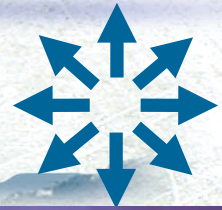
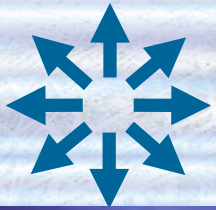


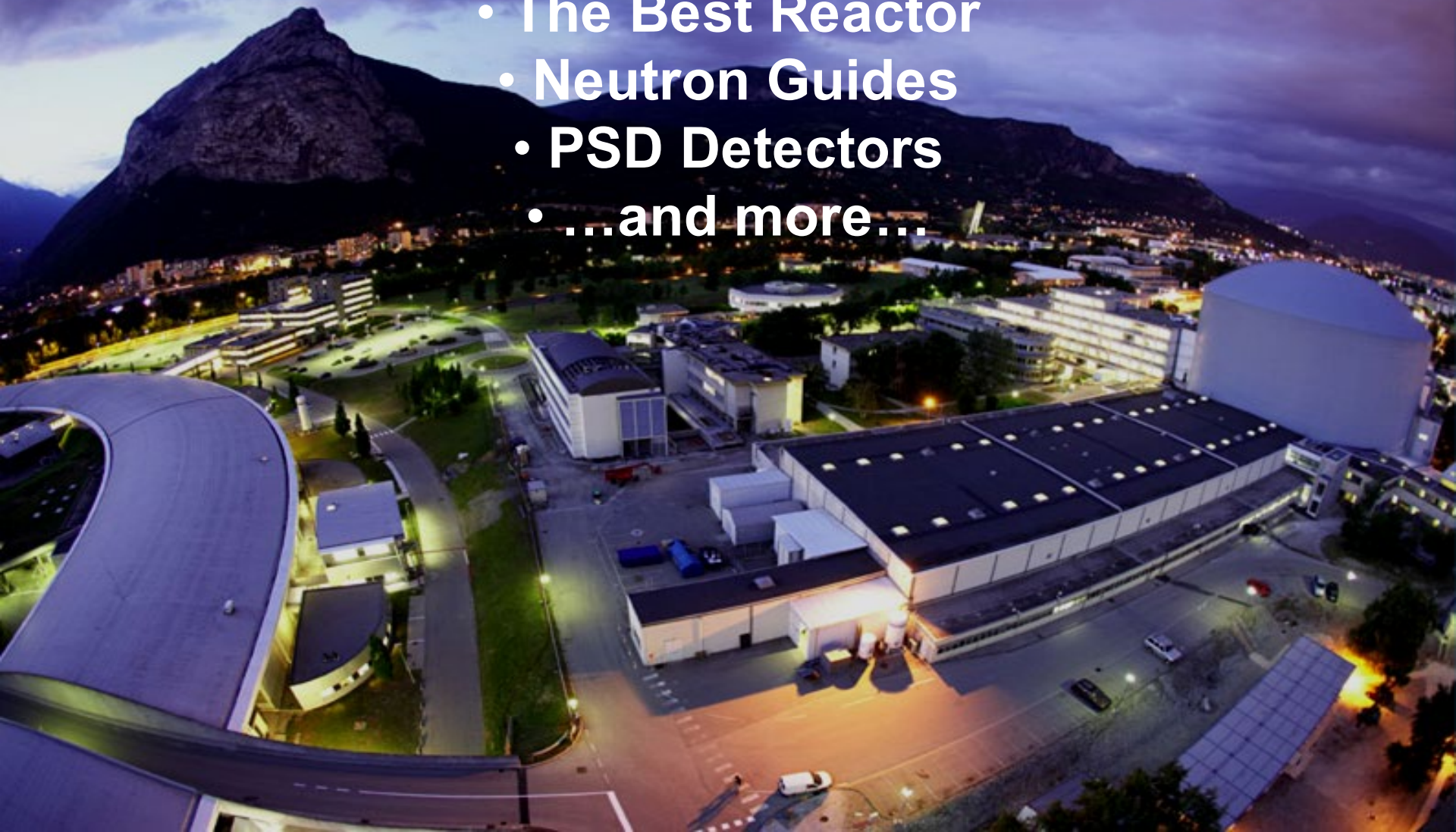
The UK Contribution to ILL since 1973

Alan Hewat, ILL and NeutronOptics Grenoble



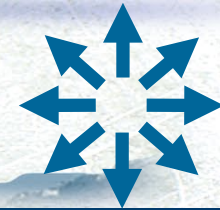
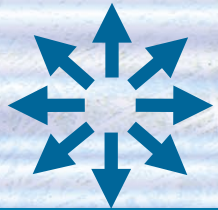
The French and German Contributions

- The Best Reactor
- Neutron Guides
- PSD Detectors
- ...and more...



