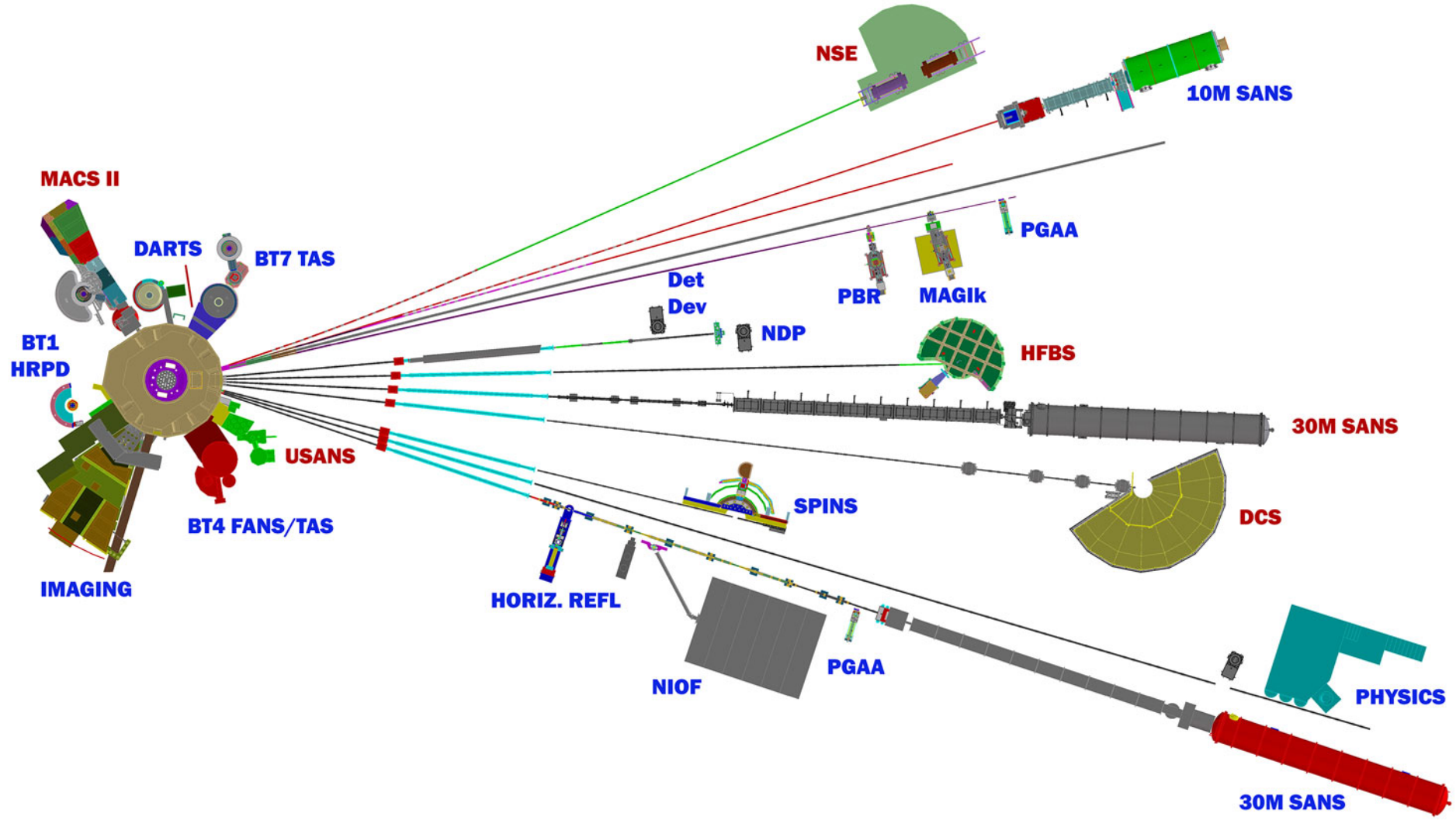
NCNR

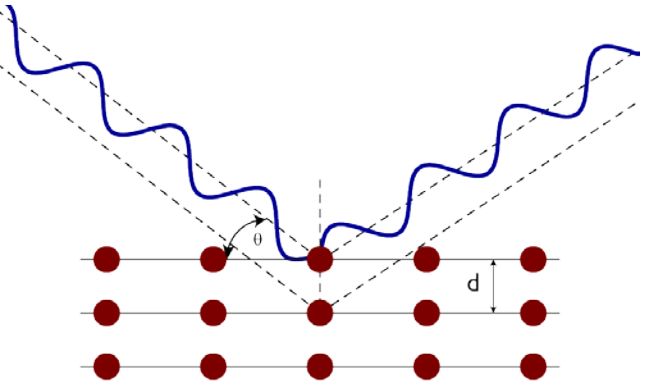
The mission of the NCNR is to assure the availability of neutron measurement capabilities to meet the needs of U.S. researchers from industry, university and Government agencies.



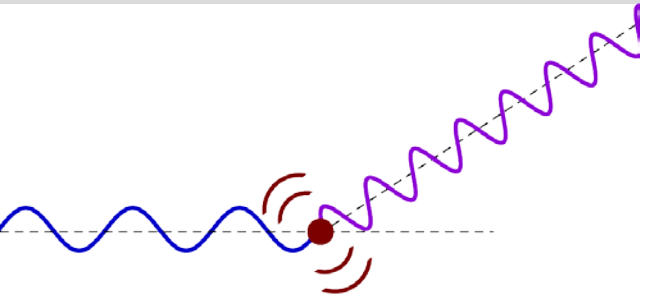
Rob**Dimeo**
Director, NCNR

WHY NEUTRON SCATTERING?

