

NEUTRON BACKSCATTERING AT NIST

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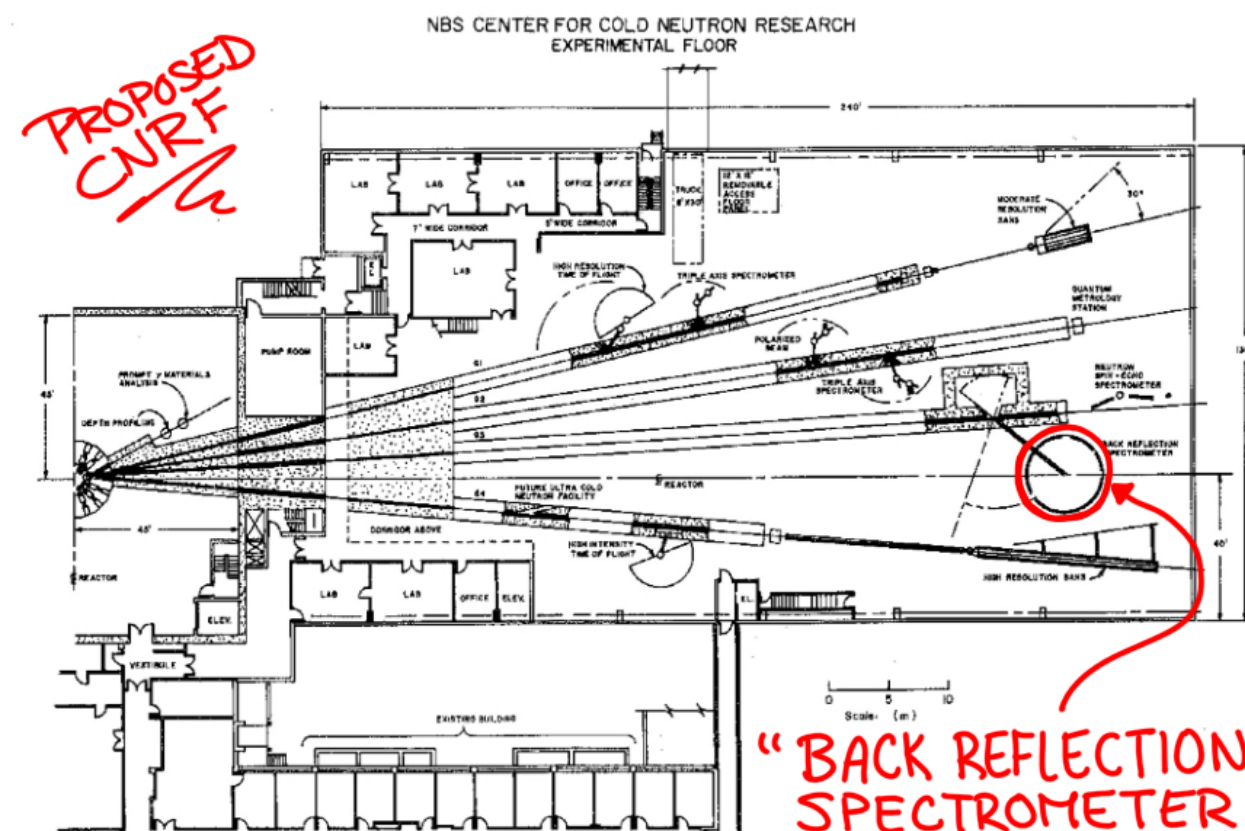
Origins

1970's & 80's

EUROPE MAKING REMARKABLE PROGRESS IN COLD NEUTRON RESEARCH. U.S. LAGS.

