

Super-D2B or D not-to-be ?



Emmanuelle Suard & Alan Hewat, Diffraction Group, ILL.

What new science will be possible ?

- A factor of x6, small samples, new materials, high pressure...
- Highest resolution, subtle transitions, magnetic/elect order...

What do we propose, & what will it cost ?

- A pseudo-2D, very high resolution detector array
- Collimators 1.25 MF, linear PSDs 1.25 MF, shielding 0.5 MF

Principal UK Supporters of the Proposal



- John Finney (London)
- Paul Attfield (Cambridge)
- Peter Battle (Oxford)
- Colin Greaves (Birmingham)
- Peter Hatton (Durham)
- Kosmas Prassides (Sussex)
- Simon Redfern (Cambridge)
- Keith Ross (Salford)
- Kurt Ziebeck (Loughborough)

Provenance of the Proposal



- ILL Management Board recommendation for 2001 funding
- Alpha+ rating by ILL Instrument Committee (Ch.de Novion et al)
- 1st priority of ILL Magnetism College (R. Cywinski et al)
- 1st priority of ILL Crystallography College (W. Kuhs et al)
- Recommended by 1999 external review of ILL instruments
- Supported by a large group of UK principal investigators

International Support for the Proposal



R. Cywinski Magnetism College Chairman

"The subcommittee expressed its strongest support for the super-D2B high-resolution diffractometer upgrade... the principal advantage of the proposed order of magnitude increase in intensity would not be that more experiments could be performed, but that new science would ensue".

W. Kuhs Crystallography College Chairman.

"Over one hour was devoted to the discussion...the highest priority was given ex aequo to Thermal LADI and the D2B upgrade. Both proposals were considered of outstanding quality, both in its scientific case and its technical feasibility".

Ch. de Novion Science Council Powder Review

"The super-D2B upgrade project, presented within the new ILL Millennium Programme, was considered as a first priority, in particular the new (and higher) detector set. This would allow to use routinely the D2B instrument in its highest resolution mode".

M. Latroche Crystallography college chairman.

"Our research group has shown the complementarity between neutron and synchrotron techniques by solving complex structures using joint refinement... from D2B and BM16 at ESRF. These structures cannot be solved from synchrotron data alone, and neutron data were essential..."

R. Cywinski further wrote in October 1999

"The subcommittee expressed its strongest and unequivocal support for the super-D2B high resolution diffractometer upgrade". "Several Experiments proposed during this round underlined the need for both high resolution and high count rate".

The super-D2B proposal (300K sterling)



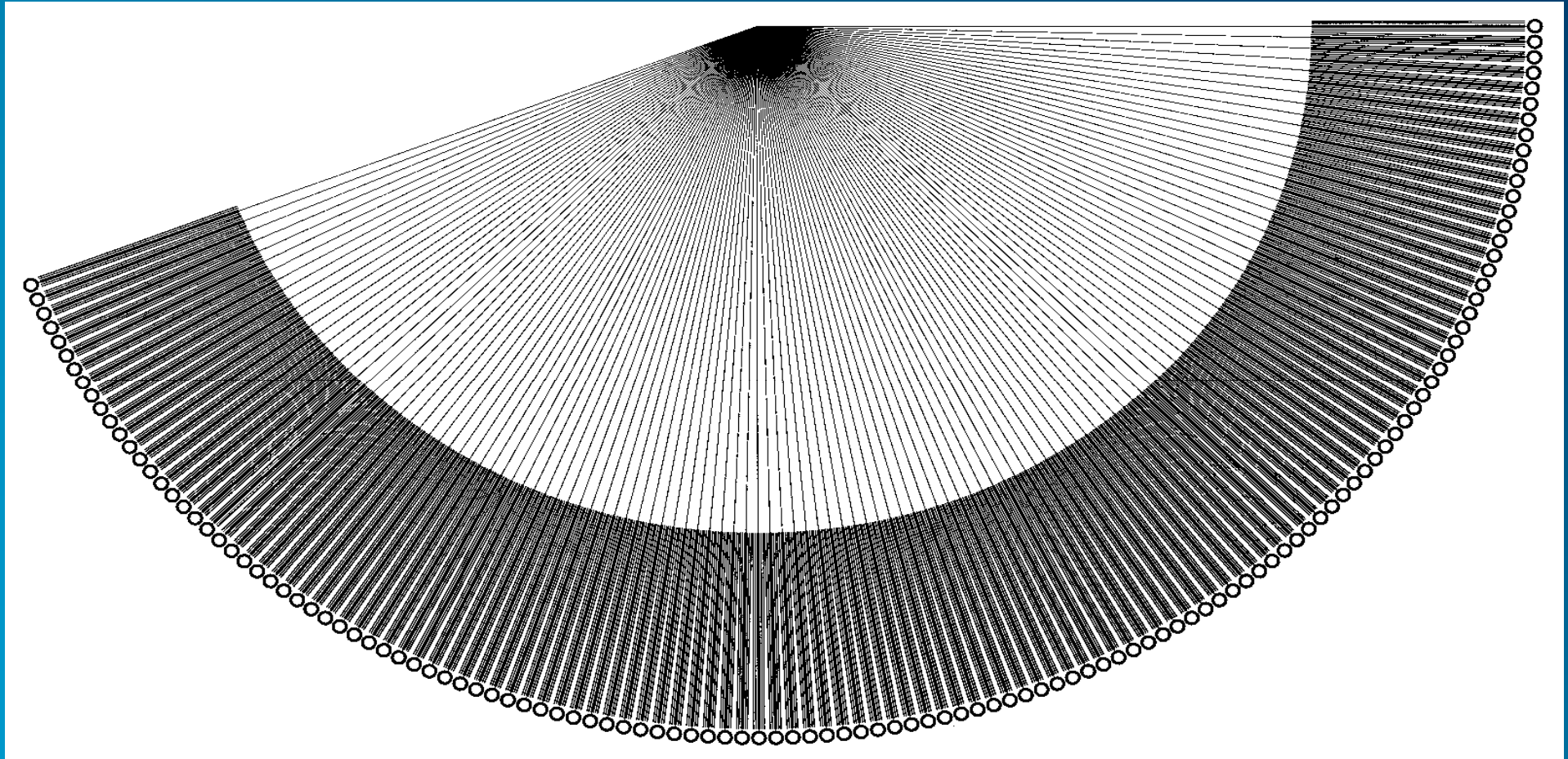
A large array of linear-wire detectors & fine collimators