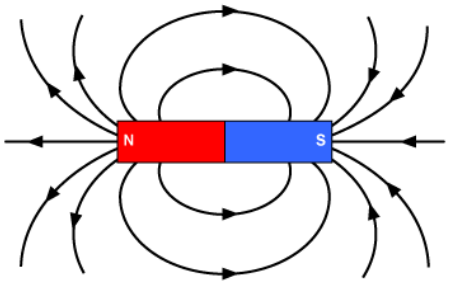
λ ~ interatomic spacing



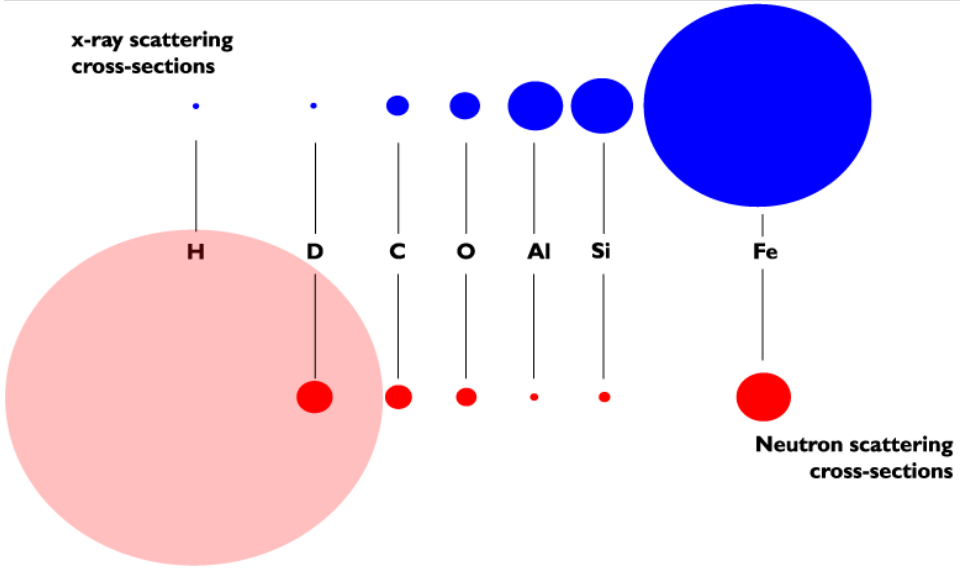
E ~ atomic motion



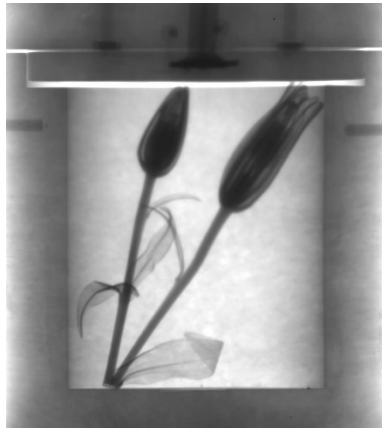
Magnetic

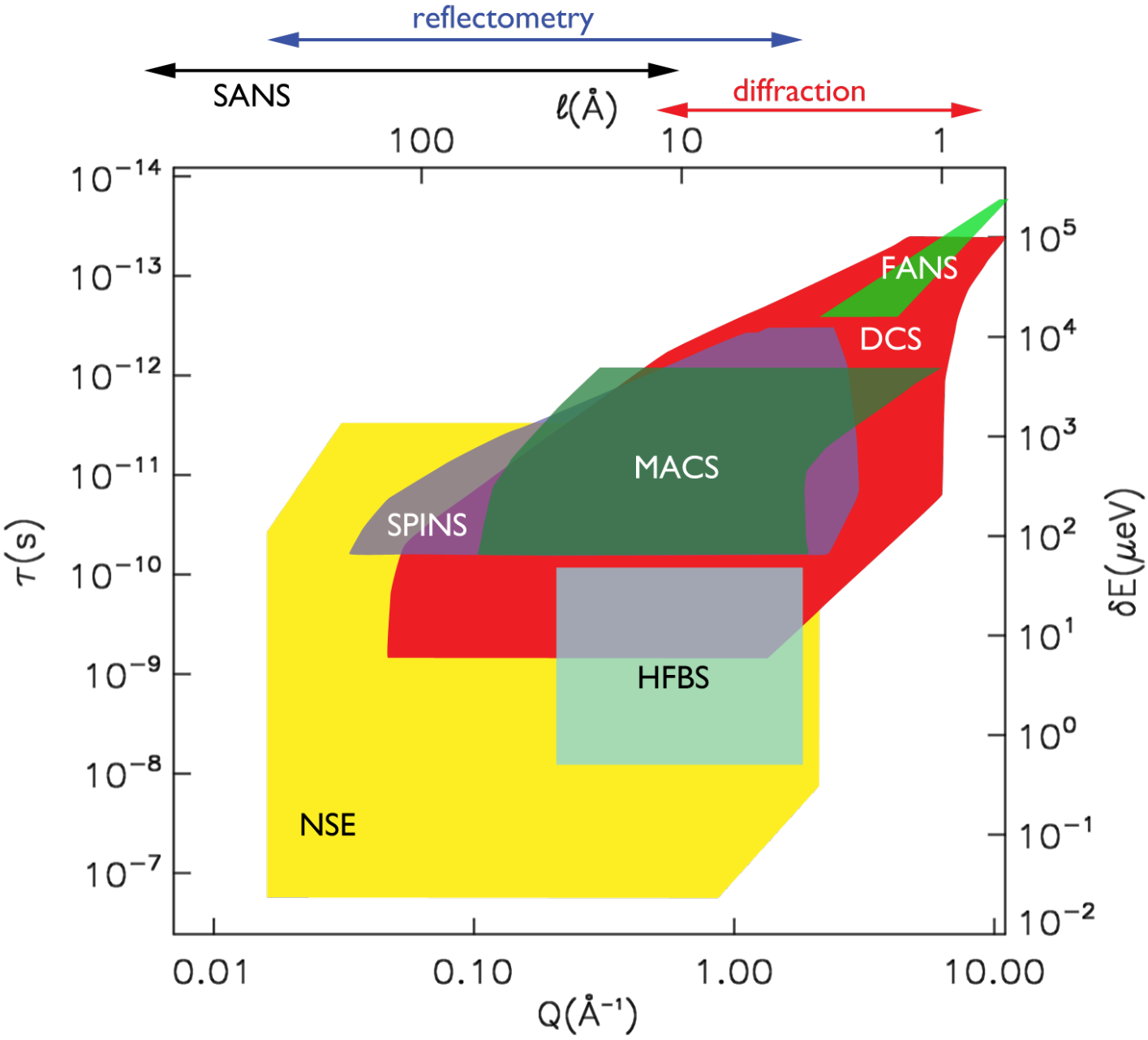


Scattering power varies randomly across the periodic table and from isotope to isotope