1984

MIKE ROWE PRESENTS IDEA FOR CNRF TO SEITZ-EASTMAN COMMITTEE

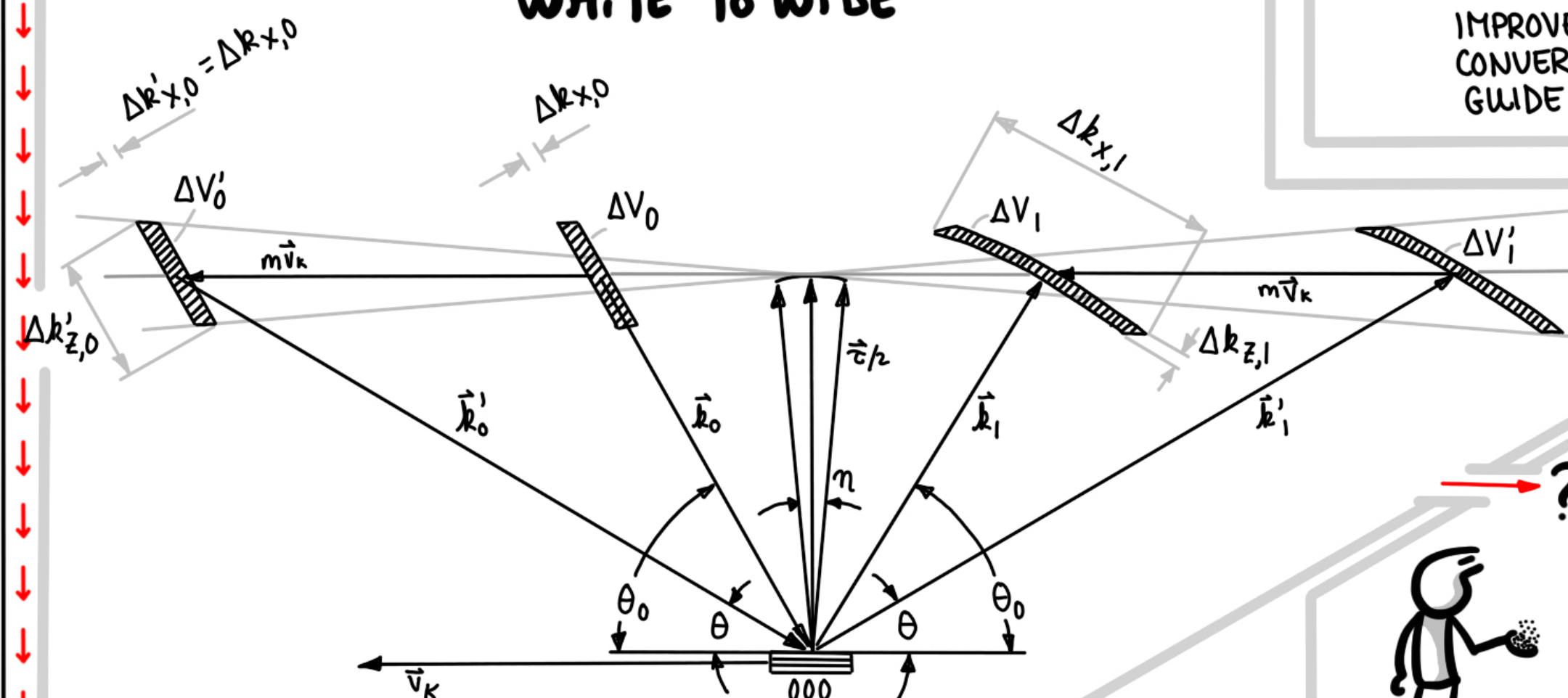


"BACK REFLECTION" SPECTROMETER

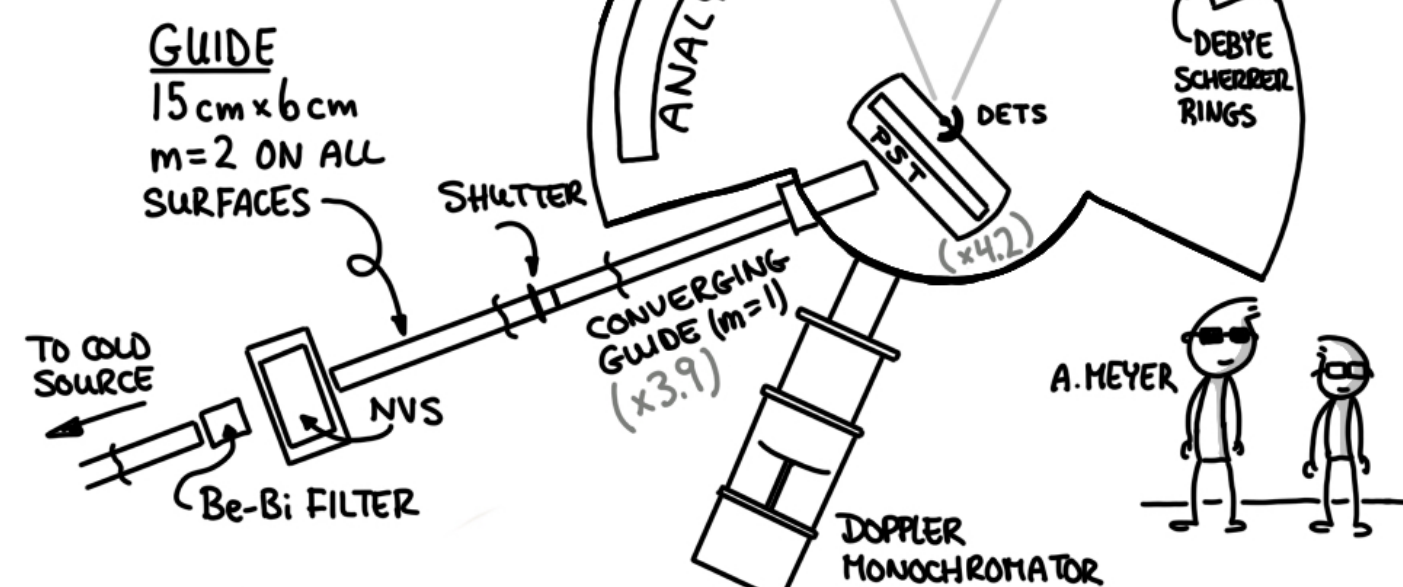
1984

SCHULTEN & ALEFELD PUBLISH IDEA FOR THE PHASE SPACE TRANSFORMER (PST)

"WHITE TO WIDE"



