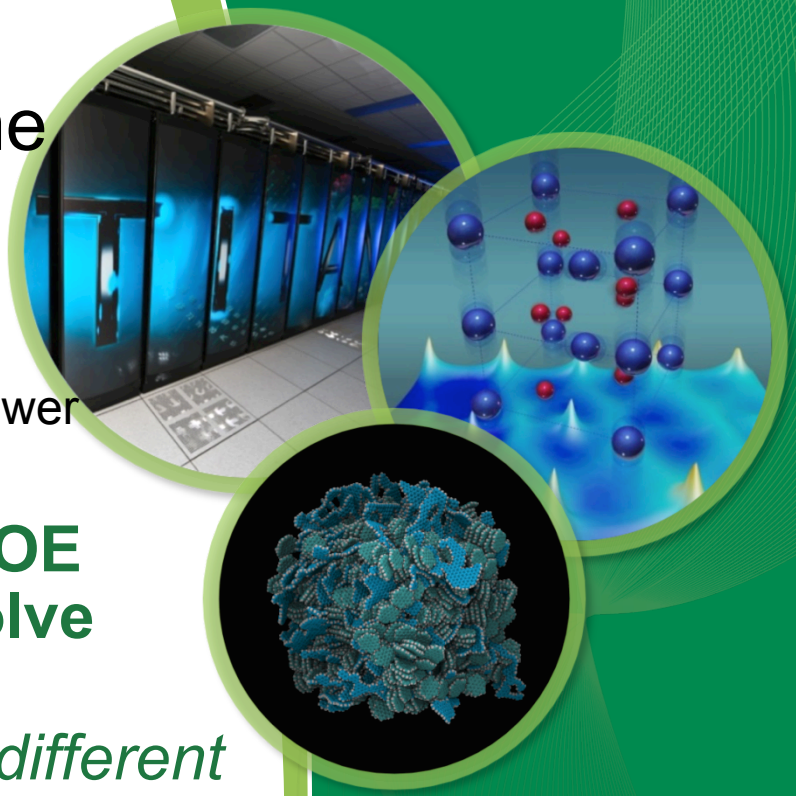
Proposal Writing:
Hints for maximizing your chances for getting beam time



John Budai

Materials Science & Technology, ORNL

Facility User – Proposal writer – Proposal reviewer

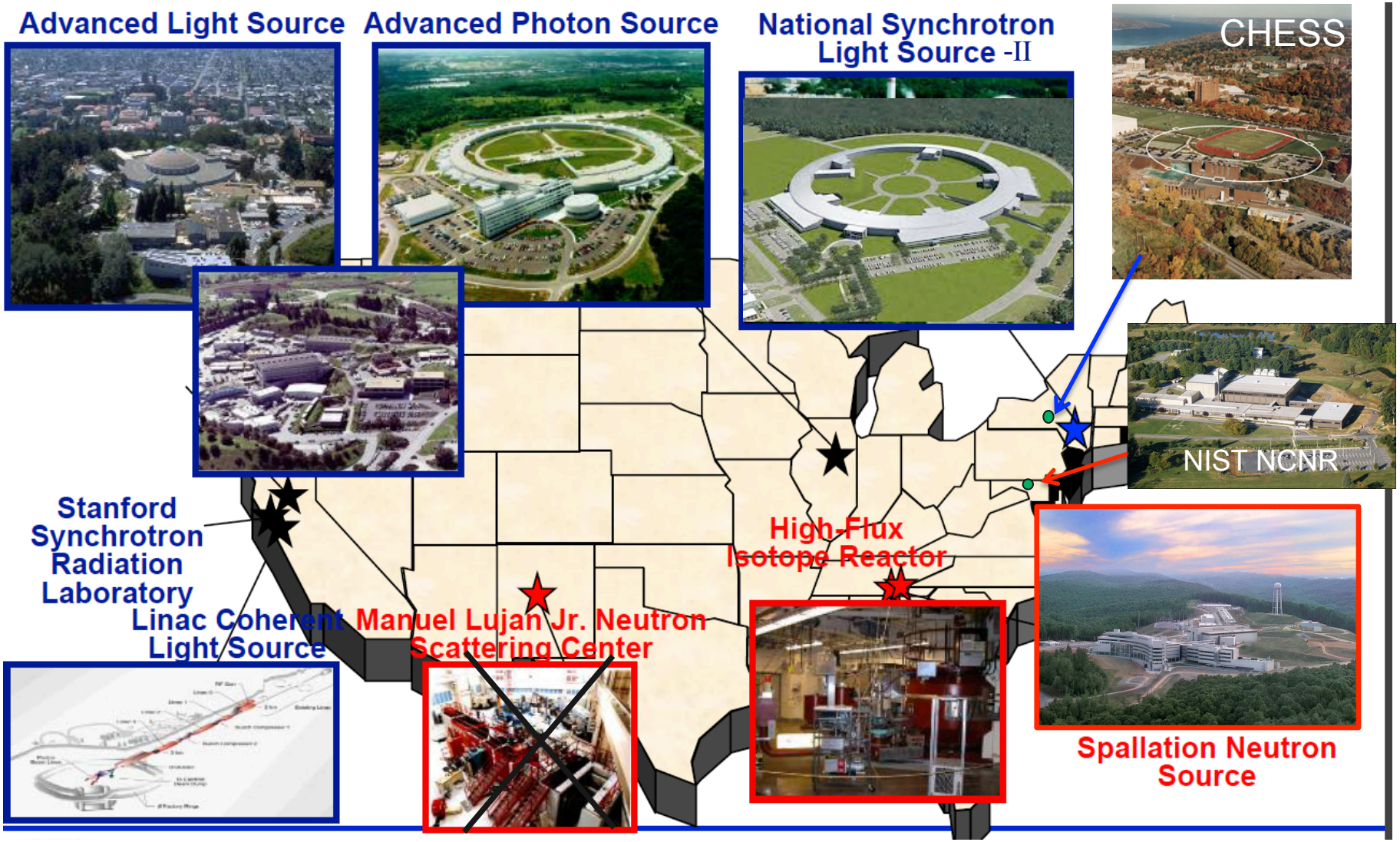
General background on how DOE user facilities function and evolve

