National Science Foundation

National User Facilities (NAF)

G.X. Tessema, Program Director

Division of Materials Research

National User Facilities

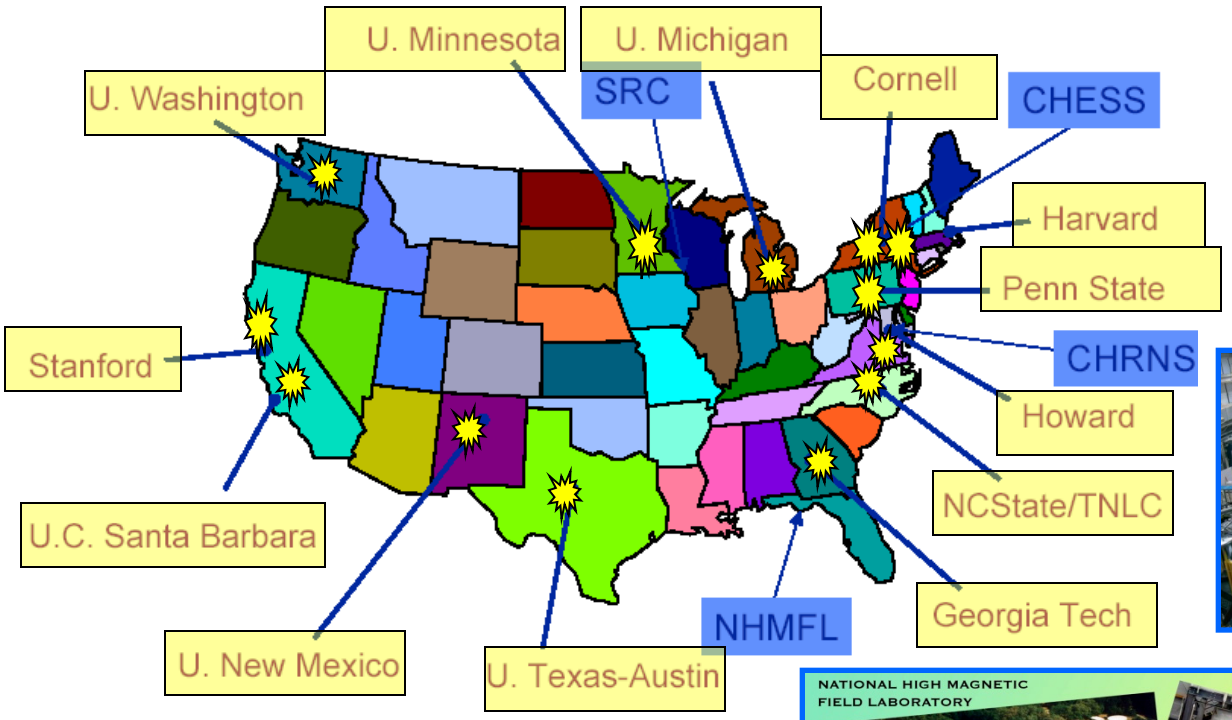
- A user facility is a federally sponsored research facility available for external use to advance scientific or technical knowledge under the following conditions:
- The facility is open to all interested potential users without regard to nationality or institutional affiliation.
- Allocation of facility resources is determined by merit review of the proposed work.
- User fees are not charged for non-proprietary work if the user intends to publish the research results in the open literature. Full cost recovery is required for proprietary work.
- The facility provides resources sufficient for users to conduct work safely and efficiently.
- The facility supports a formal user organization to represent the users and facilitate sharing of information, forming collaborations, and organizing research efforts among users.
- The facility capability does not compete with an available private sector capability

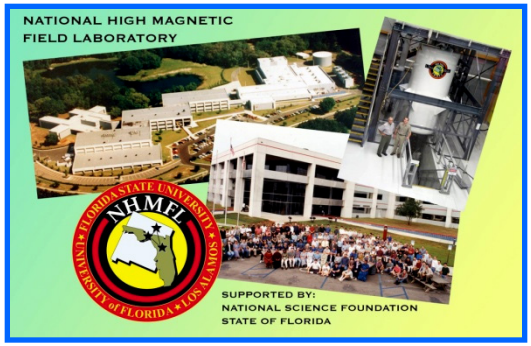
NAF– Relevance to National Priorities/NSF Mission/Research Fields

- USER FACILITIES for the research and educational communities,
- Specialized high-cost, state-of-the-art instruments
- Science and technology-related resources and experiences for students,
- Student and teacher education, general public awareness, curriculum development materials, and educational research.