INSTRUMENT CHARACTERISTICS

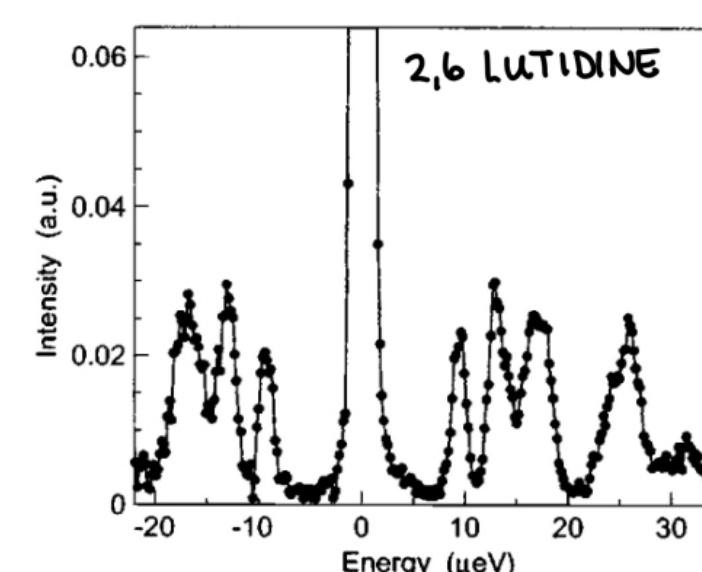


$$\lambda_0 = 6.271 \text{ \AA}$$

ΔE (meV)	ΔE (FWHM meV)
± 11	0.79
± 17	0.83
± 36	1.04

$$\Phi = 3.5 \times 10^5 \text{ n/cm}^2/\text{s}$$

AT BEAM CENTER



1999 FIRST USER EXPERIMENT

Status & Future

HFBS → NCNR FLAGSHIP
→ ATTRACTED NEW SCIENCE TO NIST
→ KEY INSTRUMENT IN CHRNS
>250 PUBLICATIONS TO DATE

UPGRADE DESIGN IN PROGRESS

IMPROVED CONVERGING + LARGER DOPPLER MONOCHROMATOR = **x2.4**

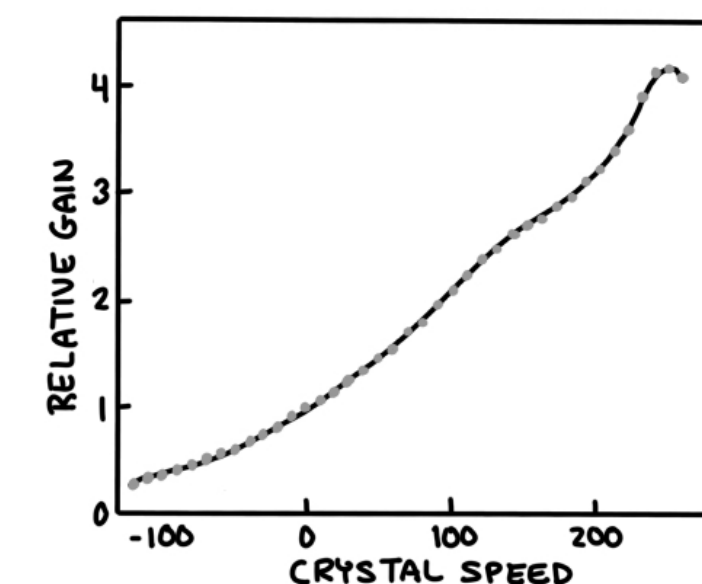
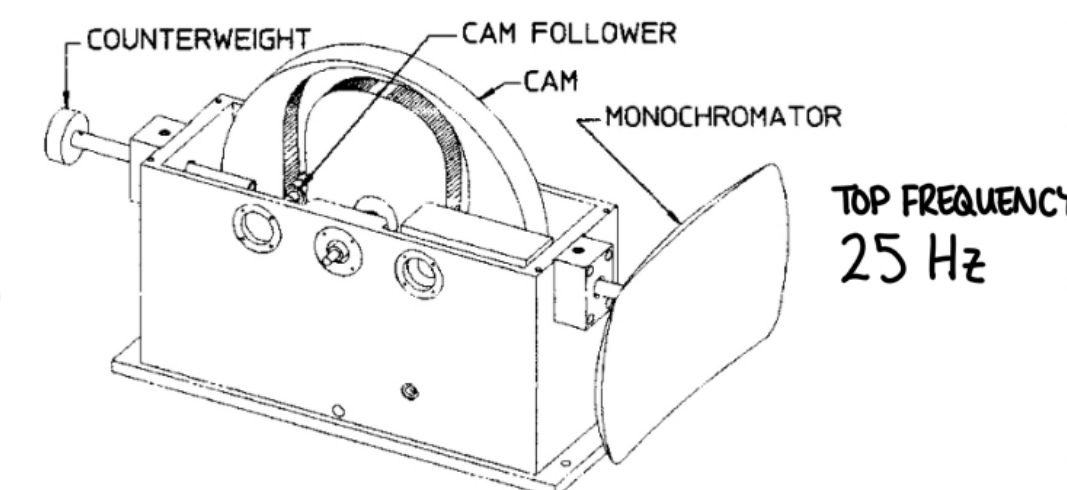
DEVELOPMENT

1987 DAN NEUMANN STARTS AT NIST

1991 ANDREAS MAGERL SHOWS DAN THE REMAINS OF GRAPHITE CRYSTALS USED IN AN EARLY ATTEMPT TO SPIN CRYSTALS