- *Now for something completely different*
- *No equations!*
- *Scientists spend a lot of time writing proposals, reviewing proposals, giving presentations and getting funding.*

ORNL is managed by UT-Battelle
for the US Department of Energy

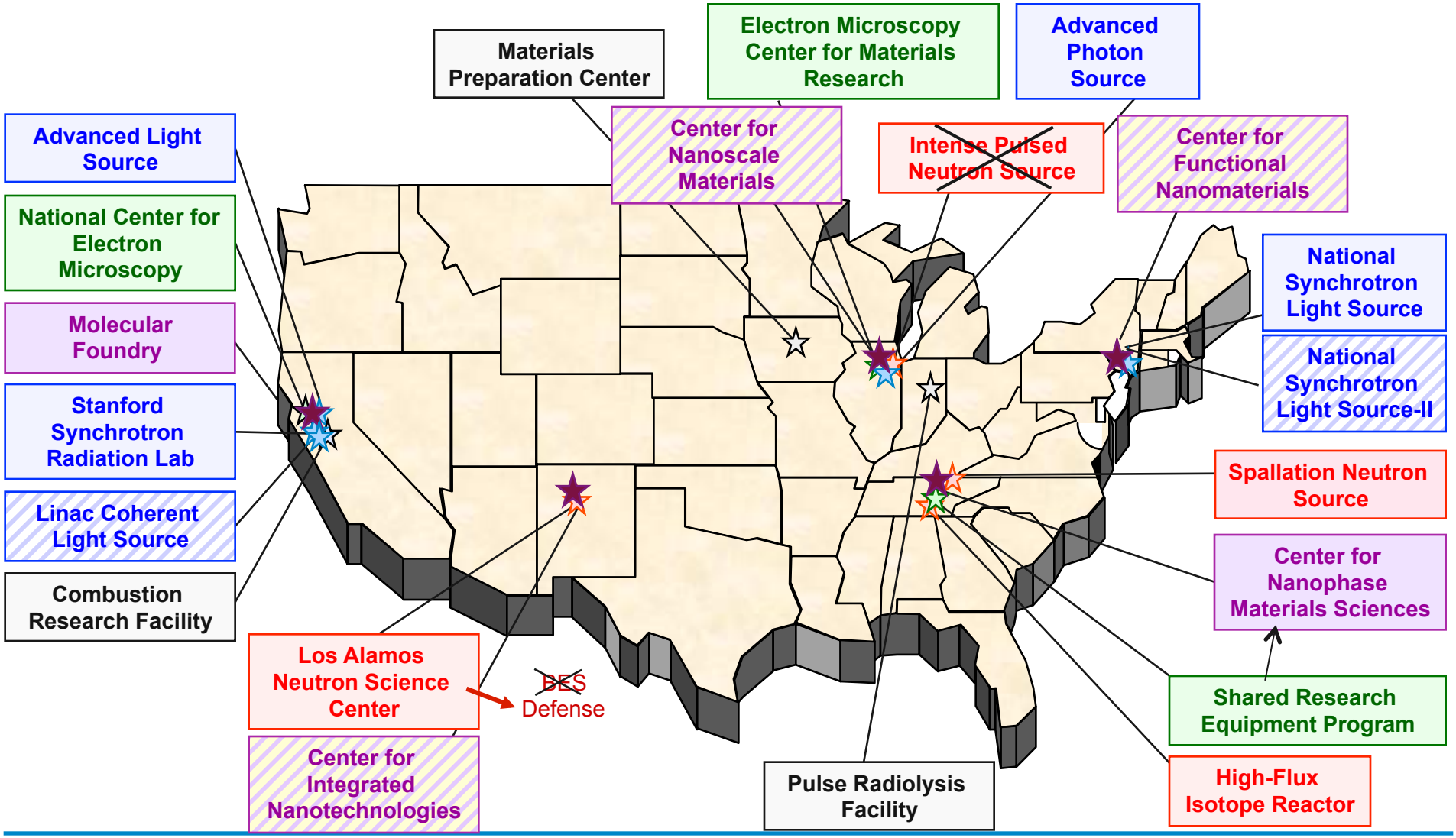
OAK RIDGE National Laboratory

X-ray and Neutron Sources (most DOE-Basic Energy Sciences)



Also 5 DOE Nanoscience Centers (BNL, SNL/LANL, ORNL, ANL, LBNL)
DOE Electron Microscopy Centers (ANL, LBNL, ORNL)

DOE-BES Scientific User Facilities



Also

36 EFRCs – Energy Frontier Research Centers, 4 HUBs
Advanced Scientific Computing Centers (e.g. NERSC)
NSF facilities (e.g. National High Magnetic Field Lab, CHESS, Nanotech)

ORNL Home to many User Facilities (acronym required)

- **HFIR - High Flux Isotope Reactor**
- **SNS - Spallation Neutron Source**
- CNMS - Center for Nanophase Materials Sciences
- BTRIC - Building Technologies Research and Integration Center
- CSMB - Center for Structural Molecular Biology (Bio-SANS)
- CFTF - Carbon Fiber Technology Facility
- MDF – Manufacturing Demonstration Facility (e.g. additive)
- NTRC - National Transportation Research Center
- OLCF - Oak Ridge Leadership Computing Facility
- SL - Safeguards Laboratory
- SHaRE - Shared Research Equipment (TEM, merged in CNMS)