DMR NATIONAL FACILITIES

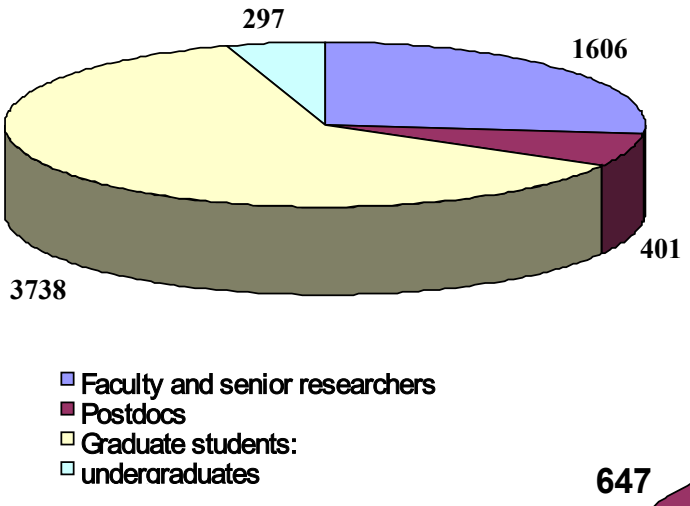
National Science Foundation

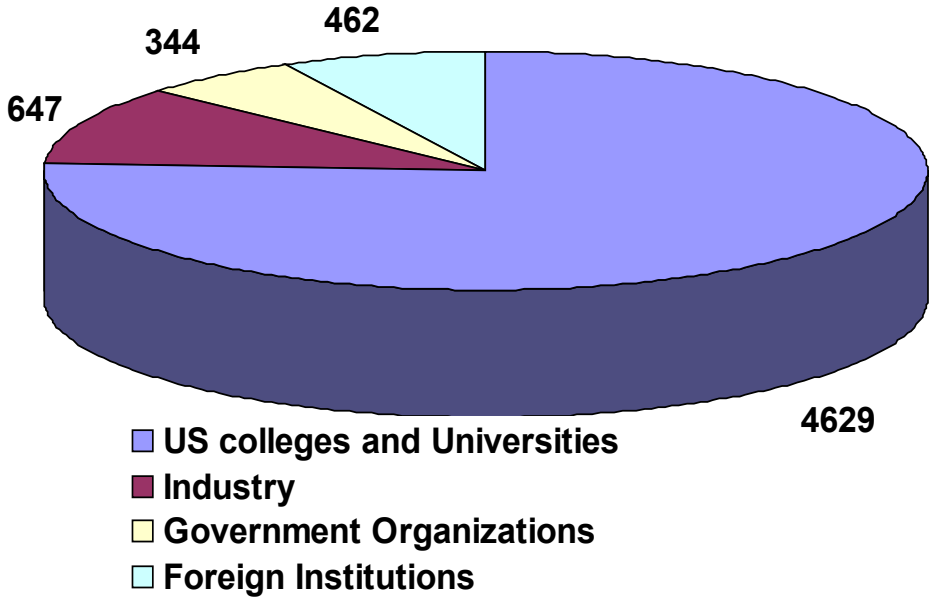




Researchers Using DMR Facilities

~ 6000 users annually





How to Approach Facilities

Find out

Which instruments are needed?
How to obtain time on them?