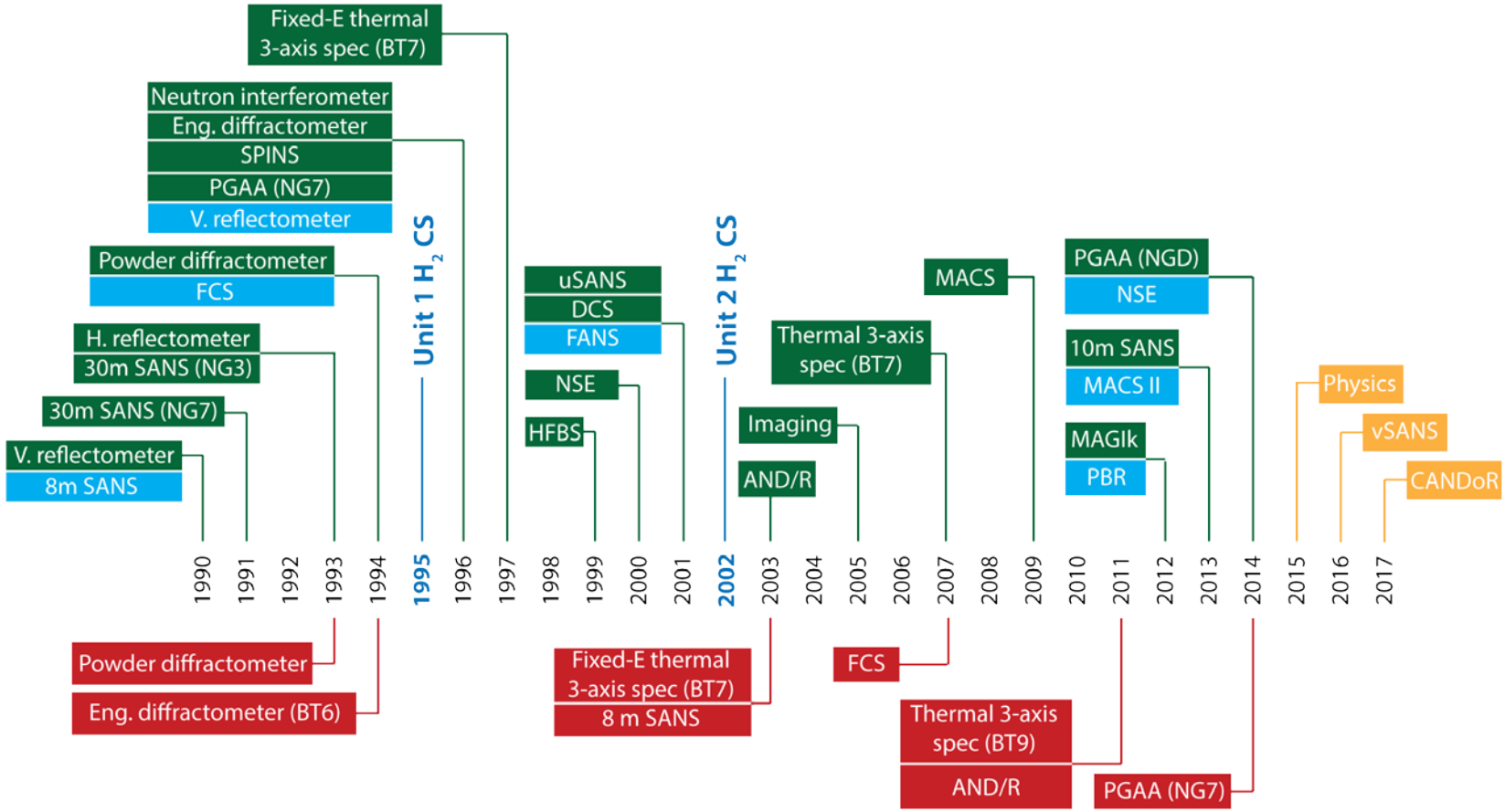
Penetrating




reflectometry
SANS
ℓ(Å)
diffraction
100
10
1
FANS
DCS
MACS
SPINS
HFBS
NSE
τ(s)
δE(μeV)
Q(Å⁻¹)
0.01
0.10
1.00
10.00

NCNR INSTRUMENT TIMELINE

Instrument became available for users
Major instrument upgrade
Projected availability for users
Instrument decommissioned



NCNR ACESS MODES

GENERAL

Based on submission and independent peer-review of beam-time proposals

Preferred mode for non-experts

Attracts larger number of users

Requires robust user support

COLLABORATIVE

Based on submission and peer-review of beam-time proposals

Creates stable, long-term relationships with particular users

High productivity per user

Good for specialized measurement types

PARTNERSHIPS

For development and operations of selected instruments

Control of beam-time: Partners can access as much as 75% of the beam-time (at least 25% goes to General Access mode) depending on contribution