Also, 2 EFRC's (Energy Frontier Research Centers), 1 Energy Hub (Nuclear Modeling and Simulation)
Try a google search of National Labs for your area

X-ray and Neutron Sources Available Worldwide

Scattering Science Goes Global – access varies

- **Light Sources summarized at www.lightsources.org**

  ~61 facilities: 48 synchrotrons + 13 free electron lasers (FELs)

  - European Synchrotron Radiation Facility (ESRF), Grenoble, France
  - SPRING-8, Japan
  - PETRA III, Germany
  - CLS, SLS, Shanghai, DIAMOND, BESSYII, SOLEIL, Taiwan, Pohang, …
  - XFEL.EU, SACLA, FLASH, …

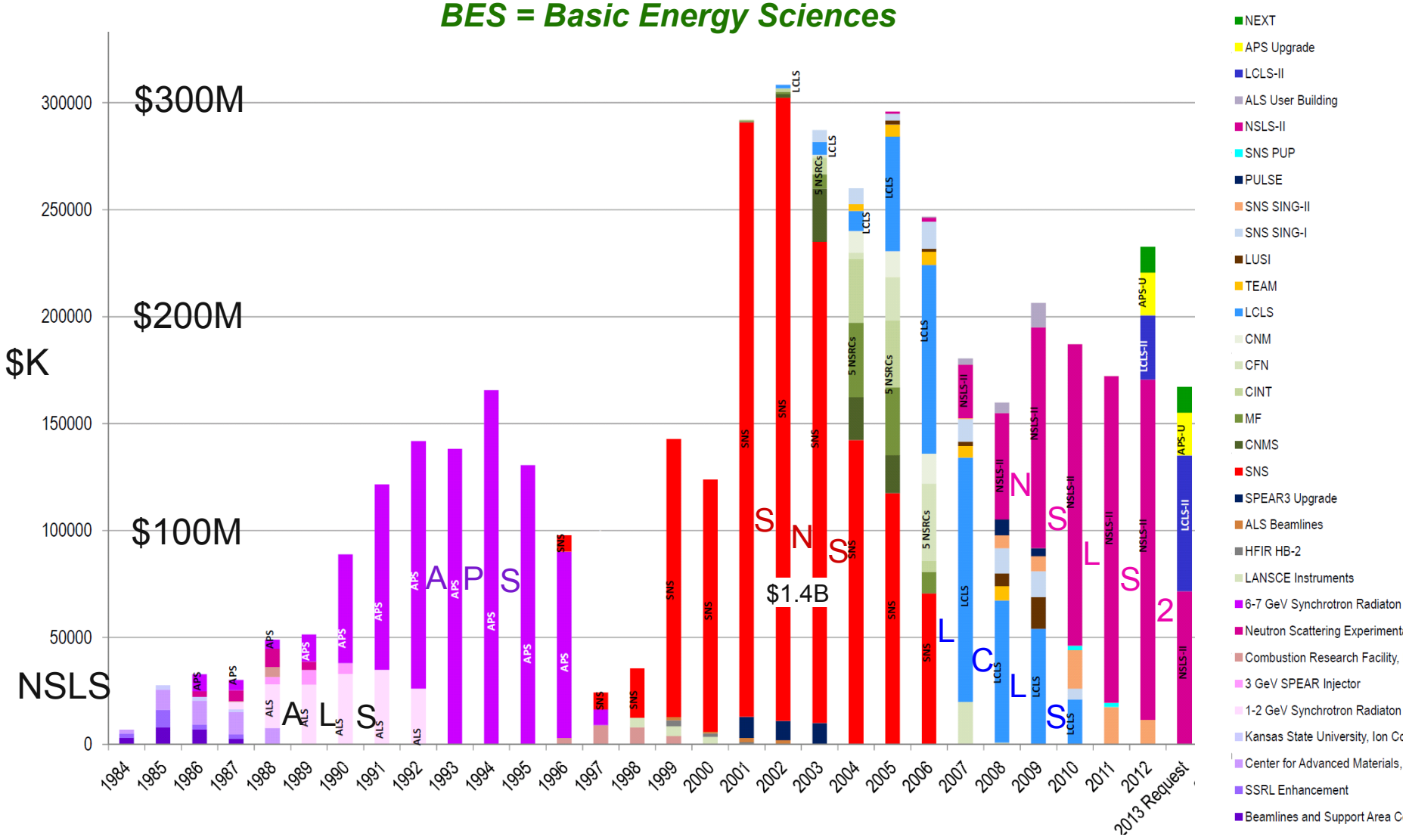
- **Neutron Sources summarized at www.neutronsources.org**

  ~50 research centers:

  - Institut Laue-Langevin (ILL), Grenoble, France
  - JSNS at J-PARC, Japan
  - ISIS UK
  - China Spallation Neutron Source, Dongguan (~2018)
  - European Spallation Source (ESS), Lund, Sweden (~2019)

DOE-BES Facilities Construction ~30 Years

BES = Basic Energy Sciences



BES MIE/Construction Funding Profile: 2000-2017

Current & Near Future?

BESAC – Basic Energy Sciences Advisory Committee

LCLS-II (-HE, ultrafast, high rep MHz)

NEXT (NSLS-II EXp. Tools)

APS Upgrade (ultrabright MBA, repeat CD-)

SNS 2nd Target (cold neutrons)

Ongoing evaluations - Subject to change

Difficult choices with large impact.

Science driven.

