**Neutron Backscattering at NIST**

**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

1984

Schenlen & Alfeld publish idea for phase space transformer (PST)

"White to Wide"

**Instrument Characteristics**

$\lambda = 6.271 \text{ Å}$

$\Delta E (\text{meV})$ | $\Delta E (\text{FWHM, meV})$
---|---
$\pm 11$ | $0.79$
$\pm 17$ | $0.93$
$\pm 36$ | $1.04$

$\theta = 3.5 \times 10^6 \text{ rad/s}$

At beam center

1999 First User Experiment

**Status & Future**

HFBS → NCNR Flagship

→ Attracted new science to NIST

→ Key instrument in CHINS

→ 250 publications to date

Upgrade design in progress

Improve converging guide + larger Doppler monochromator $= x2.4$

**Development**

1987 Dan Neuhauss starts at NIST

1991 Andreas Hagerl 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

**Decision to Build PST**

1994 HFBS vacuum chamber arrives 20.8 metric tons & 26 m$^3$

1996 Peter Geringer measures ~1900 rocking curves for HPG at BNL & NIST

1992 PST needed 180 x-rays

1992 Brocker designs robust mounting scheme for PST x-rays

Compress mounting used

Oct 1993: long, extensive tests on a boric acid showed feasibility unaffected by prolonged rotation

5° Be wedge

2° Be

Be retainer

58° of neutron backscattering spectroscopy - Institute of Advanced Study - Technische Universität München - September 23, 2014

Sketchnote: Keen