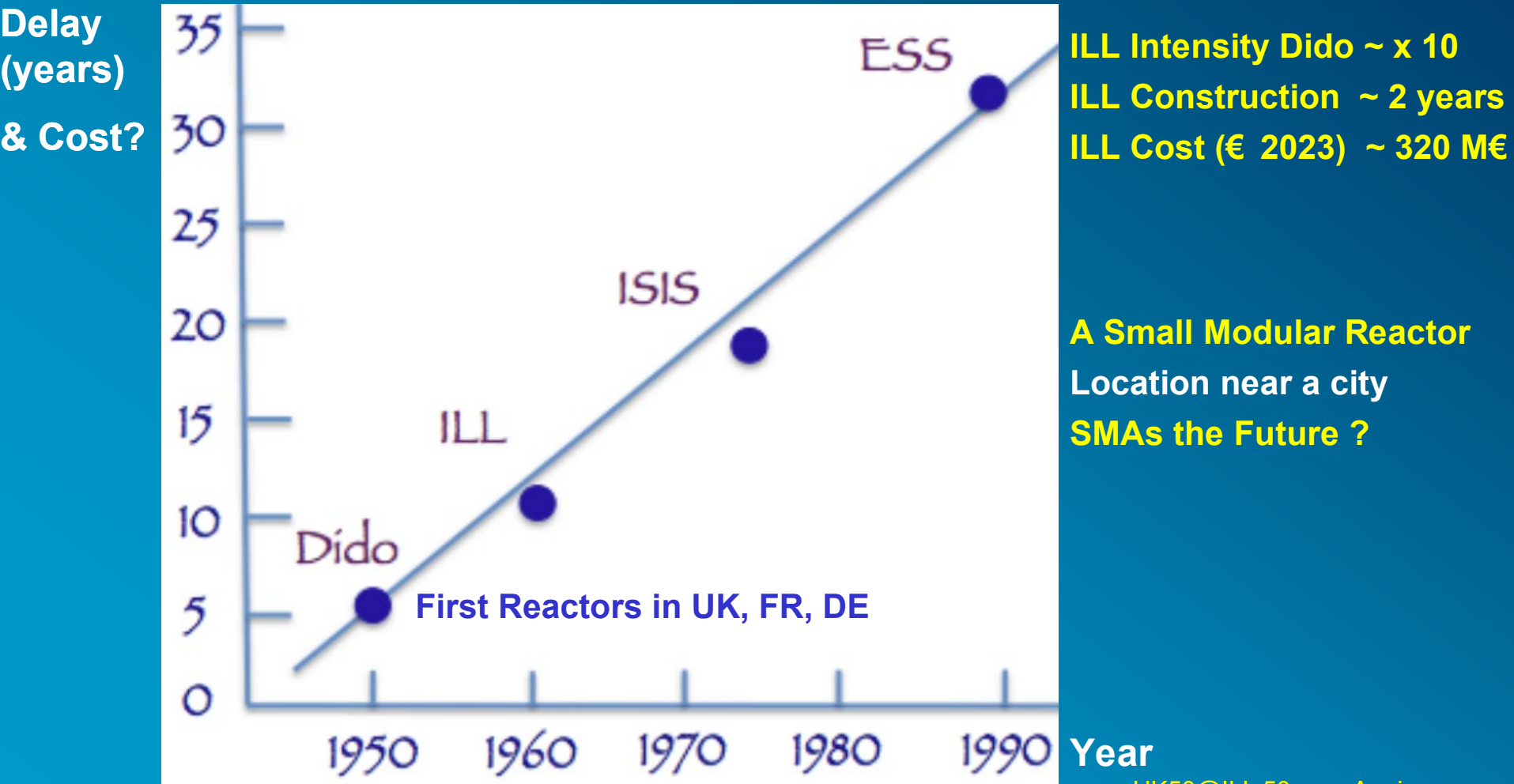
The UK Contribution to ILL since 1973

Alan Hewat, ILL and NeutronOptics Grenoble



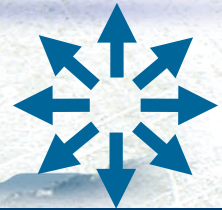
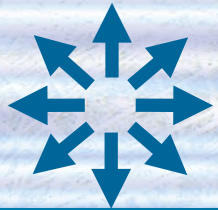
Neutron Sources - the Time it Takes & the Cost

K Andersen & C Carlile 2016 – Egelstaff's Rule of Increasing Delay



The UK Contribution to ILL since 1973

Alan Hewat, ILL and Neutron Optics Grenoble



What's left for the UK Contribution – in 10 minutes ?

1972 – I was working at Harwell – with **Joe Zaccai** (the next speaker)

ILL Director Mossbauer visits – Wants to change the ILL's emphasis

Unique in the World → Useful for University Users

The UK had the world's first Neutron User system (after Australia)

The UK Contribution was the University User system

User demand -> better instruments (x100 to x1000 efficiency c.f. x10 source intensity)

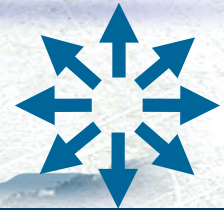
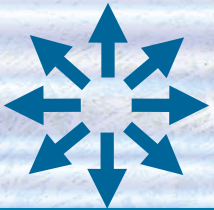
Huge increase in scientific output → User System copied by all neutron labs.