"Critical Decisions"

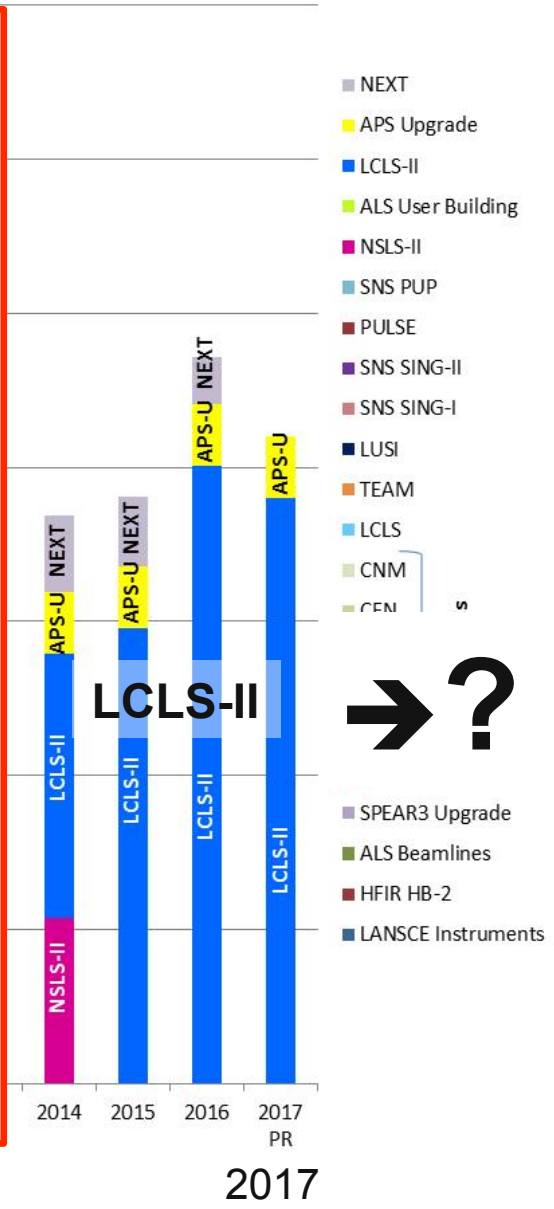
CD-0, Mission Need (proposal)

CD-1, Alternative Selection & Cost Range

CD-2, Performance Baseline

CD-3, Start of Construction

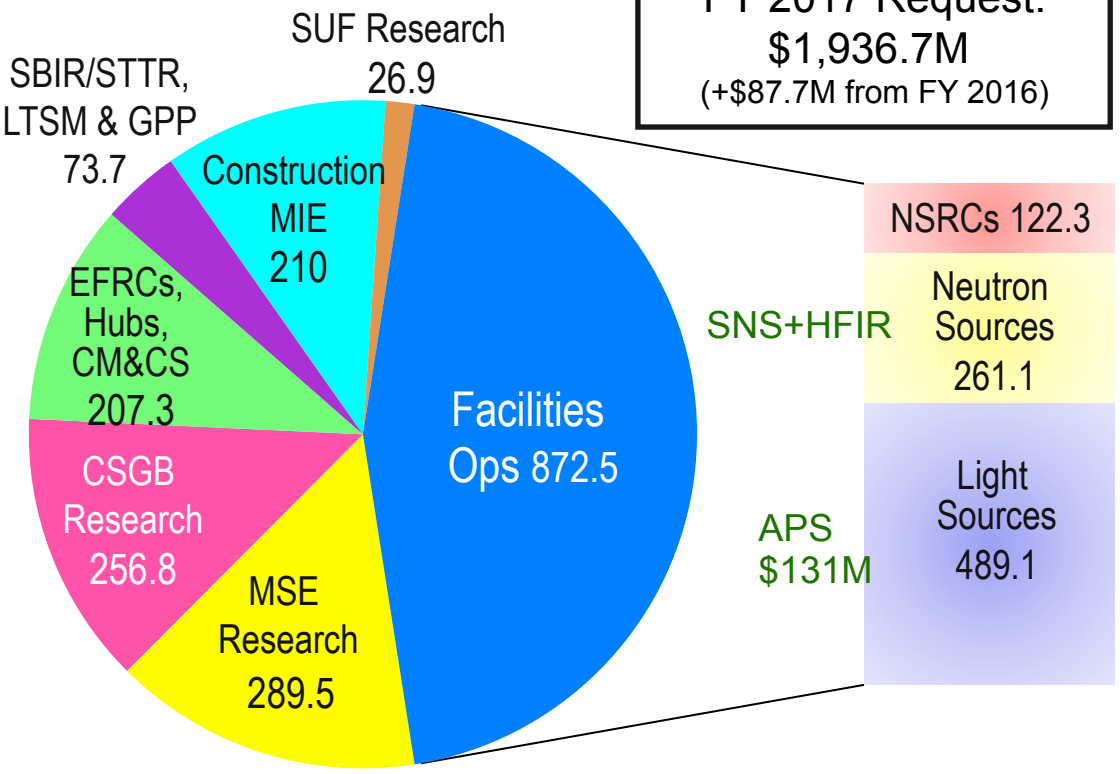
CD-4, Start of Operations



FY 2017 DOE BES Budget Request

Research programs (w/SBIR/STTR)

- Energy Frontier Research Centers (Δ = +$33.8M)
- Computational Chemical Sciences (new, $14M)
- Core Research* with increase for Mission Innovation and other new opportunities, including quantum materials, synthesis science, and subsurface science (Δ = +$52M)
- Energy Innovation Hubs & Computational Materials Sciences



