U.S. DEPARTMENT OF ENERGY | Nuclear Energy

Nuclear Science User Facilities

NSUF Overview

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NSUF Nuclear Science User Facilities

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What is a User Facility?

NSUF Nuclear Science User Facilities

Regional, national or international facility with unique experimental capabilities. Access is typically cost free through a competitive proposal process. The goal is to connect the best ideas with the capability regardless of geographical separation.

Advanced Photon Source (ANL)

Spallation Neutron Source (ORNL)

There are currently 50 DOE user facilities in the U.S.
- Advanced scientific computing research
- High flux synchrotron and neutron sources
- Electron beam characterization
- Nano-scale science
- Biological and environmental research
- High energy and nuclear physics
- Fusion energy science

……***But before 2007 there were no user facilities to address the unique challenges of nuclear energy. Then came the Advanced Test Reactor National Scientific User Facility!***

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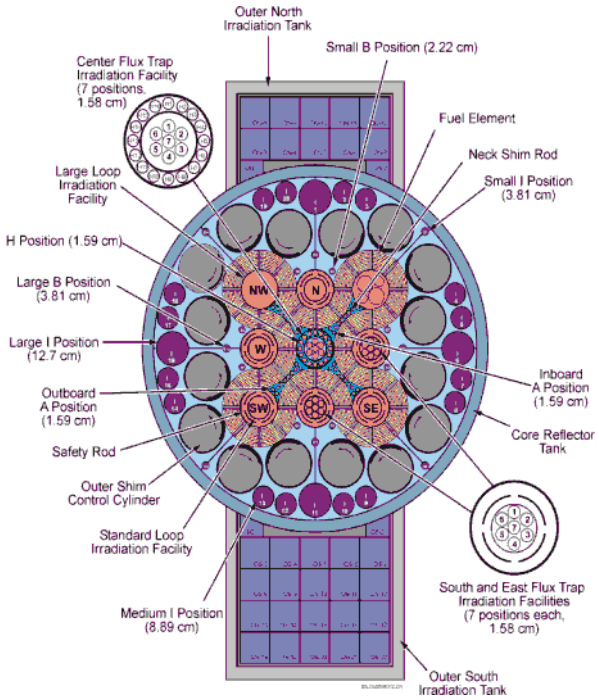
Initial Vision for ATR NSUF

NSUF Nuclear Science User Facilities

Allow the research community access to test reactor space and existing post irradiation examination facilities

Advanced Test Reactor



Post Irradiation Examination (PIE) Facilities at Materials & Fuels Complex (INL)

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NSUF – Multiple Test Reactors

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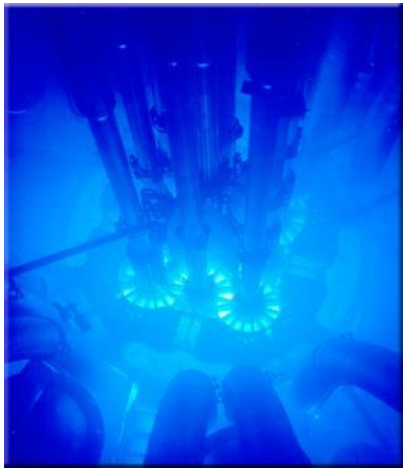
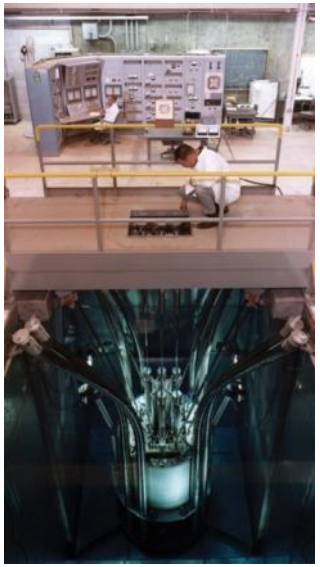
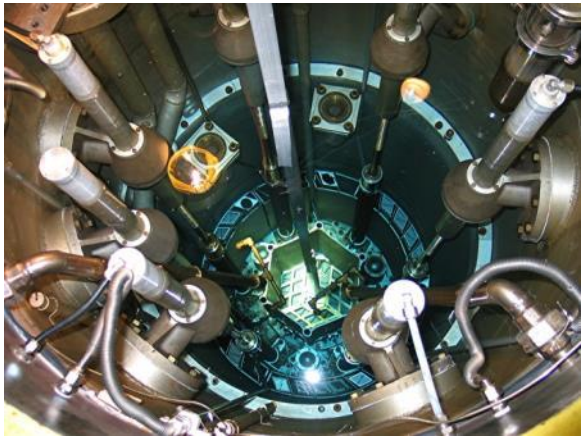