Increased budget for instrument improvement – “2nd Souffle” J White, B Fender

Instrument Improvement more Important than Source Flux

The UK Contribution to ILL since 1973

Alan Hewat, ILL and Neutron Optics Grenoble



My First ILL Job – D2B – Mission Impossible

1973 – I was recruited to ILL from Harwell (UK Director - Mick Lomer from Harwell)
My job was to build a new **high resolution diffractometer D2B** (Brian Fender)

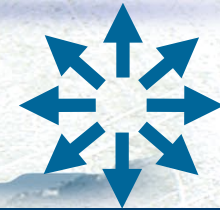
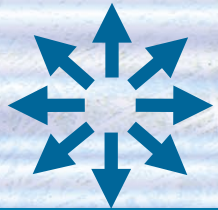
But soon after I arrived - a meeting of the ILL Science Council

- | | |
|------------------|---|
| Abragam | Asked for the price of the six hexapole sections for the spin echo spectrometer |
| Mössbauer | Gave a figure of 1.6 million... |
| Bertaut | Asked for explanations of the plans for D2B |
| Lomer | The proposed D2B plan... would be “very difficult”...
“For the time being” the idea should be abandoned... |
| Mössbauer | Reported on ultra-cold neutrons... quoted some examples... |

D2B was NOT to be

The UK Contribution to ILL since 1973

Alan Hewat, ILL and NeutronOptics Grenoble

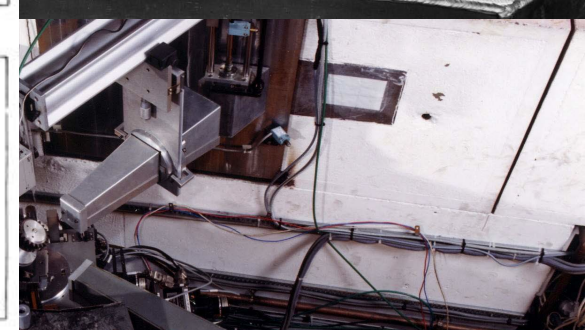
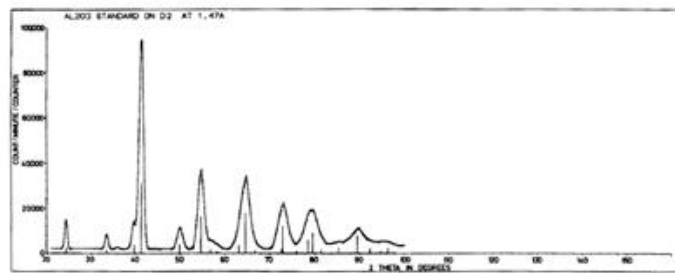
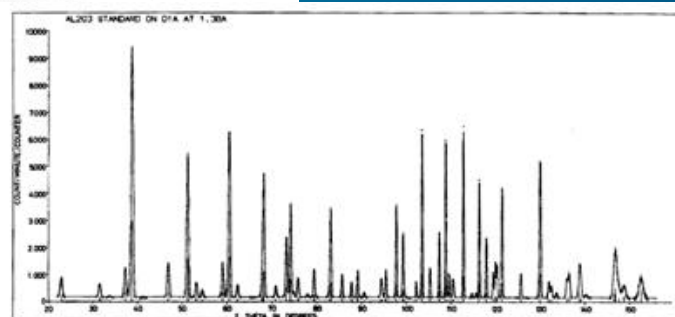


My First ILL Job – L'Impossible n'est pas Française



x500 intensity gain with Ian Bailey (1975)

- ILL Focussing Monochromators x5 (Andreas Freund)
- Rutherford Lab Mylar Collimators x4x25 (Colin Carlile)

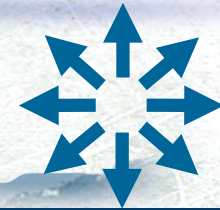
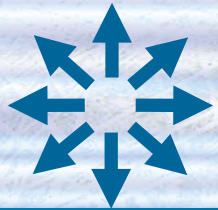


Original D1A detector (1975)

- Report: Hans Dachs & B Forsyth
- Very high resolution
- Very low intensity - **Unusable**
- My first ILL job – **Make it work** (3 year contract)