- 128 high resolution collimators (Eurocollimators, Cheltenham)
- 128 linear wire detectors (Reuter-Stokes & RAL)
- New detector protection
- Total 300K pounds for stage 1 - 300K for an optional stage 2



The super-D2B proposal (300K sterling)

A large array of linear-wire detectors & fine collimators



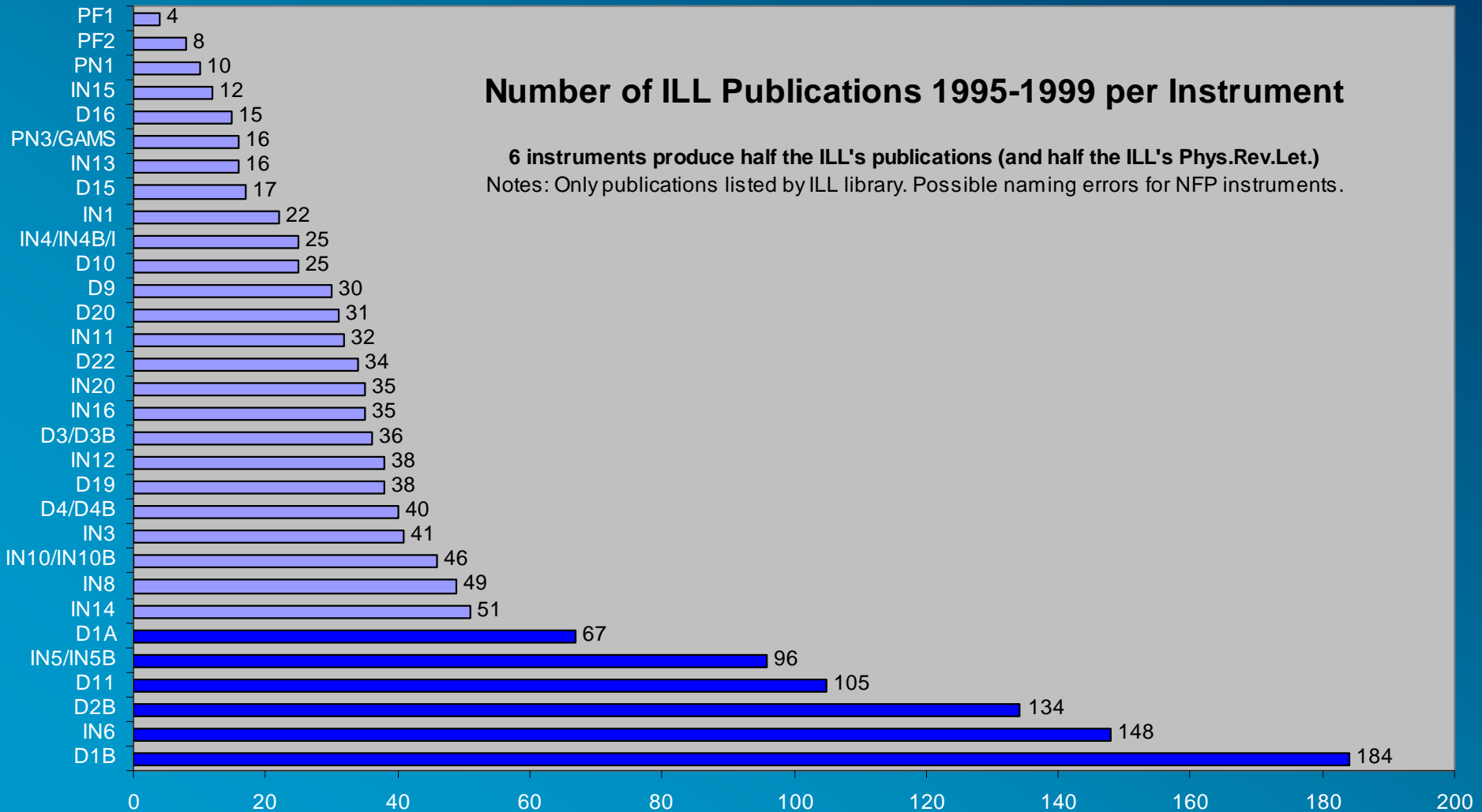
- 2D detector allows both high efficiency & high resolution