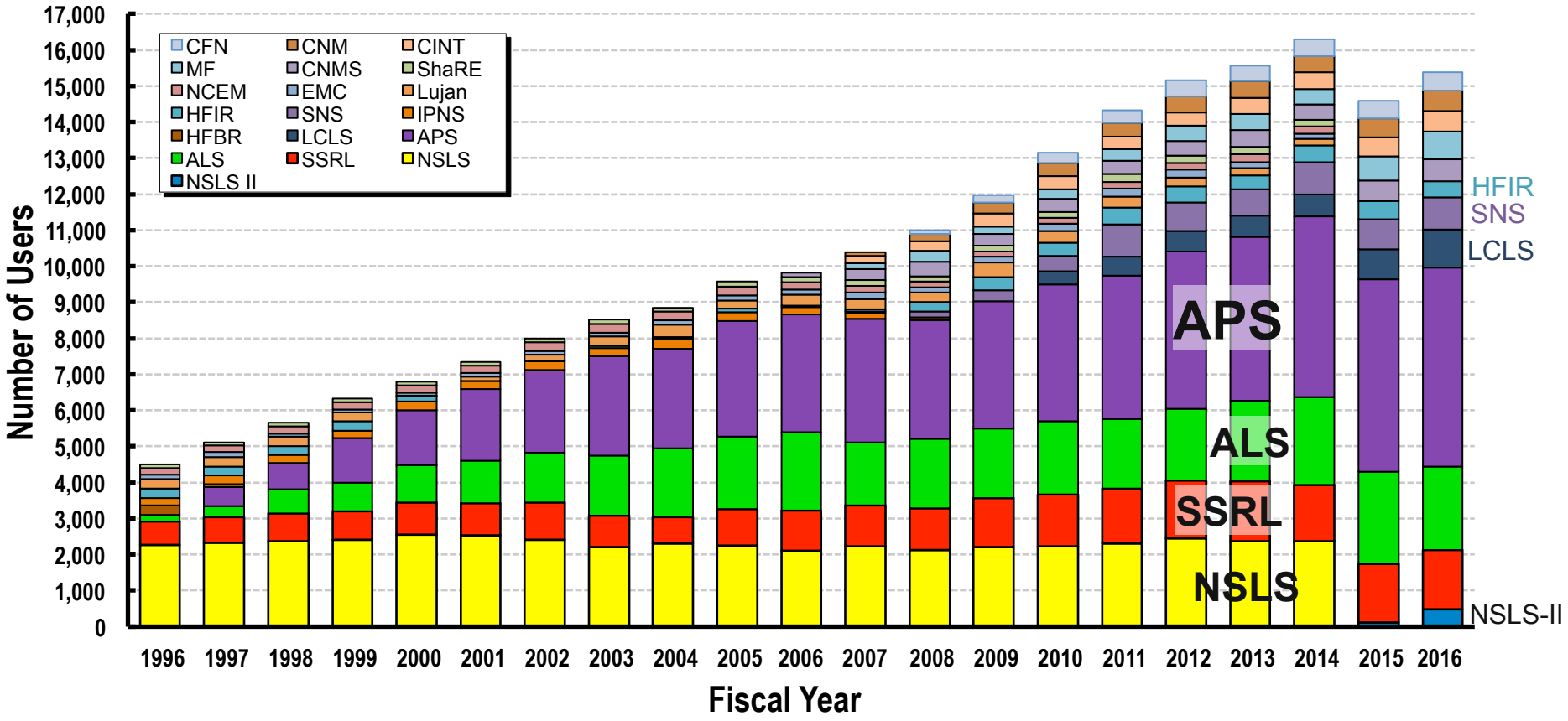
Scientific user facilities (w/SBIR/STTR)

- All full operating facilities at optimal operations (Δ = +$7.5M)
- Accelerator and Detector Research (Δ = + $4.8M)

Construction and instrumentation

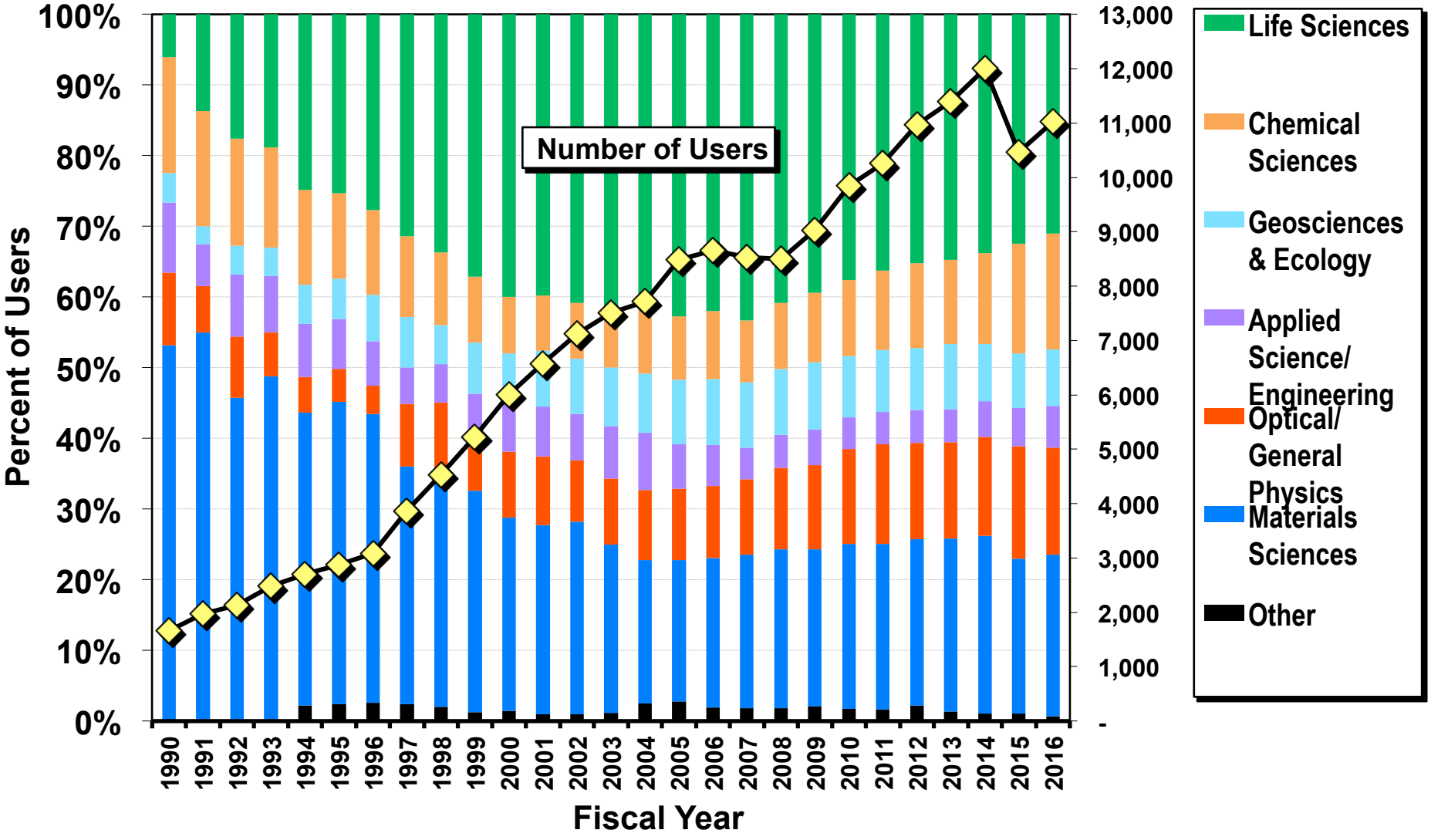
- Advanced Photon Source Upgrade
- Linac Coherent Light Source-II (Δ = -$10.3M)

