzene in sodium-Y zeolite by powder neutron diffraction.**
- **191** (D2B) Kaldis, E. et al (1989) Physica C. 159, 668.  
**Low temperature anomalies and pressure effects on the structure and T<sub>c</sub> of the superconductor YBa<sub>2</sub>Cu<sub>4</sub>O<sub>8</sub> (T<sub>c</sub>=80 K).**
- **169** (D2B) Francois, M. et al (1988) Solid State Communications. 66, 1117.  
**A study of the Cu-O chains in the high T<sub>c</sub> superconductor YBa<sub>2</sub>Cu<sub>3</sub>O<sub>7</sub> by high resolution neutron powder diffraction.**
- **125** (D2B) Bordet, P. et al. (1988) Physica C. 156, 189.  
**A note on the symmetry and Bi valence of the superconductor Bi<sub>2</sub>Sr<sub>2</sub>Ca<sub>1</sub>Cu<sub>2</sub>O<sub>8</sub>.**
- **125** (D1A) Roth, G., et al (1988) Physica C. 153-155, 972.  
**Crystallographic study of the tetragonal high-T<sub>c</sub>-superconductor YBa<sub>2</sub>(Cu<sub>0.95</sub>Fe<sub>0.05</sub>)<sub>3</sub>O<sub>7</sub>.**
- **102** (D2B) Hewat, A. W. (1987) Solid State Communications. 64, 301.  
**Structures of superconducting Ba<sub>2</sub>YCu<sub>3</sub>O<sub>7-δ</sub> and semiconducting Ba<sub>2</sub>YCu<sub>3</sub>O<sub>6</sub> between 25 degrees C and 750 degrees C.**

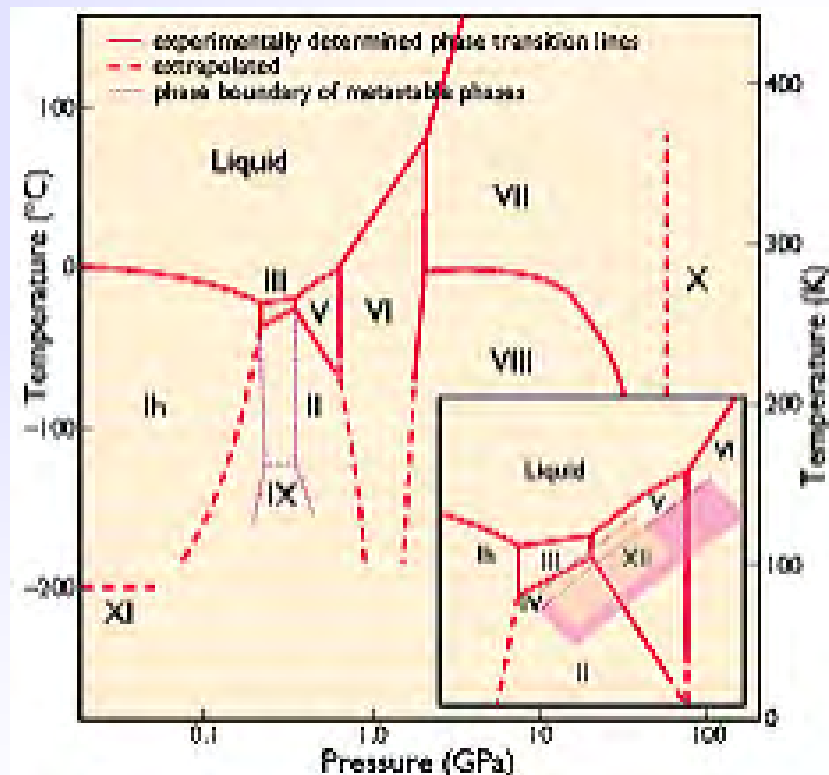
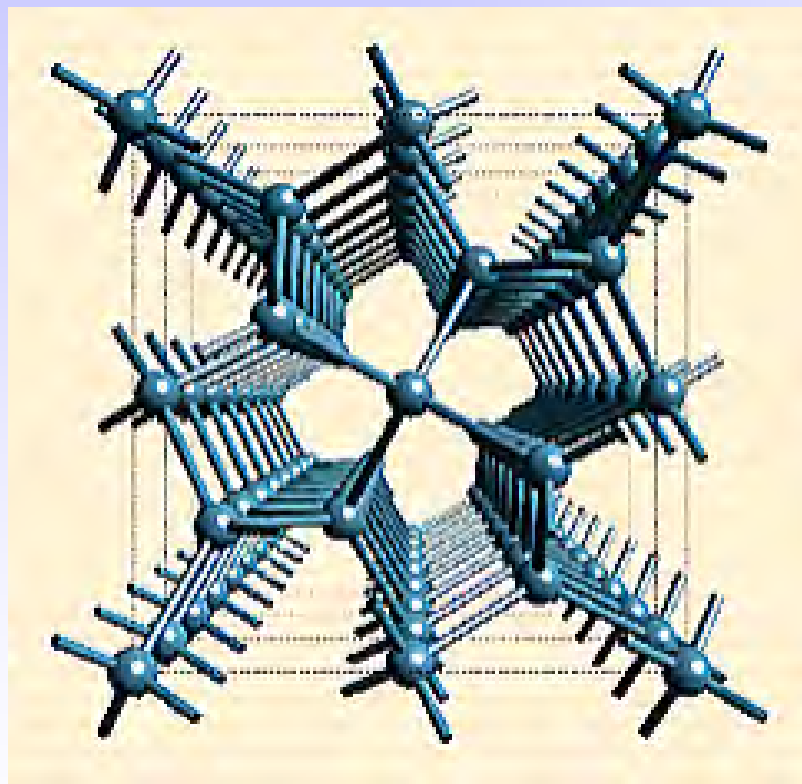
<http://www.ill.fr/dif/citations/>