Write proposals
Learn the techniques

Access

Learning tools available at user facilities
- NUF Staff
- Introductory Symposia
- Summer Schools
  - Lectures + hands-on practicals and data analysis
- Rapid Access proposals
- Webinar and other web tools

Contacts

- CHESS, Sol M. Gruner, smg26@cornell.edu , tel 607-255-3441
- NHMFL, Dr. Greg Boebinger, gsb@magnet.fsu.edu, tel 850-644-0851
- NIST, Neumann, Dan A., dan.neumann@nist.gov
- NNIN, Prof. Roger T. Howe, rthowe@stanford.edu

The National High Magnetic Field Laboratory

http://www.magnet.fsu.edu/

DC Field Facility
Tallahassee, FL

Highest continuous fields; Clean, quiet measurements

Resources include: 25T to 45 T

Pulsed Field Facility
Los Alamos, NM

Highest pulsed fields; fast, high-quality data acquisition

Resources include:

40T- (200 msec) to 300 T, single-turn magnet (10 μsec)

-

High B/T Facility
Gainesville, FL

High fields and ultra low temperature; low temperature electronics.

Resources include:

- 15.2 T magnet; T ≥ 0.04 mK

Measurements available:

Resistivity (ac, dc, Hall, high-current, microwave)
Magnetization (ac, torque, VSM)
Optics (spectrometry, ultra-fast time resolved, raman, FTIR)
High pressure (piston cylinder cells, diamond anvil cells)
Nuclear Magnetic Resonance, Electron Magnetic Resonance
Dilatometry (Thermal expansion, magnetostriction)
Ultra-sound
Heat capacity (Phase transion)
Thermal transport

Highlights: http://www.magnet.fsu.edu/usershub/publications/nsfhighlights/

User Access

One User Portal - users.magnet.fsu.edu

EASY, 2-part process for magnet time:

Proposal – very brief overview of science / technology

Experiment request – description of experiment

Support for first-time users

Interested? Questions?– contact us:

DC Field Facility – Tim Murphy tmurphy@magnet.fsu.edu

Pulsed Field Facility – Jon Betts jbetts@lanl.gov

High B/T Facility – Neil Sullivan sullivan@phys.ufl.edu

MagLab Summer School

Experimental techniques

For grad students, postdocs, early career scientists

Lectures and hands-on practicals

Winter Theory School

Condensed matter theoretical techniques

For grad students, postdocs, early career scientists

Lectures and hands-on computer exercises

Research partnerships with Claflin, Prairie View, Morehouse

Are you interested in a partnership? Lets talk…

CHESS Facility Instruments and Capabilities Overview

Station	Major Uses, Capabilities	Science application
A1	Macromolecular, Se-edge SAD	Structural Biology, Biological membranes, pharmaceutical targets, Protein complexes
A2	High-energy or wide-bandpass wiggler beam	Rapid materials characterization, combinatorial screening, structural materials, engineering analysis
B1(+B2) combined	High-pressure program	Nanocrystals complexes, geological and earth science materials, materials processing under pressure
C1	High-resolution diffraction; windowless operation, white-beam mirror	Chemistry-specific analysis of materials, topography of diamonds, electronic transitions
D1	SAXS/WAXS soft matter program; windowless operation	Nanomaterials synthesis, processing and characterization, polymeric systems, OLEDs
F1	Macromolecular, Br-edge SAD	Structural Biology, Biological membranes, pharmaceutical targets, Protein complexes
F2	BioSAXS	Solution scattering, macromolecular complexes, Structural Biology, Protein complexes
F3	Wide-bandpass Macro, XRF, Imaging	Marine biology, dendrochronology, cultural heritage and art restoration materials
G1	SAXS/WAXS, wide energy bandpass	Polymers, solution scattering, carbon nanotube fabrication and analysis, biomaterials
G2	High-resolution, kappa diffractometer	*In-situ* electrochemical cell analysis, battery materials, carbon nanosheets and frameworks
G3	Wide-bandpass Pulsed-laser deposition laboratory	Complex oxide and magnetic materials thin-film growth, organic vapor deposition materials growth

CHESS Facility: new user introduction and training

http://www.chess.cornell.edu/

Contacting people at CHESS

Find out more information about the capabilities of CHESS instruments and stations See: http://www.chess.cornell.edu/
Contact the User Administrator: Kathy Dedrick ((607) 255-0920 , kd73@cornell.edu).
Send e-mail a short couple of sentences of what you would like to do and Kathy will put you in touch with the correct Staff Scientist.