BES User Facilities Hosted Over 15,000 Users in FY 2016

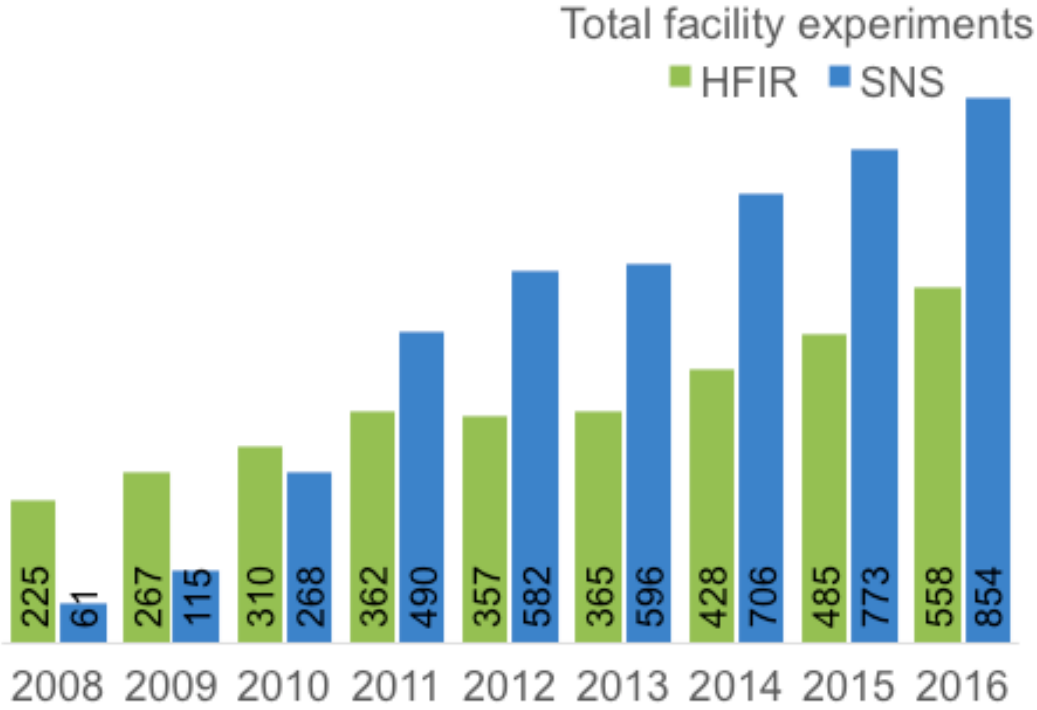


- NSLS-II started early operations in FY 2015.
- The three electron beam microcharacterization centers were merged administratively with their respective neighboring NSRCs in FY 2015.
- The BES operations at the Lujan Neutron Scattering Center ceased operations in FY 2014.