Fixed time period

Expands access to NCNR capabilities

Successful mechanism to develop new instruments

PROPRIETARY

For all measurements in which researcher wishes not to make results public

Full cost recovery charged for beam-time

CONSORTIA

Emphasizes expertise transfer

Can address problems of interest common to consortium members

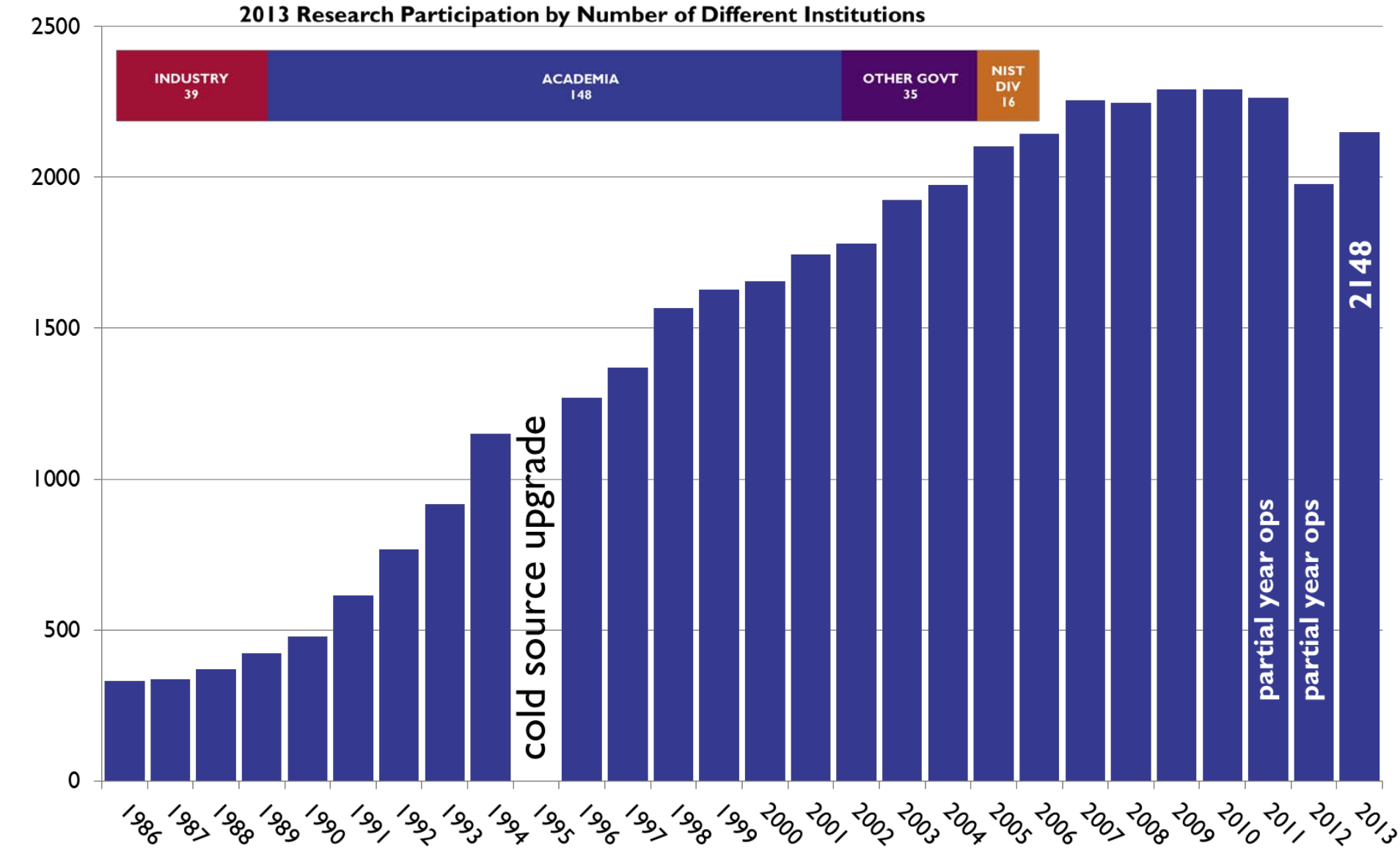