Whole Life Costs and Responsibility

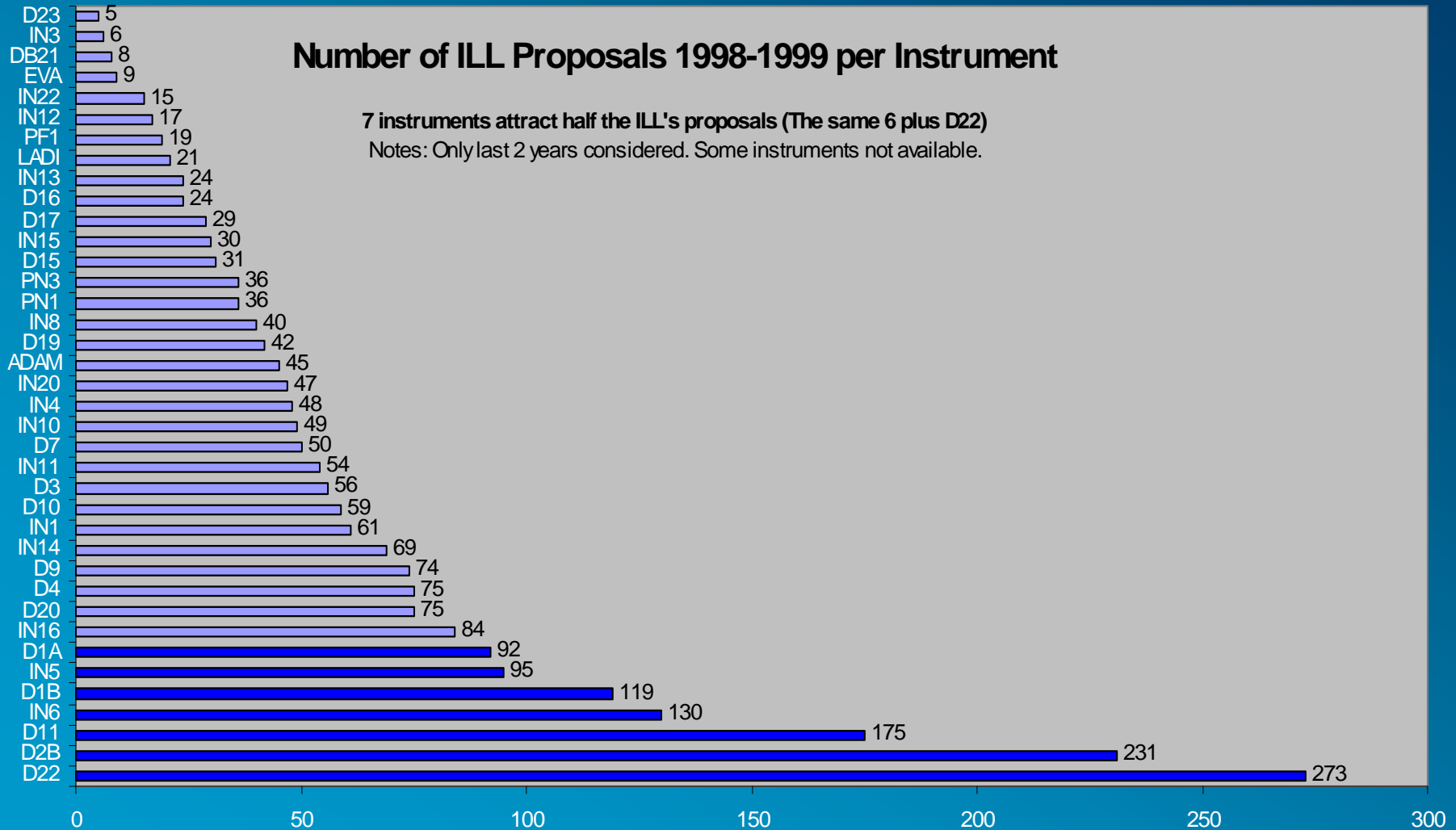


- Operation of D2B is 100% funded by ILL, and this will continue (no extra long term funding required, either in money or manpower)
- But 3 MFF capital investment is needed for the new super-D2B detector (most of which would be spent in the UK)
- A further 3 MFF investment in neutron optics for an optional stage 2 (an option independent of the x6 detector, giving a further gain of at least x2)
- The project has strong support from the German & French communities (possibility of some French funding, backed by leading French chemist Raveau)
- Super-D2B would be available to the entire user community (the UK chemistry & physics communities are particularly strong in this area)
- Super-D2B would be seen as a unique contribution of the UK (in an area where the UK is seen to be leading)

Are we building machines that people want to use ?