Users by Discipline at the DOE Light Sources

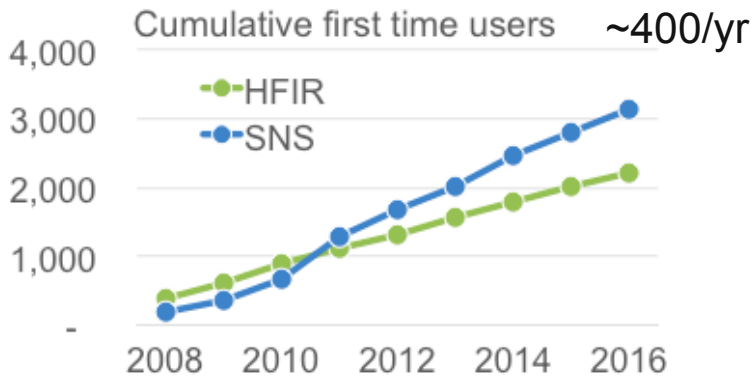


The SNS and HFIR user community continues to expand

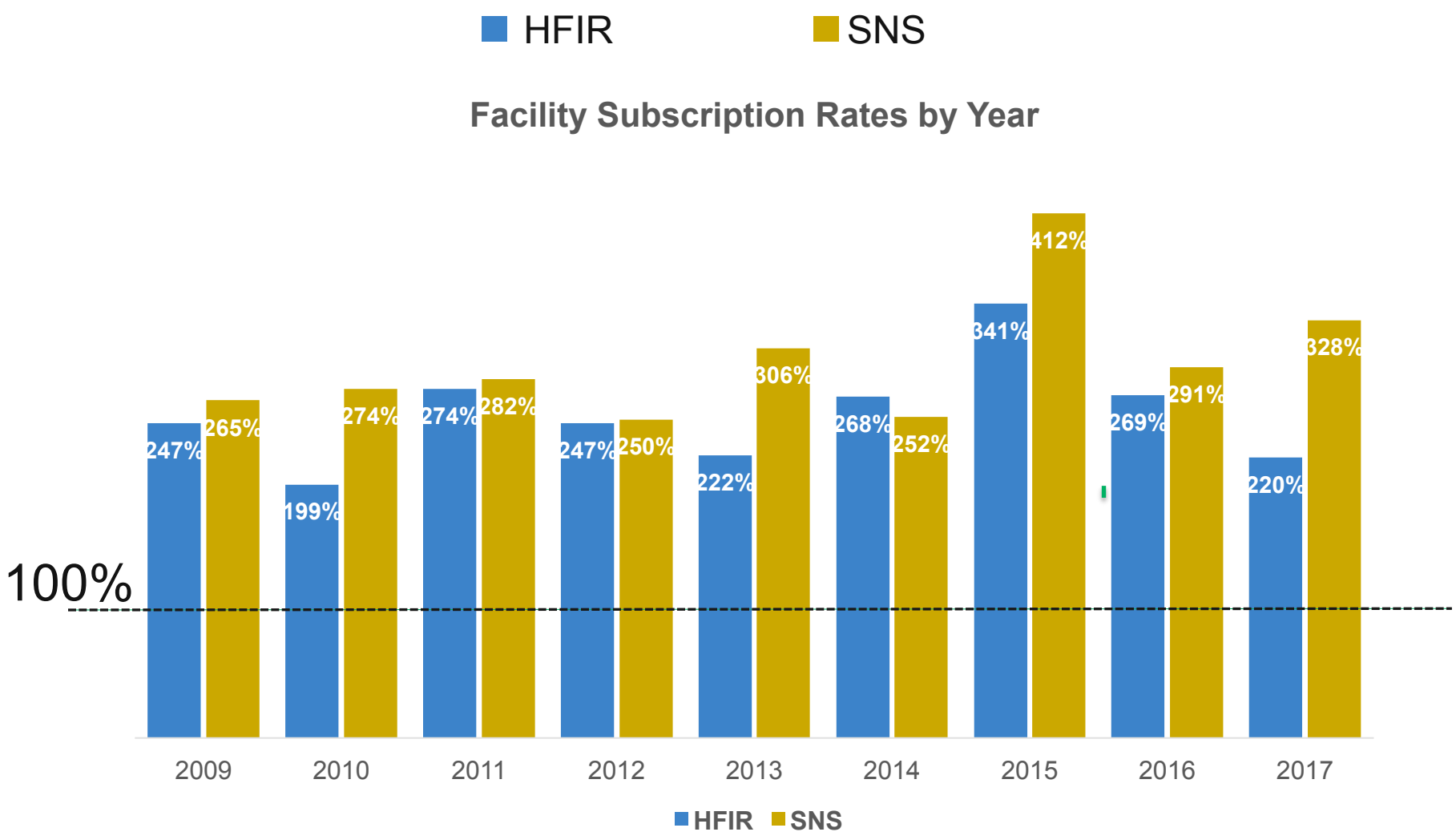


2016
SNS 854
HFIR 558

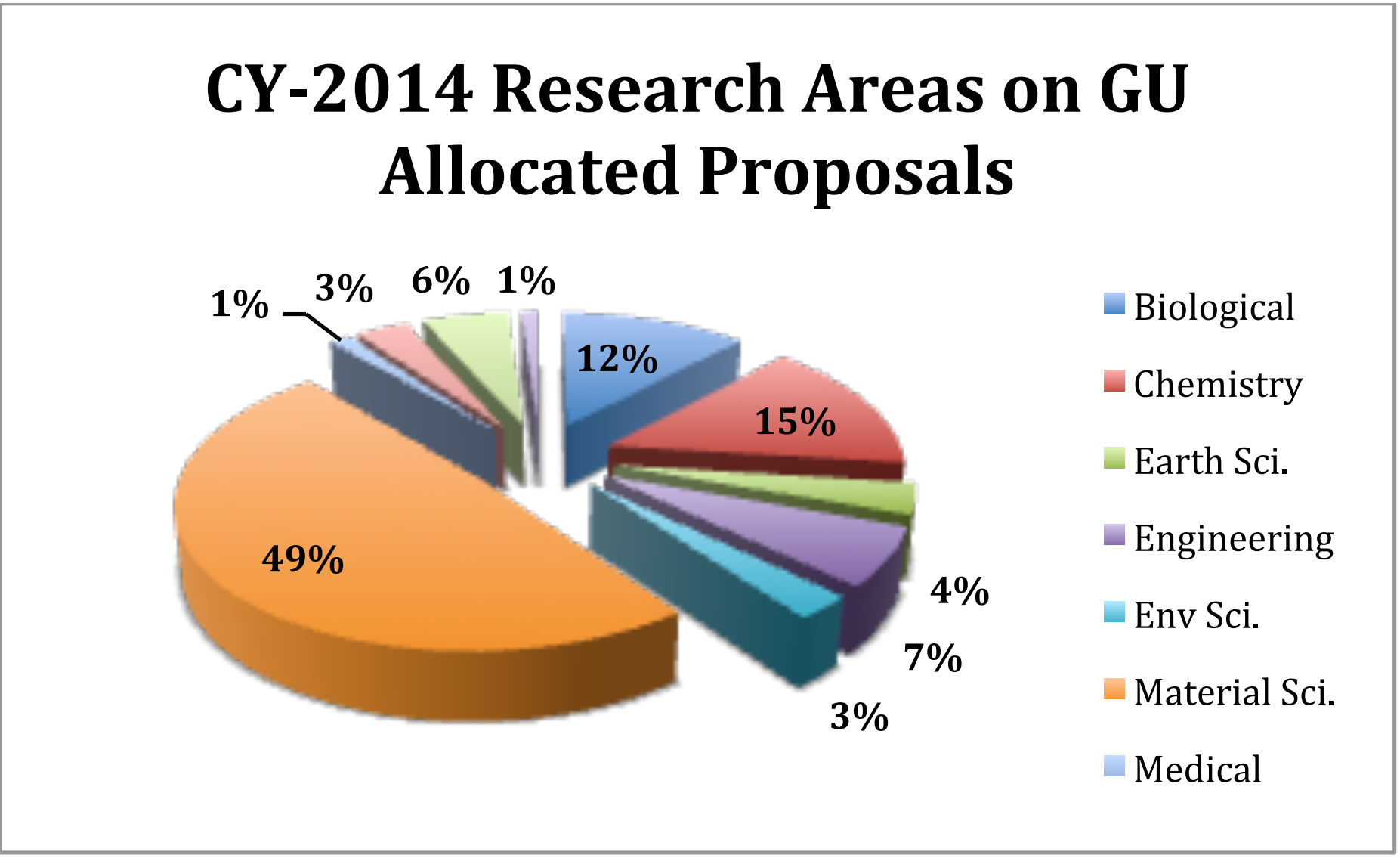
1412 experiments



Overall subscription rates at both facilities remain high



Neutron User Communities



Basics of the facility proposal systems

How do you beamtime with enhanced success rate?

- All the DOE (NIST & NSF) neutron and x-ray sources offer access to beam time through an experimental proposal system. "General Users (GU)".