*Diffraction Group, Science Division, Institut Laue Langevin*



# Super D2B - high resolution powder diffractometer

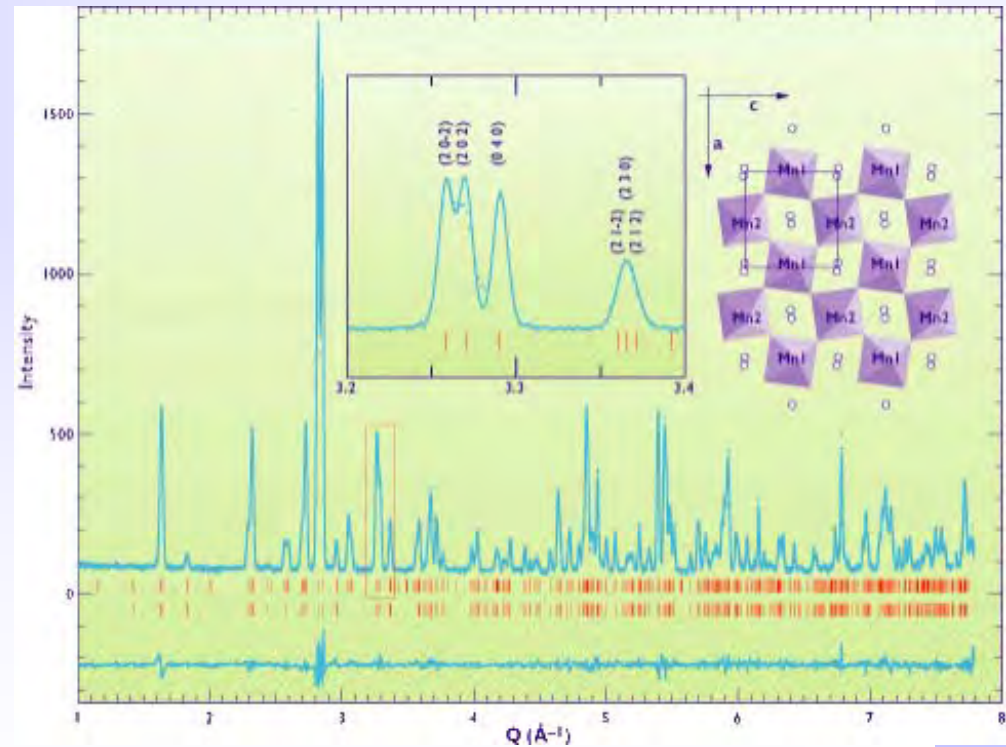
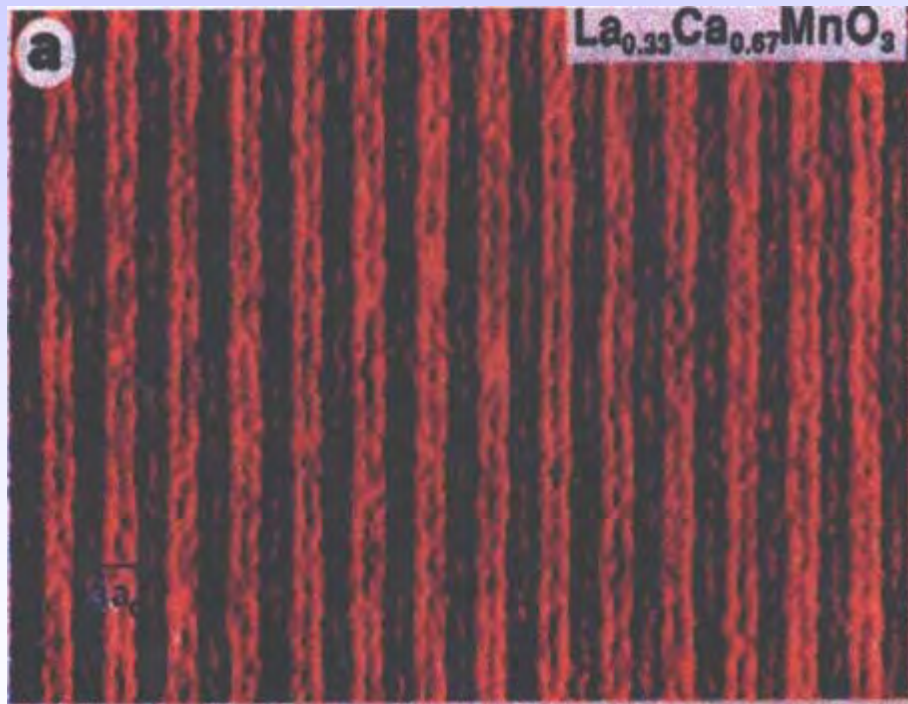
New High Pressure Phases of Ice (W. Kuhs, W. Finney et al.) D2B (1998 ILL Report)



# Super D2B - high resolution powder diffractometer

**Giant Magneto-Resistance (Fernandez-Diaz, Suard, Radaelli et al.) ILL Report 1997**

Charge ordering ? Stripes or no stripes ? GMR Mechanism? Magnetic structure ?



# Super D2B - high resolution powder diffractometer

- More detectors (x2)
- Bigger detectors (x3)
- More efficient monochromator (x2)
- Smaller samples
- Higher resolution
- Faster T, P scans



# Super D2B - high resolution powder diffractometer

- More detectors - 128 high pressure He3 tubes of 2 cm diameter  
High resolution collimators reduced from 20mm to 12mm width  
Similar collimators already produced - commercially available.
- Bigger detectors - 300 mm high detectors & collimators as already used for incident beam, replacing 100mm detectors/collimators.  
Again, such detectors are commercially available.
- More efficient monochromator - horizontal focussing as well as vertical focussing.  
Separate from the detector replacement. Requires development.



# Super D2B - high resolution powder diffractometer

## What will it Cost ?

- Each collimator+detector would cost ~ 30 kFF: total 3.8 MF
- New shielding: 0.5 MF
- New mechanics (mainly re-used) 0.5 MF
- Eventually new monochromator (separate from det.) 1.5 MF
- Total cost 4.8 + 1.5 MF