Defining your project and gaining access to CHESS

Submitting a short project proposal at
http://www.chess.cornell.edu/prposals/
Once a proposal is peer reviewed and rated, you will be contacted by a CHESS Staff Scientist or User Administrator about scheduling a visit.

On-site training at CHESS

Your visit will be supervised by a beamline or instrument specialist who will help you learn how to collect x-ray data and begin data analysis.
Chemistry, computing, machine shop and stockroom facilities are available as needed.

The NSF/NIST Center for High Resolution Neutron Scattering

Capabilities for structural studies (1 nm → 20 μm)

- Small Angle Neutron Scattering (SANS) and Ultra Small Angle Neutron Scattering (uSANS) instruments yield structural information (shape, size, size distribution)
- Contrast variation and isotopic labeling, which exploit the difference in scattering power for H and D, are used to isolate structural components Polarized SANS yields magnetic structural information

Capabilities for studies of dynamics (0.1 ps → 100 ns)

- Triple Axis Spectroscopy, Time-of-flight Spectroscopy, Backscattering Spectroscopy, and Neutron Spin Echo Spectroscopy yield dynamic information over different length and time scales
- Motions that can be studied include vibrations (phonons), librations, translational and rotational diffusion, relaxations, structural fluctuations, and magnetic excitations

http://www.ncnr.nist.gov/programs/CHRNS

National Science Foundation

The NSF/NIST Center for High Resolution Neutron Scattering

Obtaining access to the instruments

1) Peer-reviewed proposals
2) Feasibility studies (time can be arranged with the CHRNS staff)
3) Discretionary time (some time is available for new users – arrange with CHRNS staff)

Educational activities

1) Summer schools (targeted to graduate students)
2) Tutorials (targeted to graduate students)
3) REU program (called SURF)
3) Limited funding is available for travel to first-time users

Assistance for users (includes advice on planning an experiment and on analyzing data)

1) Local contacts
2) Sample environment staff
3) User laboratory staff

Questions can be addressed to :

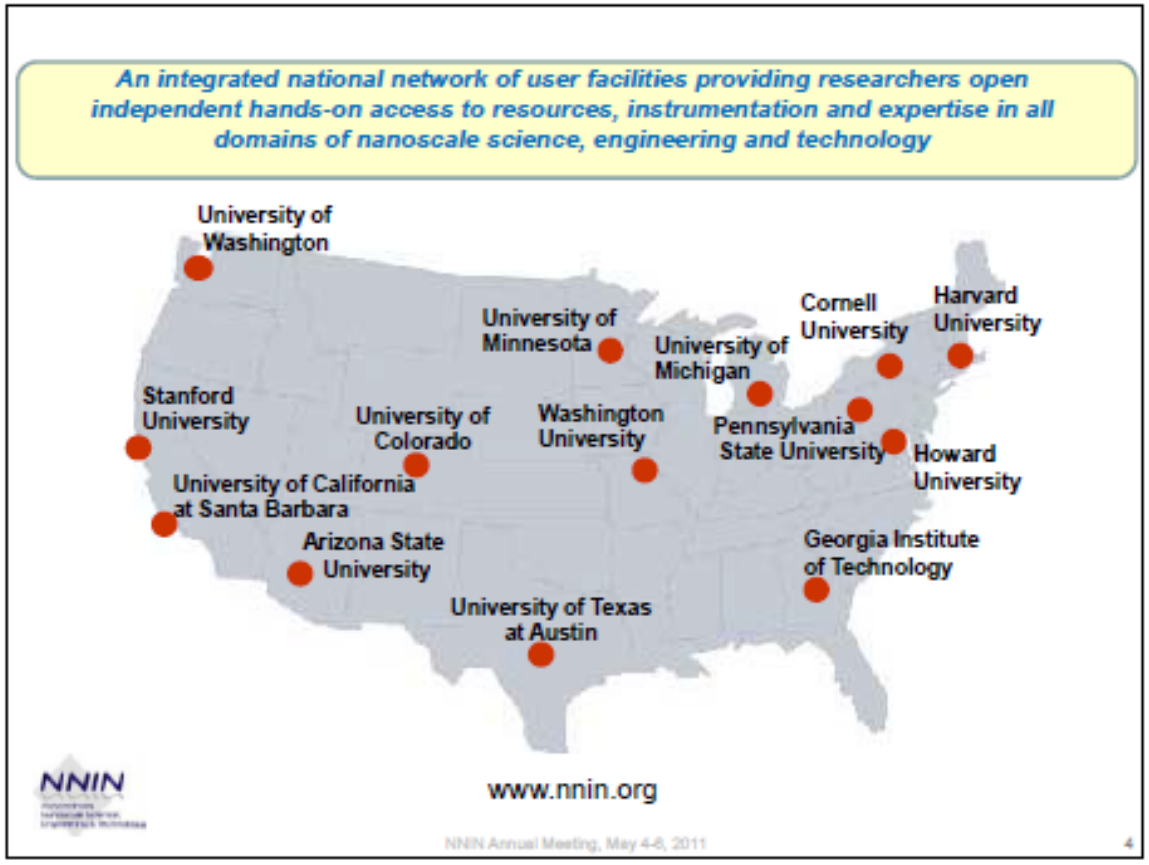
Dan Neumann (dan@nist.gov)
John Copley (john.copley@nist.gov)