Support collaborative research

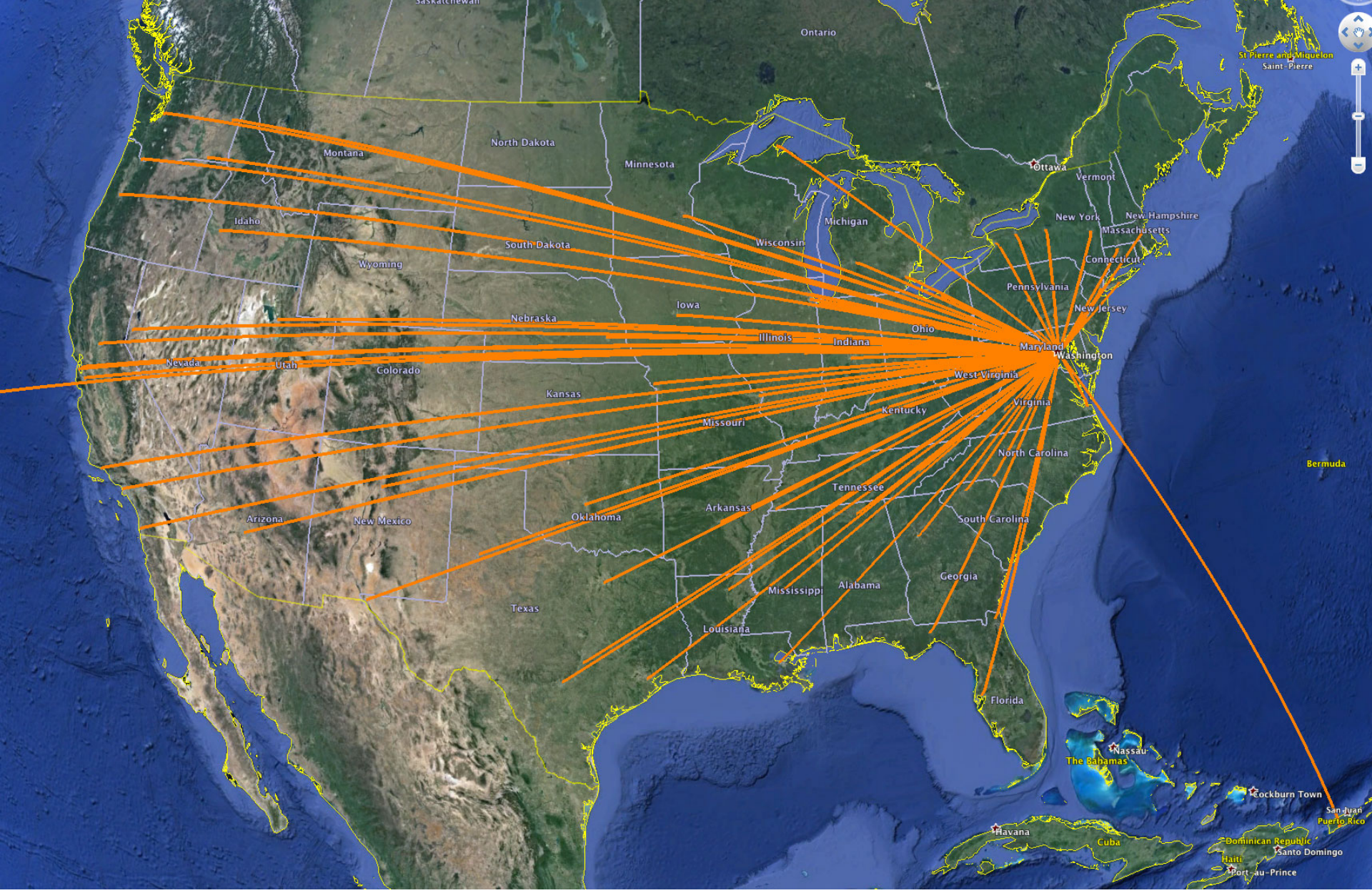
Expands access to NCNR capabilities

NCNR by the numbers

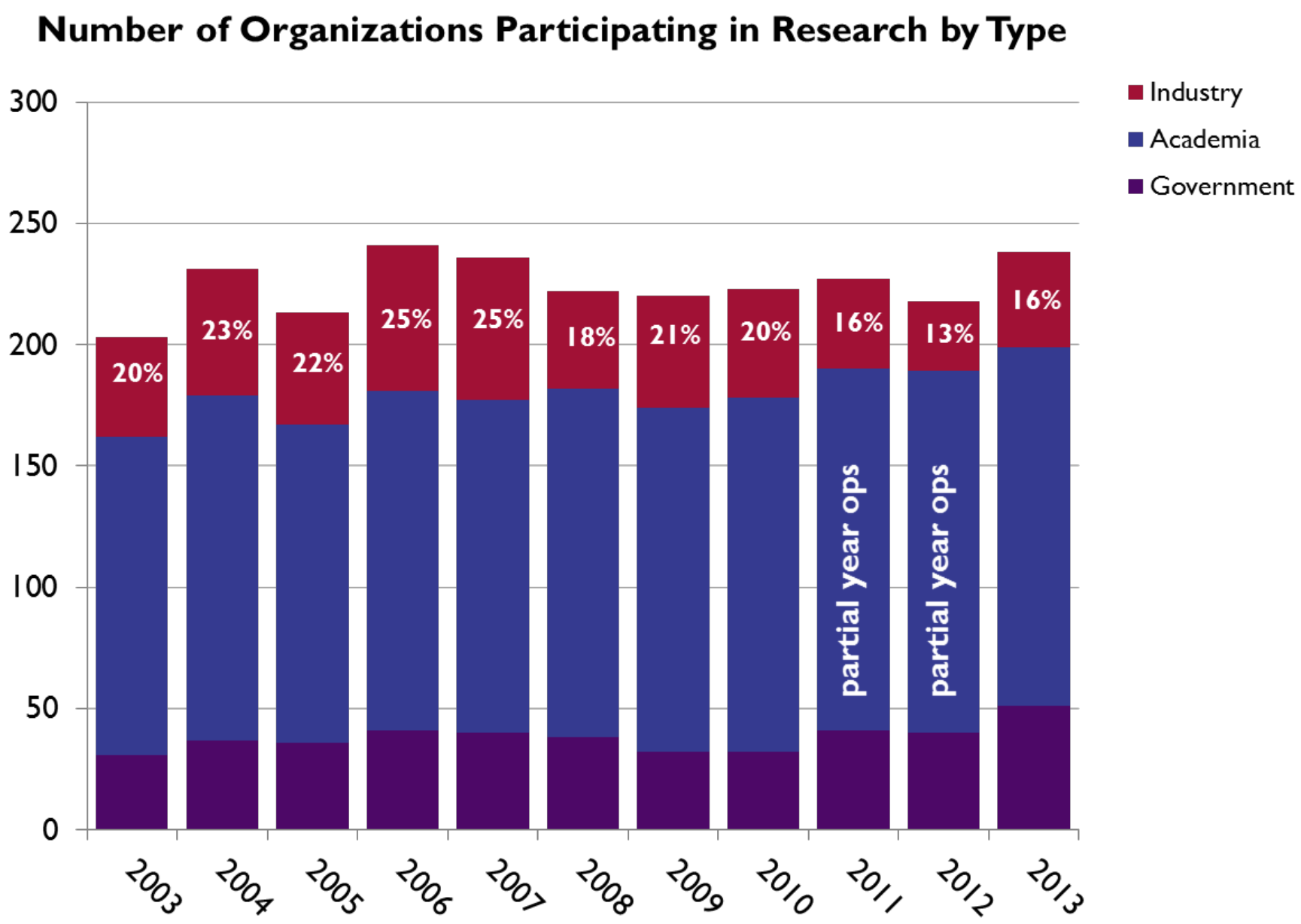
~250 operating days/year	**~7000** instrument days/year	**>2000** research participants/year
~300 publications/year	**~40** companies/year	**~40** Ph.D's/year
35 summer school students/year	**~6** new faculty/year	**10** SURF students/year