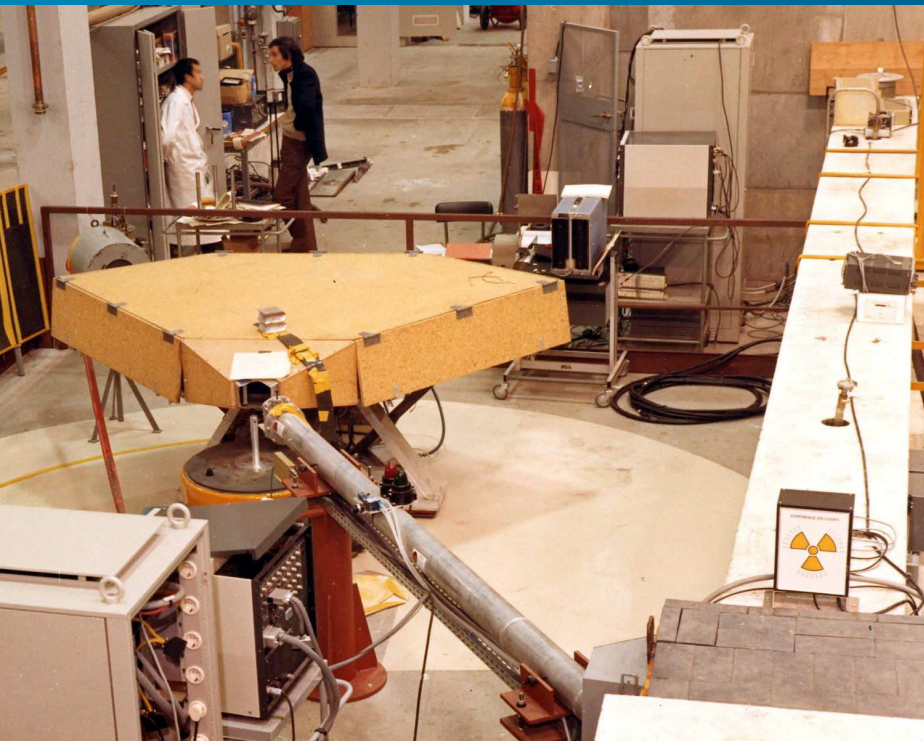
The UK Contribution to ILL since 1973

Alan Hewat, ILL and NeutronOptics Grenoble



x1000 gains in instrument performance to satisfy users

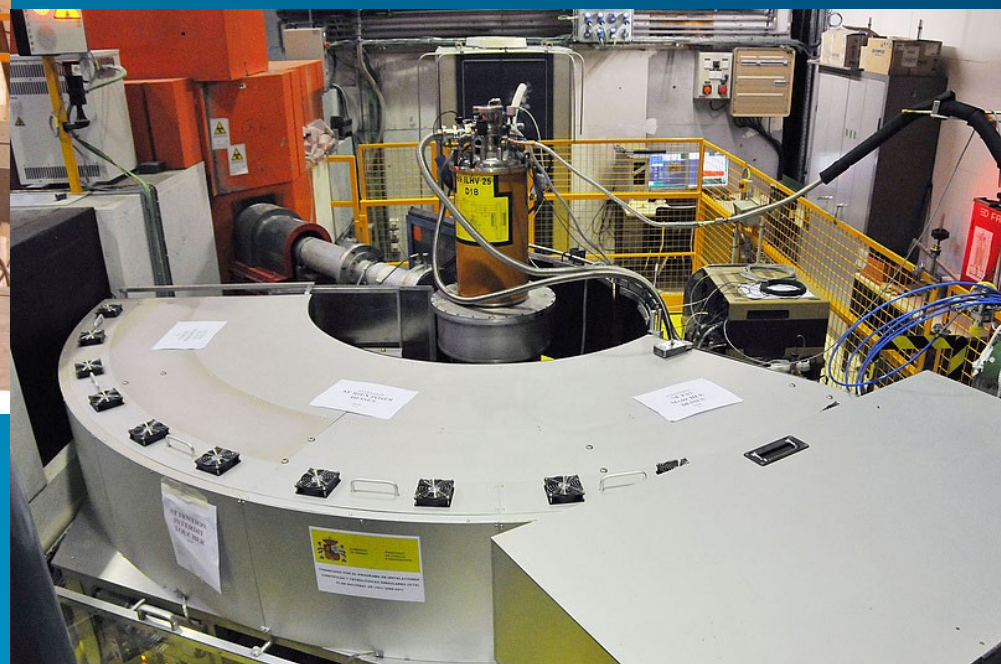
The CEA/LETI development of Position sensitive Neutron Detectors



Original D1B detector (1973)

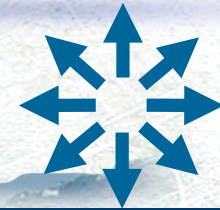
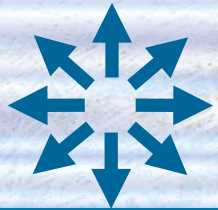
CEA PSDs E Roudaut, R Allemand, J Jacobe
Pierre Convert (1970) ILL BF3 “banana”