National Science Foundation

National Nanotechnology Infrastructure Network (NNIN)

http://www.nnin.org/nnin_overview.html

Provides extensive support in nanoscale fabrication, synthesis, characterization, modeling, design, computation and hands-on training. in an open, hands-on environment, available to all qualified users.



How to Start an NNIN Project

1- Review NNIN web site for process and capability information
Also refer to the Technical FAQ for answers to common questions.
Check the Education link useful for various training resources

2- Contact one or more NNIN sites to discuss your application to assess the technical feasiblity of the project and the scope of your work.

3- The site technical contact will be able to either 1) commit to doing the project at that site, 2) refer you to a site more appropriate, or 3) explain why the project is not feasible with the available resources.

4- If you are unsuccesful in your initial site discussions, please contact NNIN management for guidance.

5- Prepare a brief written project description and submit to chosen NNIN site. (No external review required).

6- Prepare informally a purchase order to cover charges and sign a brief user agreement.

Upon approval, your project will be scheduled at a mutually agreeable time, generally within 1 month. The selected site will arrange for appropriate training and project supervision

How to Start an NNIN Project

NNIN

Accelerating and enabling United States leadership in engineering, science and technology of the nanoscale

Promote discovery, invention, and development at the nanoscale across disciplines and at interdisciplinary boundaries by enabling efforts in materials, structures, devices and systems

Open shared laboratories embracing interdisciplinary research

External user focus

Advanced accessible resources – equipment, training, cumulative knowledge

World leading one-of-a-kind resources tied to university technical strengths

Expert staff, Domain Experts, who help bridge interdisciplinary research

Synergy of network

Continuously evolving to improve and towards new directions

Building bridges with other national activities

Broad range of national-scale activities in education and technical development

Societal and ethical consciousness development through national research reach

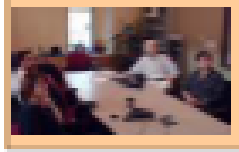
How to Start an NNIN Project

How Does a User Project Happen?

Personal Contact
Web/Email
phone
Conferences
Other Users

Prompt Response from Site User Staff

Consultation with NNIN Staff



Max. 2 pg Proposal/ Project Plan/ MOU

Scheduling (~2 wk goal)

Pre-visit Planning and Training as appropriate

One to three weeks elapsed time, depending on user's timeline, …

Hands on training:
Safety training
Society and Ethics tutorial
Staff Consultation
Process Integration
Timely equipment training

Goals:
Evolution to independent user
Useful structures by end of first visit

NNIN

>2200 new users trained per year on a large equipment set