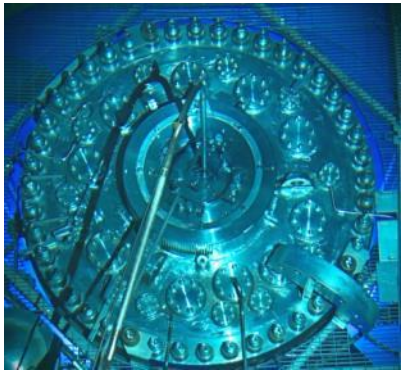
Advanced Test Reactor (INL)



ATR Critical Facility (INL)

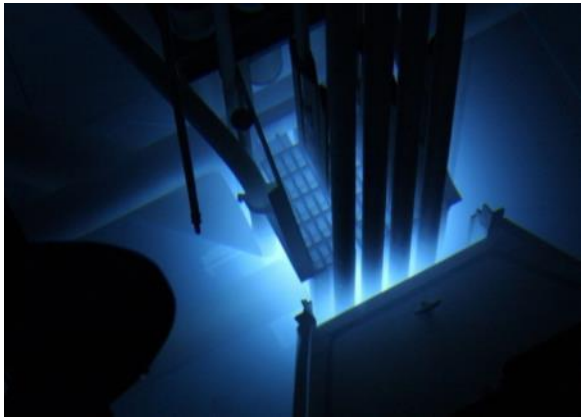


MIT Reactor



High Flux Isotope Reactor (ORNL)

NRAD Reactor (INL)



PULSTAR Reactor (NCSU)

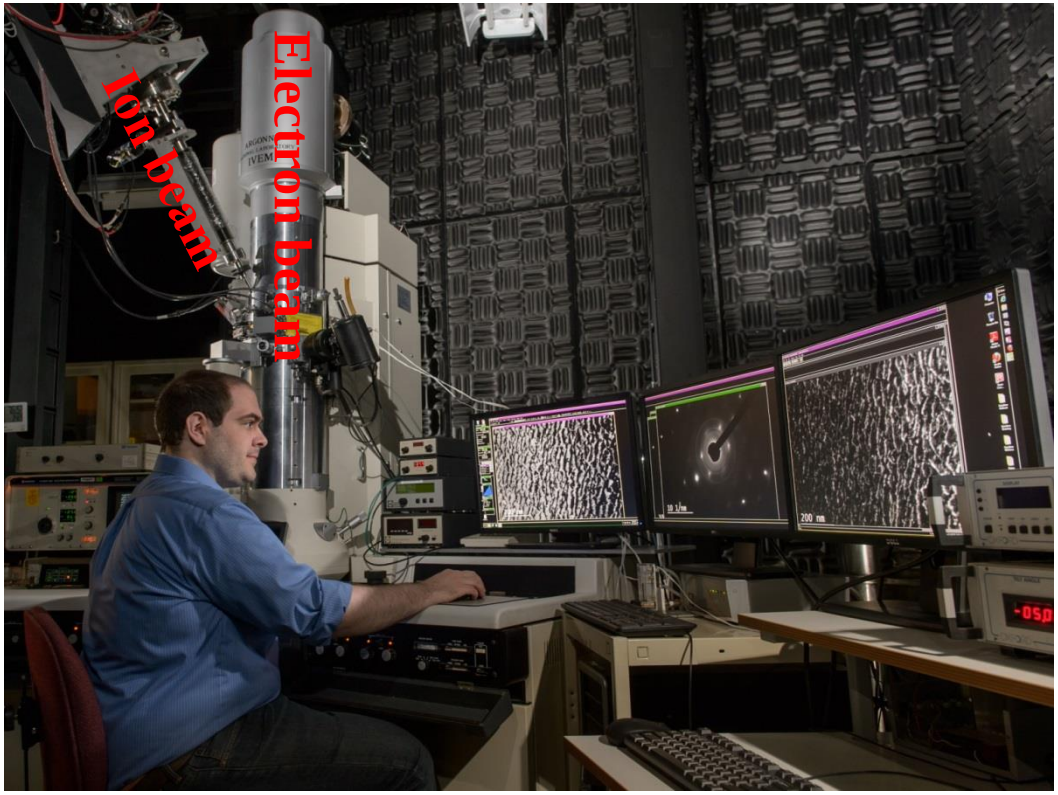
NSUF – Ion Beams

University of Michigan
Ion Beam Laboratory

University of Wisconsin
Tandem Accelerator Ion Beam

NSUF - Ion Beams

- **Intermediate Voltage Electron Microscope (IVEM)**



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NSUF - Synchrotron Irradiation