**New He3 D1B (Convert, MICINN)
x100 intensity gain**



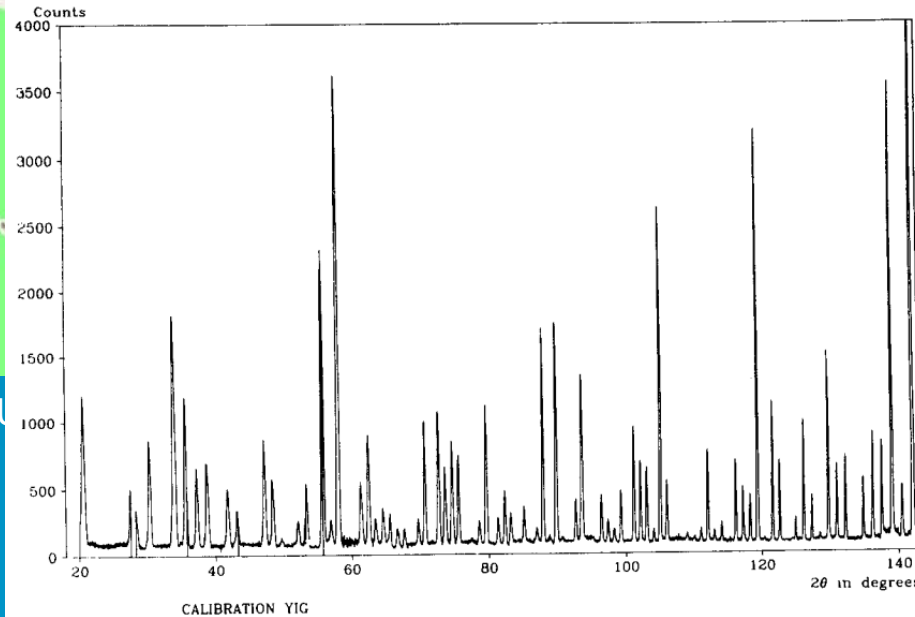
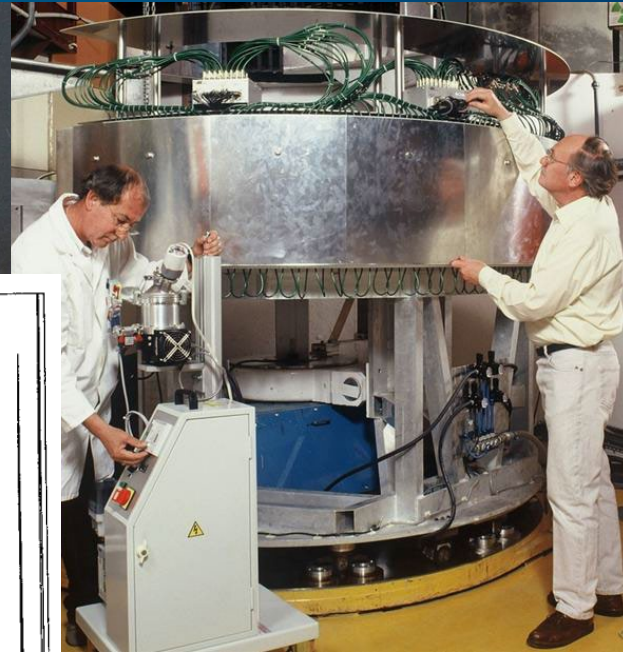
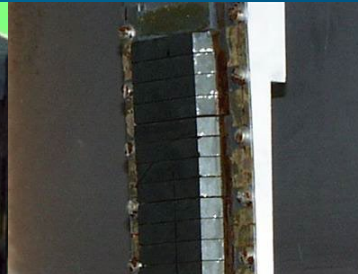
The UK Contribution to ILL since 1973

Alan Hewat, ILL and NeutronOptics Grenoble



ILL 2nd Souffle – First UK Director, John White

D2B 1980 + 2003 Paul Attfield EPSRC grant - 128 Mylar Collimators, He3 Linear PSDs



X128 EuroCollimators (U

ster Cross, Alan Hewat on D2B

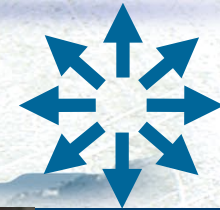
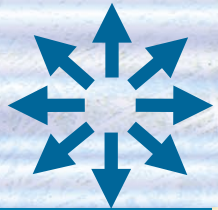
Brian Fender 1973 project, delayed 7 years by “budget priorities”

John White † 15Aug23 with Jenny Stirling
1st UK Director at UK50@ILL lunch, 15June23, Grenoble



The UK Contribution to ILL since 1973

Alan Hewat, ILL and NeutronOptics Grenoble



4 π Position Sensitive Detector-Laue Diffraction The Hedgehog Multi-Detector

B. Klar, 9th Int. Congr. of Crystallography, Kyoto (1972)

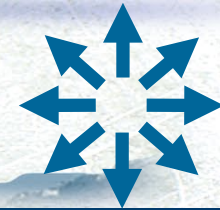
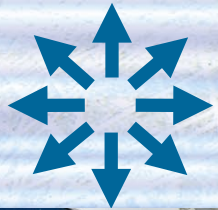


"Ingenious, but Impractical – Use a PSD"