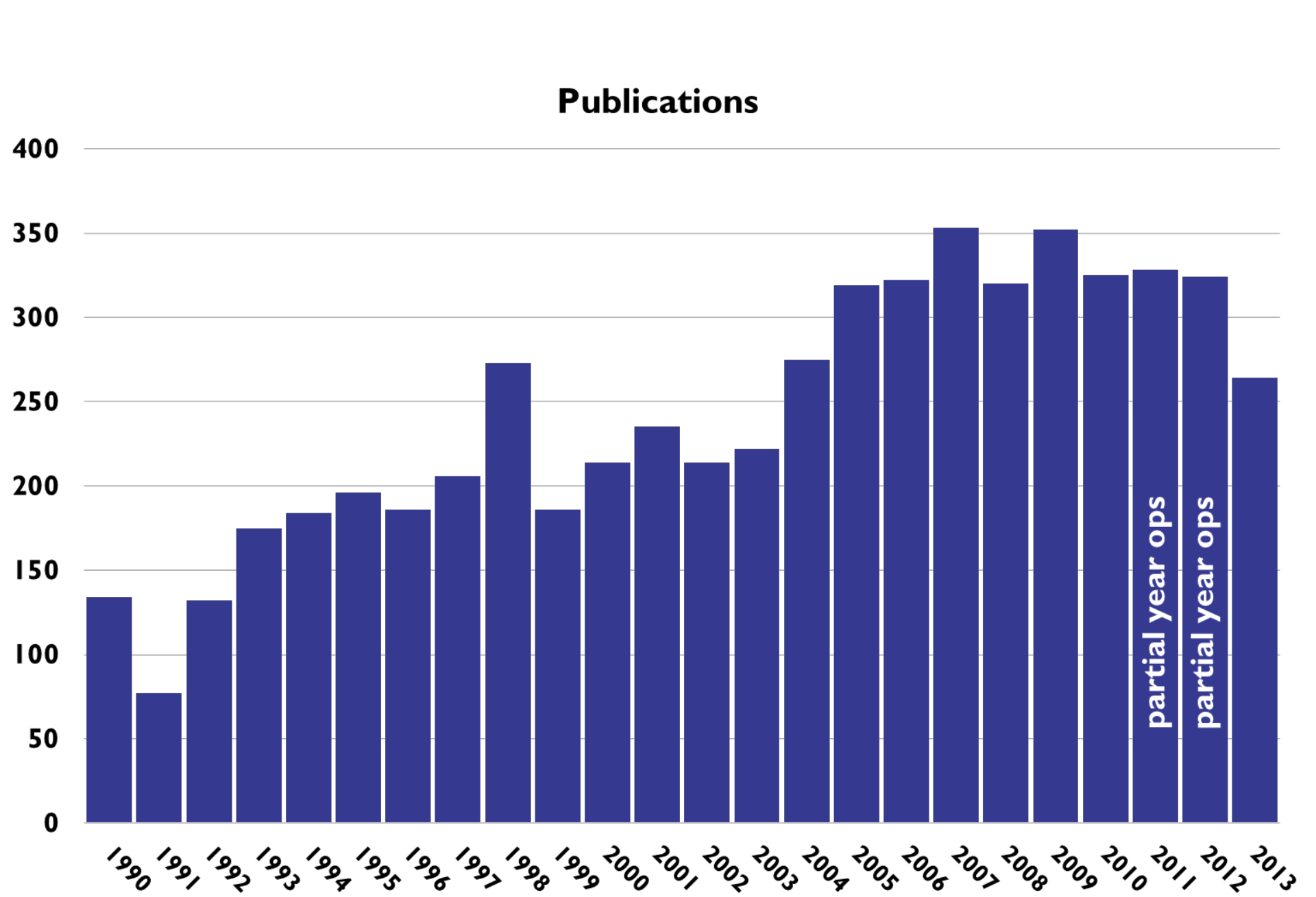
Research Participants





U.S. Research Participation at the NCNR


Number of Organizations Participating in Research by Type
Industry
Academia
Government
300
250
200
150
100
50
0
20%
23%
22%
25%
25%
18%
21%
20%
16%
13%
16%
partial year ops
partial year ops
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013


Publications
400
350
300
250
200
150
100
50
0
1990
1991
1992
1993
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2001
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2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
partial year ops
partial year ops

The structure of paint under shear

A.I. Nakatani, A. VanDyk, L. Porcar, J.G. Barker

Length scales: light or neutrons

Optically opaque: ~~light~~ or neutrons

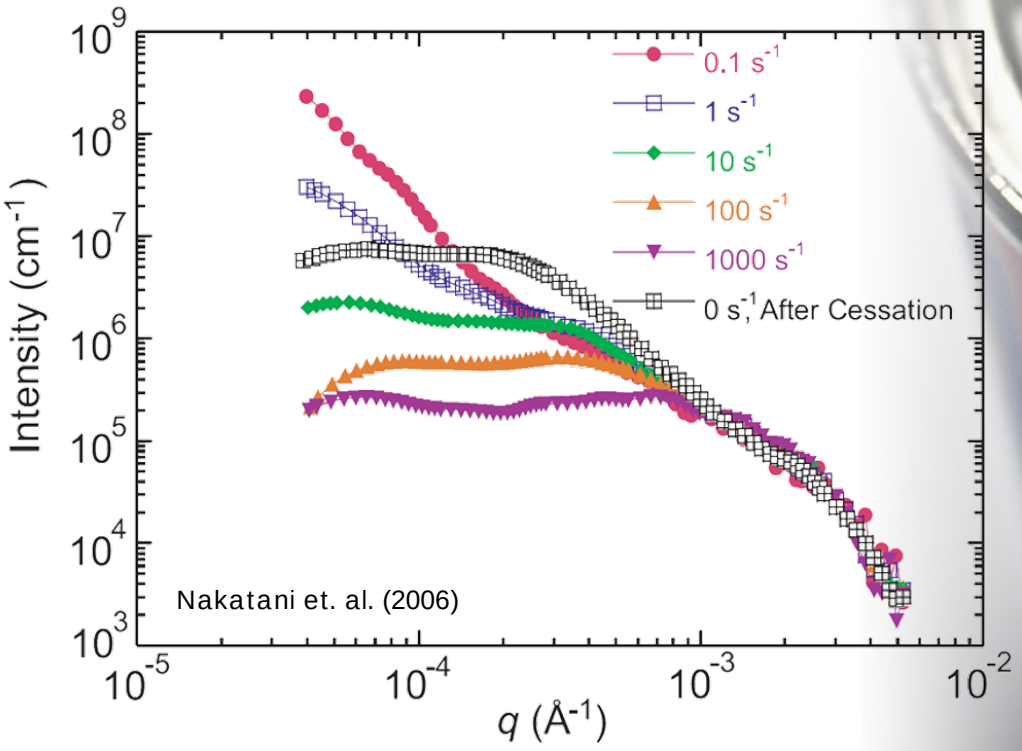
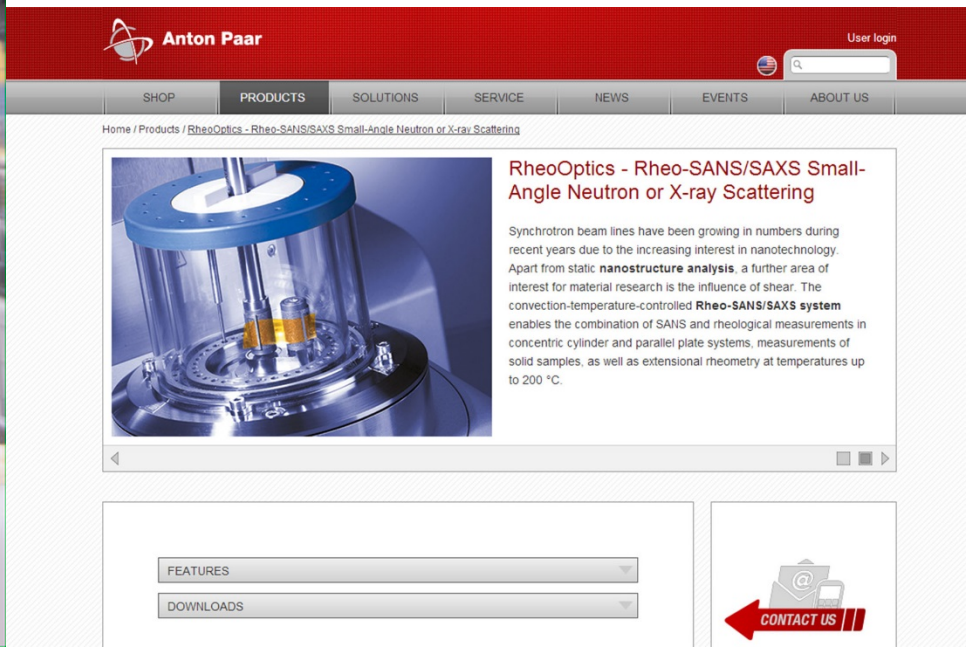