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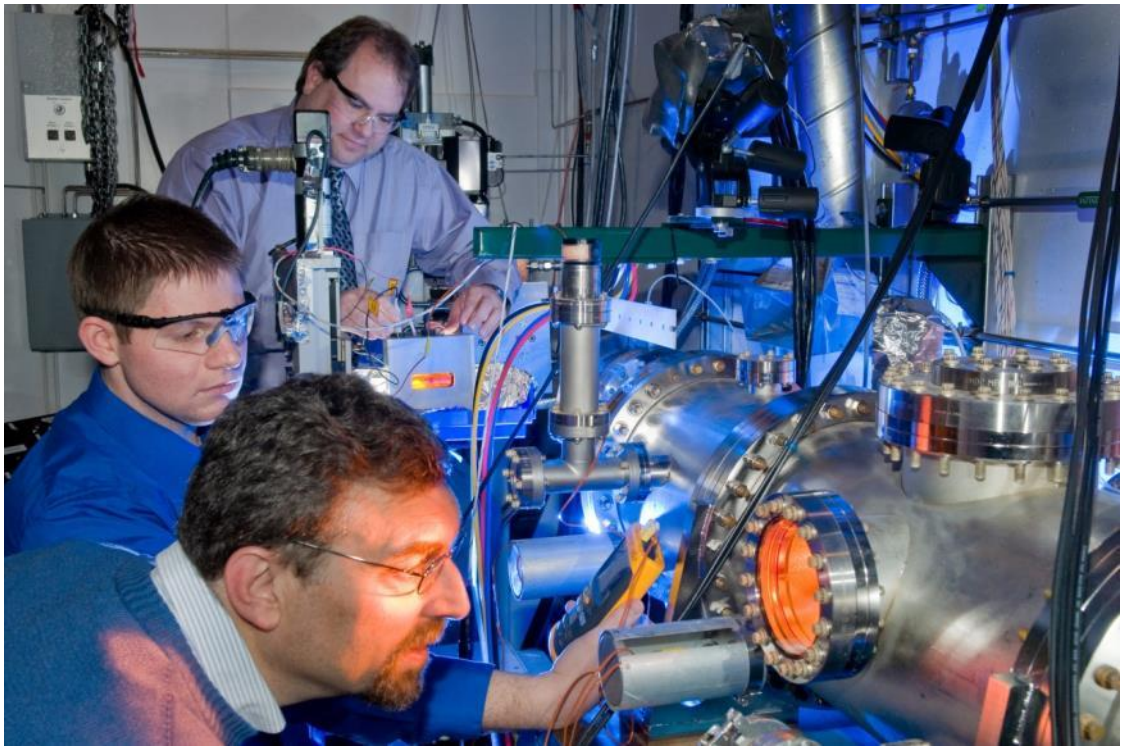

Illinois Institute of Technology MRCAT Beamline
at Argonne National Laboratory's Advanced Photon Source

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NSUF - Hot Cell Capabilities

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Hot Fuel Examination Facility (INL)

Radiochemical Engineering Development Center (ORNL)

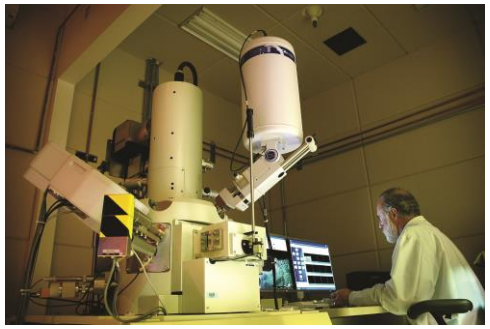
MIT Reactor Hot Cells

Materials Center of Excellence Laboratories (Westinghouse)

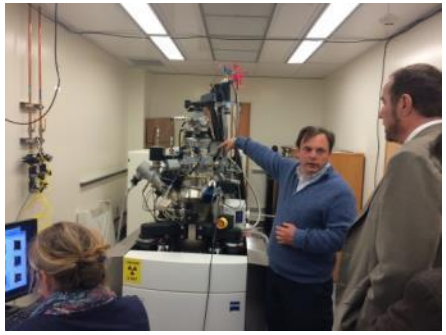
Radiochemistry Processing Laboratory (PNNL)