R. Mossbauer (1975)

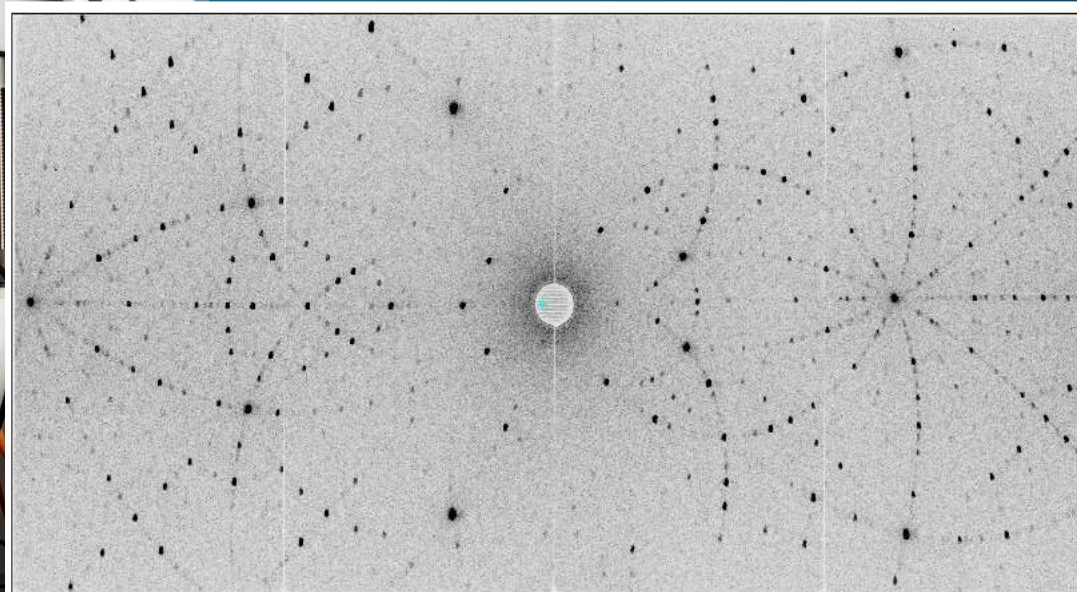
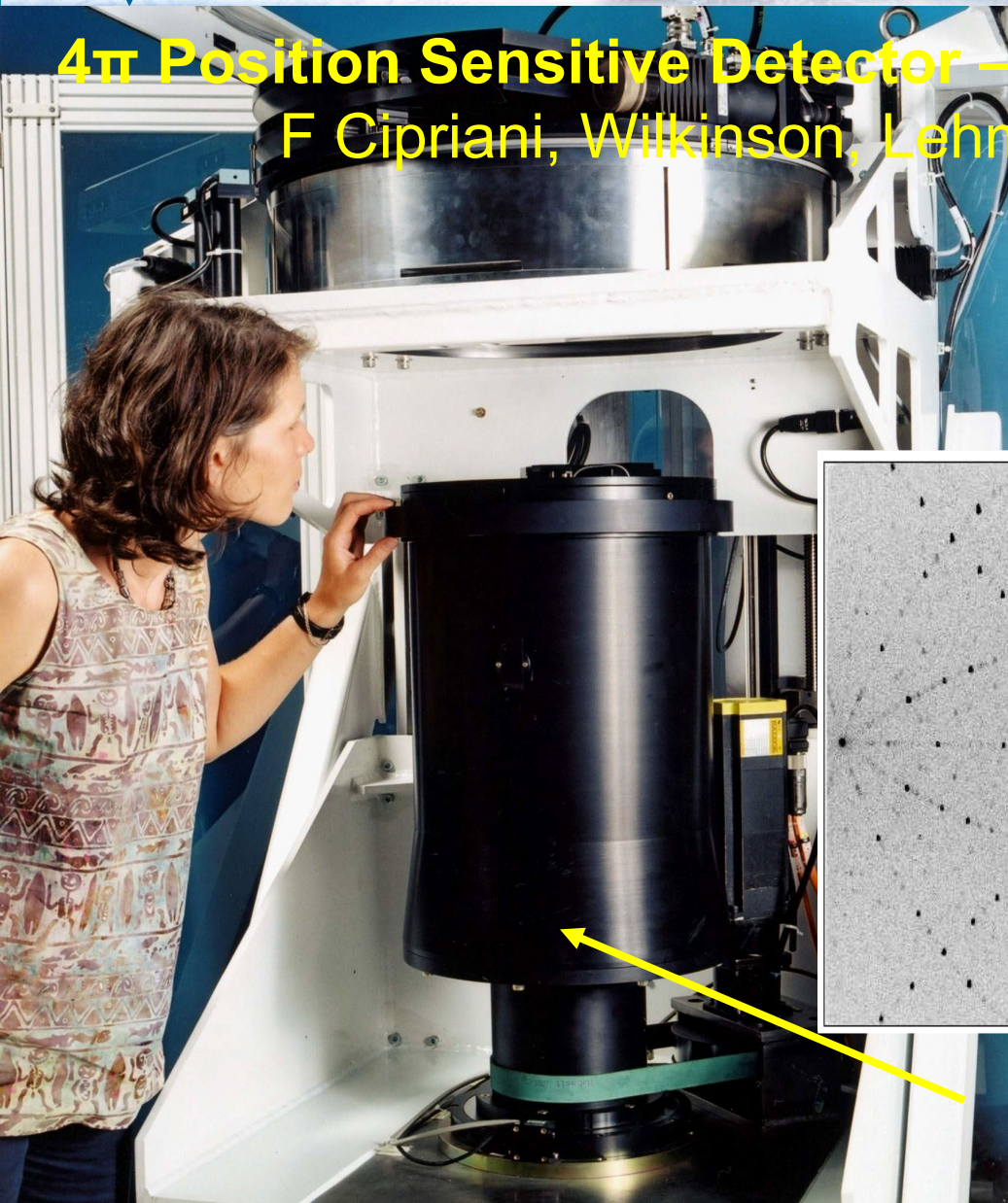
The UK Contribution to ILL since 1973

Alan Hewat, ILL and NeutronOptics Grenoble



4 π Position Sensitive Detector – LADI (1996) Vivaldi (2005)
F Cipriani, Wilkinson, Lehmann, McIntyre et al.