Photo credit: Nomadic Lass (Flickr)

“These measurements led to an accelerated development of new products for our businesses. These advancements would not have been possible without USANS.”

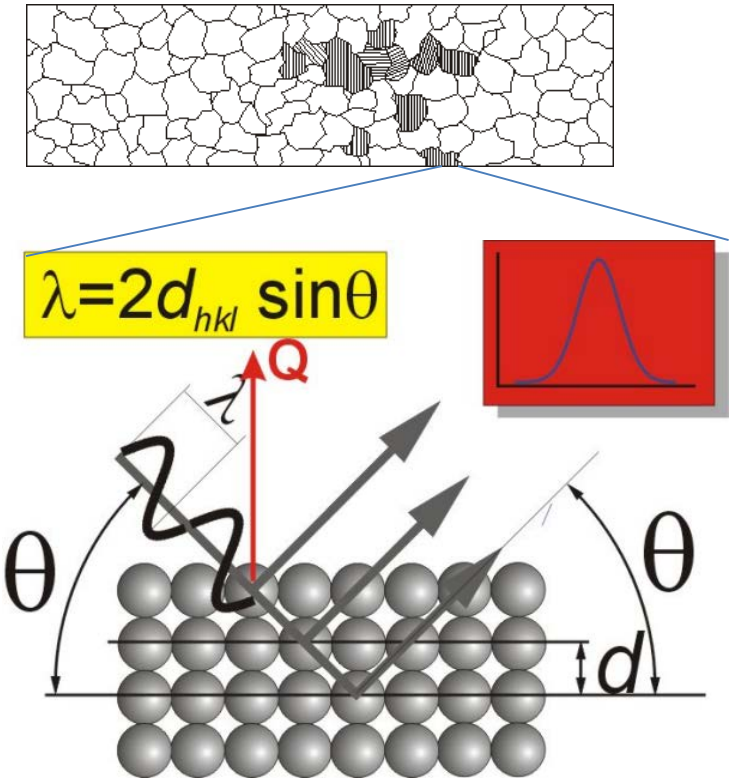
Rheo-SANS capability developed by staff scientists at the NCNR

Anton-Paar now markets the technology

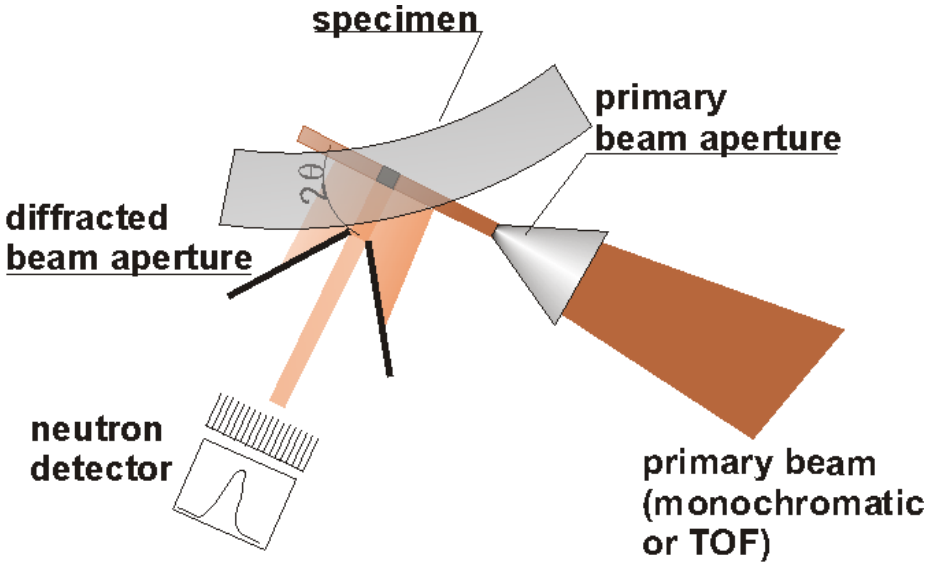


Neutron Stress Measurements

Elastic changes of lattice spacings in grains provide strain information



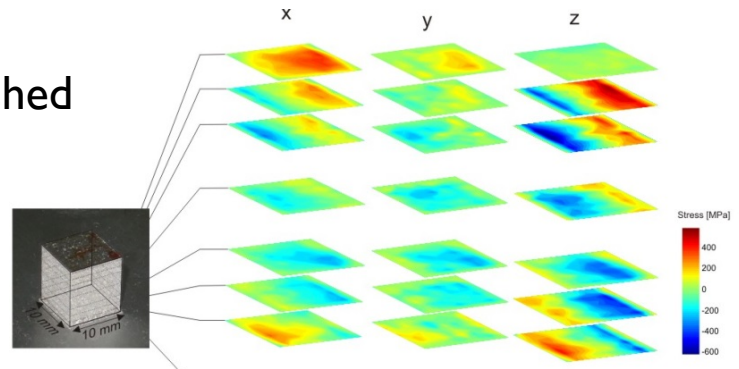
Penetration of neutrons (≈ cm) provides non-destructive depth information