NSUF – Post Irradiation Examination

(A sample to whet your appetite – visit nsuf.inl.gov for the full menu)



Electron Microscopy Laboratory (INL)



Nuclear Materials Laboratory (UCB)

Radiochemistry Processing Laboratory
Materials Science and Technology Laboratory (PNNL)

Microscopy and Characterization Suite
Center for Advanced Energy Studies

Low Activation Materials Development and Analysis Laboratory (ORNL)

MOOSE

Multi-physics Object-Oriented Simulation Environment

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High Performance Computing

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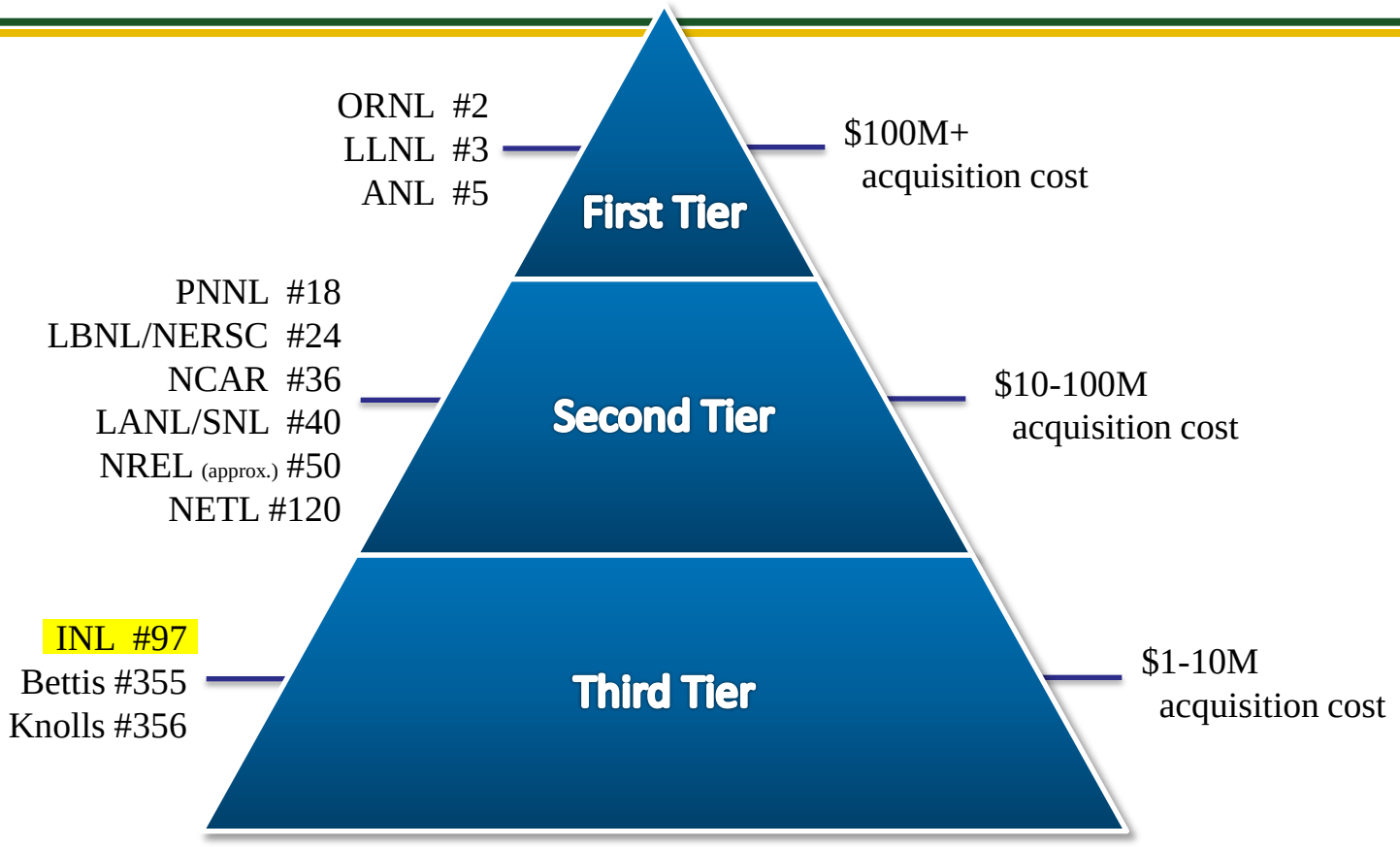