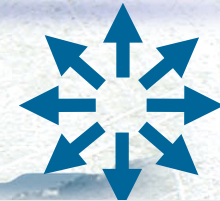
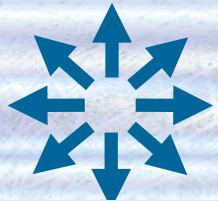
Neutron Image Plate (NIP)
High Resolution 2D - PSD



NIPs inside cylinder, Laser readout

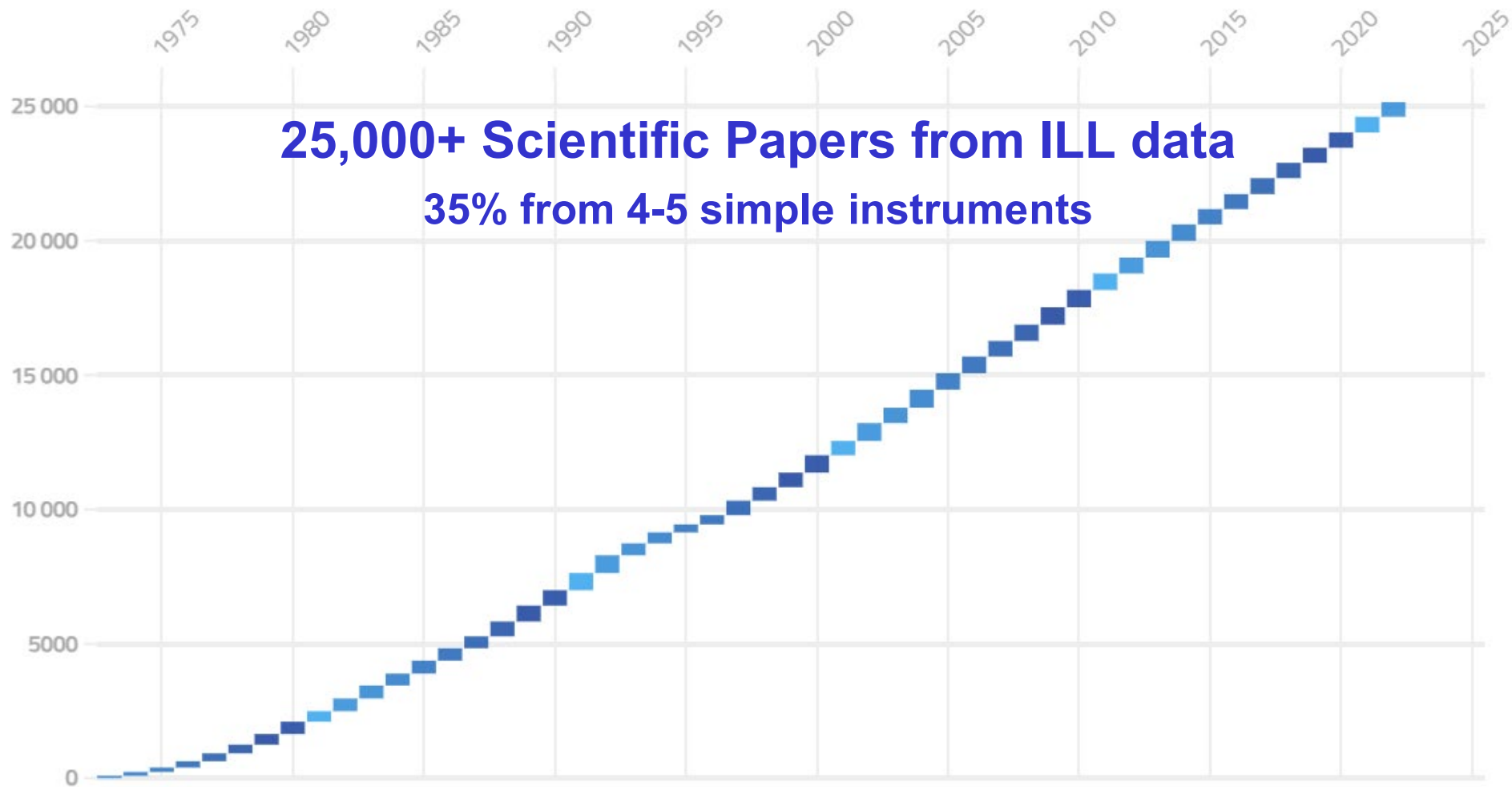
The UK Contribution to ILL since 1973

Alan Hewat, ILL and NeutronOptics Grenoble



Cumulative number of scientific publications at the ILL

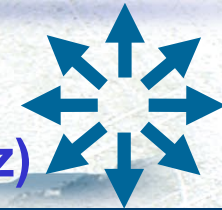
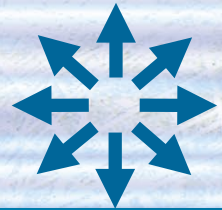
25 159 publications registered in the ILL library since 1973



The UK Contribution to ILL since 1973

Alan Hewat, ILL and NeutronOptics Grenoble

ILL Impact - Most Cited ILL Papers (Fischer & Rodriguez)