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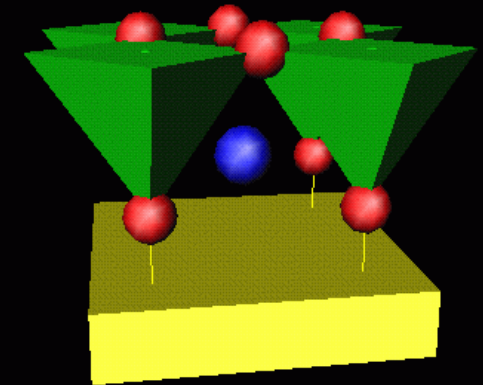
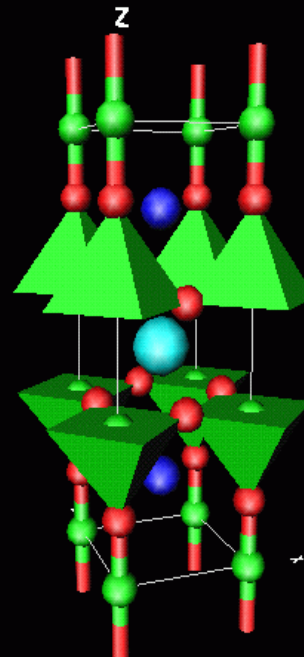
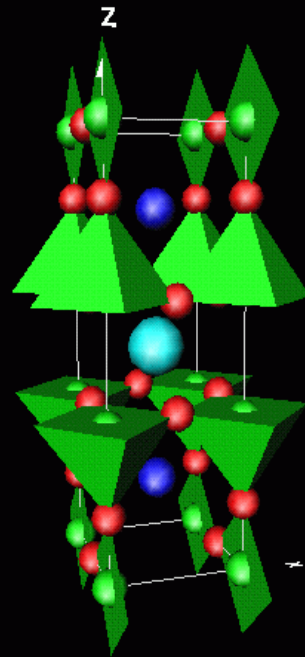
Neutron Powder Diffraction

Essential technique for new materials



Most cited ILL paper - "charge reservoir" concept in oxide superconductors
- lead to a successful search for new materials

- Superconducting phase
- Non-superconducting phase
- Charge Reservoir



- Cava, Hewat et al. (1990). *Physica C*. 165: 419

Complementarity with ISIS



- **EPSRC has recently spent x10 as much on GEM at ISIS**
How does the super-D2B project compare ?
- **GEM (GEneral purpose Machine)**
 - liquids, structure, chemistry etc
- **ILL strategy is different (dedicated no-compromise machines)**
 - New D4 for liquids
 - New D20 for in-situ chemistry (high flux, very fast)
 - New D2B for very precise measurements (high resolution)