November 2014 Top500 Rankings

Approximately five systems in the first tier

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NSUF – A consortium

A group formed to undertake an enterprise beyond the resources of any one member

NSUF Nuclear Science User Facilities

CAES Center for Advanced Energy Studies

THE UNIVERSITY of WISCONSIN MADISON

Massachusetts Institute of Technology

INL Idaho National Laboratory

ILLINOIS INSTITUTE OF TECHNOLOGY

University of Michigan

Pacific Northwest NATIONAL LABORATORY

OAK RIDGE National Laboratory

NC STATE UNIVERSITY

Berkeley UNIVERSITY OF CALIFORNIA

UNLV UNIVERSITY OF NEVADA LAS VEGAS

Westinghouse INNOVATION YOU CAN BE SURE OF

PURDUE UNIVERSITY

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NSUF – A sample of our technical expertise

NSUF Nuclear Science User Facilities

DOE Staff
Mr. Mike Worley
Ms. Alison Hahn
Mr. Brooks Weingartner

NSUF Staff (INL)
Dr. J. Rory Kennedy
Mr. Dan Ogden
Ms. Lindy Bean
Mr. Jeff Benson
Ms. Kelly Cunningham
Dr. Brenden Heidrich
Dr. John Jackson
Mr. Jon Kirkham
Mr. Collin Knight
Ms. Sarah Robertson
Ms. Renae Soelberg
Dr. Sebastien Teysseyre

Neutron Irradiation
Dr. Donna Guillen (INL)
Dr. Paul Murray (INL)
Dr. Lin-wen Hu (MIT)
Dr. Gordon Kohse (MIT)
Dr. Joseph Nielson (INL)
Dr. Kurt Terrani (ORNL)
Dr. Randy Nanstad (ORNL)
Ms. Misti Lillo (INL)
Mr. Kevin Clayton (INL)
Mr. Dave Schoonen (INL)
Ms. Debra Utterbeck (INL)
Dr. Sean O'Kelly (INL)
Dr. David Senor (PNNL)
Mr. Brian Durtschi (INL)
Dr. Ahmed Hassanein (NCSU)

Ion Beams
Dr. Gary Was (UM)
Dr. Beata Tyburska-Puchel (UW)
Dr. Meimei Li (IVEM)

Examinations
Dr. Assel Aitkaliyeva (INL)
Dr. Brandon Miller (INL)
Dr. Jian Gan (INL)
Dr. Yaqiao Wu (CAES)
Ms. Joanna Taylor (CAES)
Dr. Andrew Casella (PNNL)
Dr. Maria Okuniewski (Purdue)
Dr. Peter Hoseman (UCB)
Mr. Ron Crone (INL)
Dr. Mitch Meyer (INL)
Dr. Dan Wachs (INL)
Ms. Katelyn Wachs (INL)
Mr. Mike Heighes (INL)
Dr. James Cole (INL)
Ms. Paula Freyer (Westinghouse)

Synchrotron Irradiation
Dr. Jeff Terry (IIT)

And many more scientists, engineers and technical staff to help get things done - you are not alone!

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NSUF – Library and Database

Nuclear Science User Facilities

Nuclear Fuels and Materials Library

- A cache of irradiated material with pedigree
- Available for Rapid Turnaround Experiments and full PIE projects

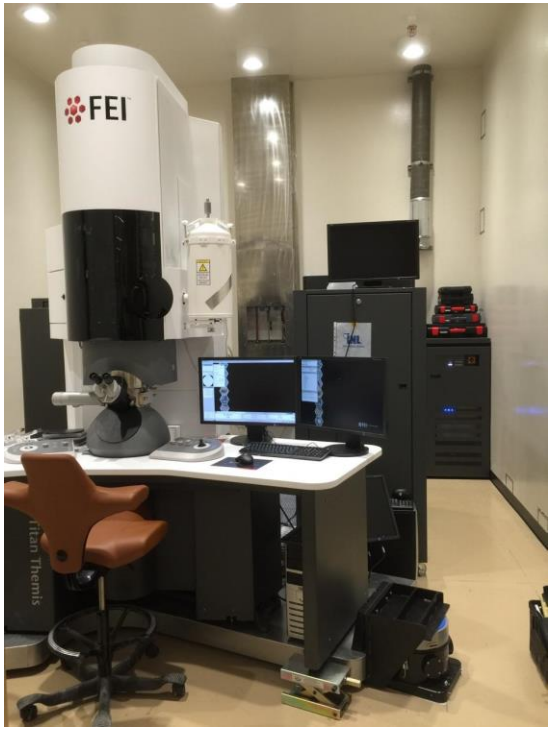
Nuclear Energy Infrastructure Database (NEID)