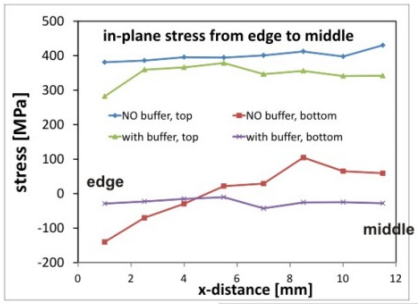


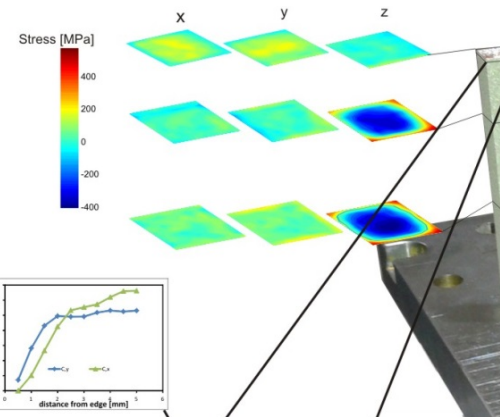
Stresses in a test artifact produced by laser-based additive manufacturing

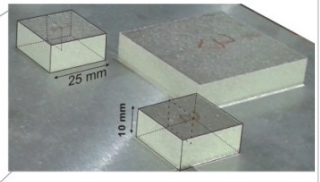
T. Gnaupel-Herold, J. Slotwinski, and S. Moylan

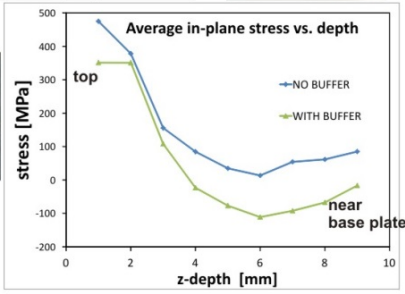
How well does the finished product match the design/specs?

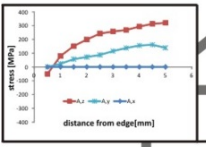


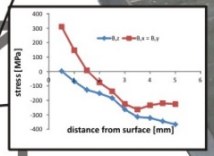


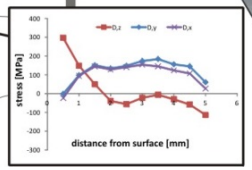


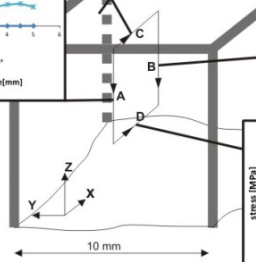


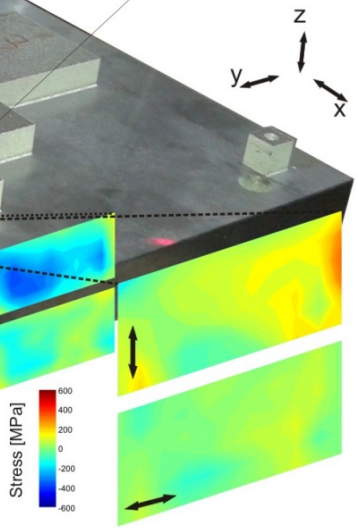


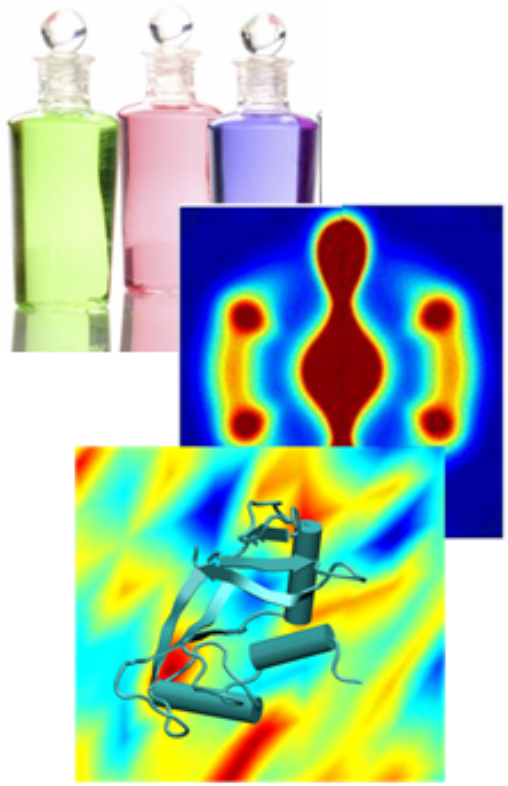












nSoft

A consortium for the advancement of neutron-based measurements for manufacturing of soft materials.

The nSoft Model

Members identify key problems
NIST develops sample environments, data analysis packages, neutron measurement methods
nSoft transfers expertise to members
Members use expertise in proprietary access mode
Membership = $20k/year
Proprietary access purchased separately

Member Benefits

Tailored measurement techniques for show stopper problems
Training in the use of those techniques
Unprecedented access to NIST staff, programs, and resources

Ron Jones, *nSoft Director*

expertise transfer

nSoft
current membership

2013 Panel on Neutron Research

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V. Adrian Parsegian	U Mass

*Members of the National Academies
†Former members of VCAT


Thank You