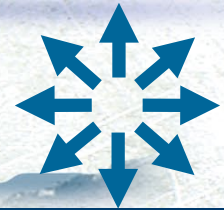
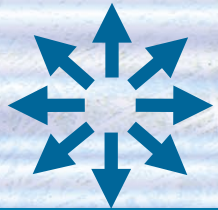
Instrument	Pubs 2007-'16	All Cites 2007-'16	100+Cites 2007-'16	100+Cites to 2016	Note	Instrument	Pubs 2007-'16	All Cites 2007-'16	100+Cites 2007-'16	100+Cites to 2016	Note
DIFFRACTION						INELASTIC					
D1A powder	266	3207	3	28	Closed	BRISP TOFSANS	25	203	0	0	Closed
D1B powder	476	4202	6	39	CRG	IN4 Thermal TOF	135	1721	2	8	Closed
D2B powder	543	7262	6	58		IN5 TOF	194	3005	1	21	
D20 powder	383	4801	3	24		IN6 SHARP TOF	226	3850	5	40	CRG
XtremeD pressure					New CRG	IN10 TOF	78	971	0	16	Closed
SALSA strain	160	1198	0	0		IN13 TOF	124	1780	2	18	CRG
D4 Liq/Amor	129	1804	1	34	50%	IN16B TOF	150	2242	2	8	
D3 Hot polar	50	437	0	4		IN11 SpinEcho	64	992	1	14	
D7 Cold Diffuse	62	1035	2	4		IN15 SpinEcho	73	1325	1	3	
D9 Hot Single-X	52	476	0	10		WASP SpinEcho					New Test
D10 Single-X	67	1150	2	12		IN3 3-axis Test	28	235	0	2	Test
D19 Single-X	64	967	1	12		IN1/Lagrange 3Ax	54	467	0	5	50%
D23 Single-X	59	865	0	2	CRG	IN8 3-Axis	86	1944	4	18	
VIVALDI	59	717	1	2	Closed	IN12 3-Axis	69	1275	2	11	
OE+CYCLOPS					New Test	IN20 3-Axis	74	1290	1	12	
DIFFRACT total	23T0	28121	25	229		IN22 3-Axis	66	1142	0	3	CRG

More Citations for Simple Instruments Unexpected ?

LS STRUCTURE						NUCLEAR PP					
D11 SANS	357	6371	6	71		PF1 Cold Polar	91	916	1	4	
D22 SANS	351	5678	2	20		PF2 UCN	90	1098	1	2	
D33 SANS	32	218	0	0	60%	SuperSUN UCN					Test
D16 Cold LSS	84	1059	0	12		PN1/Lohengrin	75	604	0	1	
LADI(-I,-III) Laue	57	908	0	1		PN2					Closed
DALI Cold Laue					New	PN3/GAMS	17	214	1	4	
D17 Reflect	142	1506	0	33		FIPPS					New
FIGARO Reflect	81	780	0	0	60%	S18 Interferometer	49	483	1	3	CRG
ADAM Reflect	67	603	0		CRG	GRANIT Gravity	34	326	0	0	80%
NeXT imaging					New CRG	NPP total	356	3641	4	14	
LSS total	1171	17123	8	137		ILL total	5393	72813	61	569	

The UK Contribution to ILL since 1973

Alan Hewat, ILL and Neutron Optics Grenoble

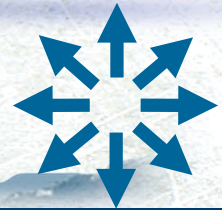
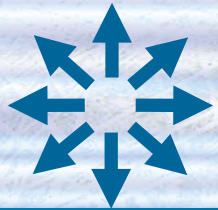


**Only 4 out of 25,000+ ILL Papers with >1000 Citations
All on Simple Instruments**

- D19 - Sax Mason, Judith Howard (EPSRC grant) D11 - Peter Timmins (2nd Souffle)
- D19** ← **Crystal Structure & Hydrogen-Bonding in Cellulose... Fibres**
Yoshiharu Nishiyama, Paul Langan, and Henri Chanzy
(2002) J. Am. Chem. Soc. 124, 9074–9082
- D11** ← **Phase Diagrams & Aggregation Behavior of... Triblock Copolymers..**
G. Wanka, H. Hoffmann, and W. Ulbricht
(1994) Macromolecules 27, 4145–4159
- D2B** **Lattice Effects on the Magnetoresistance in Doped LaMnO₃**
H.Y. Hwang, S-W. Cheong, P.G. Radaelli, M. Marezio, and B. Batlogg
(1995) Phys. Rev. Lett. 75, 914
- D2B** **Structural anomalies, Oxygen & Superconductivity in... Ba₂YCu₃O_x**
R.J. Cava, A. Hewat, E. Hewat, B. Batlogg, M. Marezio...
(1990) Physica C: Superconductivity 165, 419-433

The UK Contribution to ILL since 1973

Alan Hewat, ILL and NeutronOptics Grenoble



The UK Contribution was the University User system

User Demand → Instrument Investment

Instrument Investment >> Source Flux

Simple Instruments → Most Papers & Citations