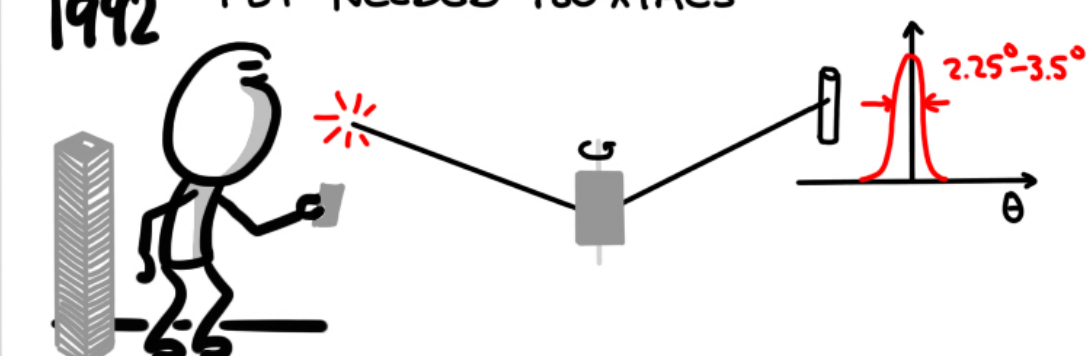
DECISION TO BUILD HFBS

CHRISTOPH BROCKER (MECH ENG) HIRED TO DESIGN HFBS AND MAYBE THE PST



1994 HFBS VACUUM CHAMBER ARRIVES 20.8 METRIC TONS & 26 m³

1996 PETER GEHRING MEASURES ~1900 ROCKING CURVES FOR HOPG AT BNL & NIST
↑
1992 PST NEEDED 180 XTALS



1992 BROCKER DESIGNS ROBUST MOUNTING SCHEME FOR PST X-TALS.

COMPRESSION MOUNTING USED

¹⁰ B EPOXY ABSORBER 2mm	OCT 1992
ZrH PG 1.5mm	LONG, EXTENSIVE
Be 2.5°	TESTS ON A ROTOR
ZrH PG 1.5mm	SHOWED MOSAICITY
5° Be WEDGE	UNAFFECTED BY
ZrH PG 1.5mm	PROLONGED
Be 2.5°	ROTATION
Be RETAINER	

DECISION TO BUILD PST