- A database capturing the nuclear energy research and development facilities and equipment

Please visit our website: nsuf.inl.gov

NSUF - On the Horizon

- **Irradiated Materials Characterization Laboratory (IMCL)**
  - **Located at the Materials and Fuels Complex at INL**
  - **Fully outfitted by end of FY 2017**
  - **Preparation and Examination of High Dose Rate Specimens**



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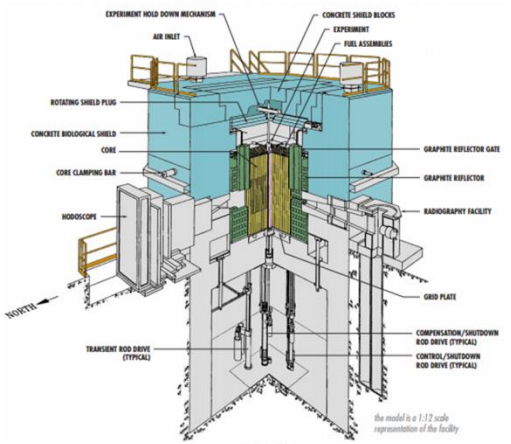
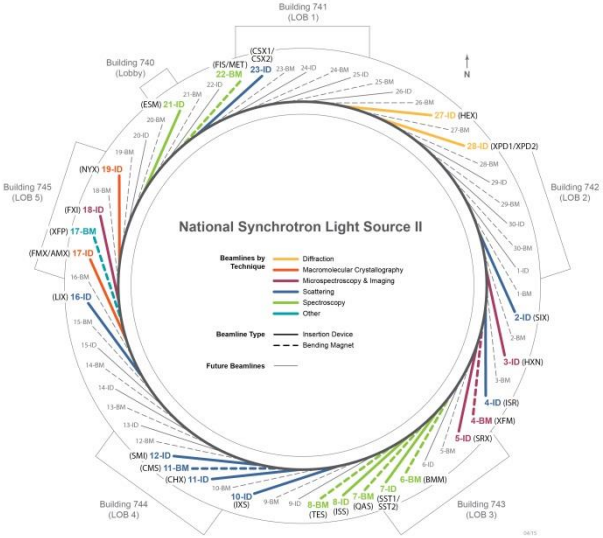
NSUF - On the Horizon

NSUF Nuclear Science User Facilities

- **Transient Test Capability**
  - **TREAT at INL**
  - **Available in 2018**
  - **Accepting proposals in the next CINR FOA – August 2016 kickoff**



- **Brookhaven National Laboratory**
  - **Partnership for NSLS-II access**
  - **X-ray Powder Diffraction (XPD) Beamline**
  - **Accepting requests in the next RTE / Beamline call – Closes September 30)**



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Accessing the NSUF

NSUF Nuclear Science User Facilities

- **Consolidated Innovative Nuclear Research FOA**
  - **For full irradiation/PIE, PIE Only, or APS projects**
  - **Kickoff in August, Award the following June**
  - **R&D support funding can be requested**
- **Rapid Turnaround Experiment / Beamline call**
  - **For small examination or beamline projects**
  - **Three calls per year**
  - **No R&D support funding**
  - **XPD at NSLS-II, IVEM and MRCAT at APS are available**
- **CRADA and WFO (non competitive)**
  - **Cost shared non-proprietary research**
  - **Full cost recovery proprietary research**
  - **Utilized so far by industry and the Nuclear Regulatory Commission**

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NSUF Awards and Publications

NSUF Nuclear Science User Facilities

- Historical data through FY 2015
  - 134 Awarded Projects (274 proposals)
  - 26 Full irradiation / PIE
  - 11 Synchrotron irradiation
  - 97 Rapid Turnaround Experiments
- FY 2016 Applications / Awards
  - 63 CINR Pre-applications, 32 Full Applications
  - 30/39 Rapid Turnaround Experiment Awards/Proposals
  - 37 RTE Proposals in third call
- Cooperative Projects
  - Two CRADAs with EPRI, One CRADA with CNL
  - One WFO with NRC, One WFO with EPRI
- Publications
  - 255 Reported journal publications and conference proceedings through CY 2015

Questions?


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