- Proposal submission is done through a web-based application. When and how often proposals are submitted varies by facility.
  - APS and NSLS-II three times ("cycles") per year.
  - SNS/HFIR and ALS two times per year
- All proposals are peer-reviewed and rated, and beam time is allocated using the scores of these reviews. Once time has been allocated, the beamline staff schedule the proposals.

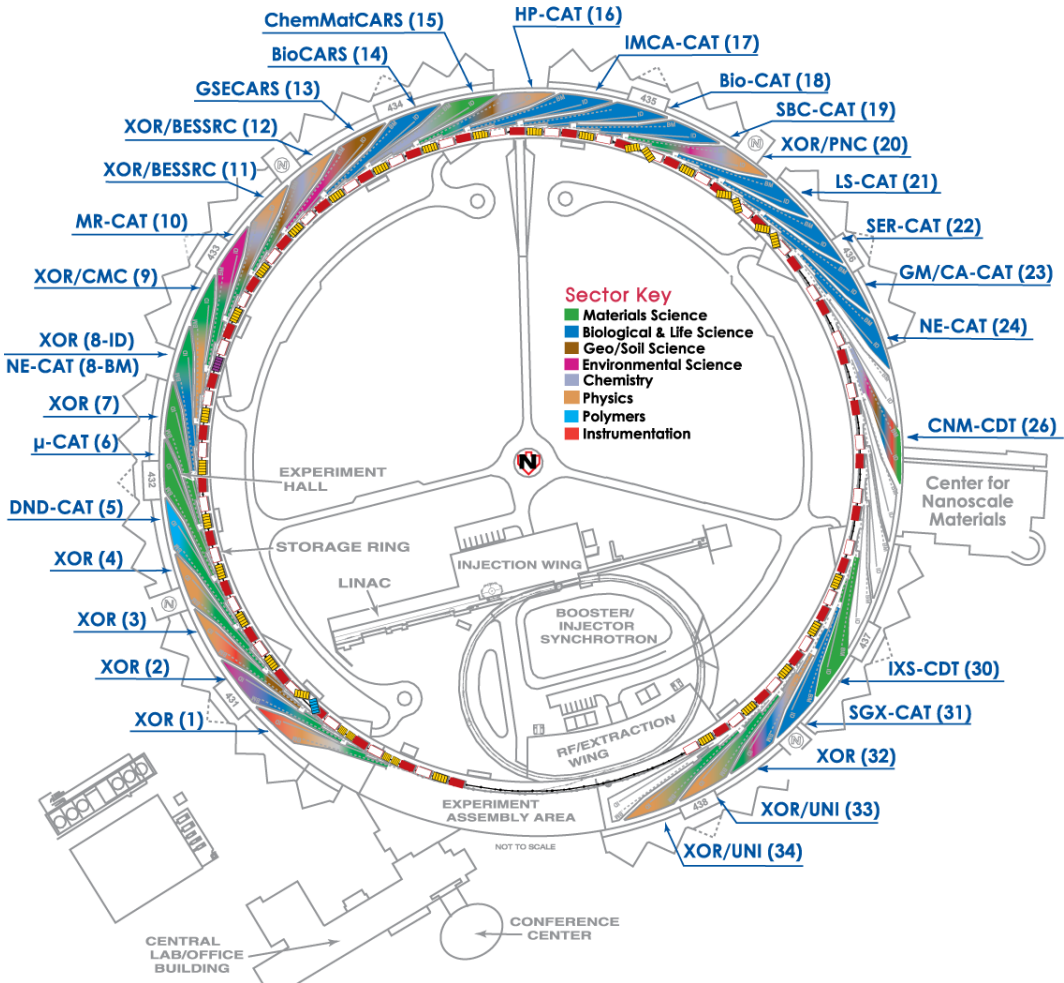
Amount of general user time available

APS/NSLS/SSRL/ALS

- ✓ All beamlines offer GU beam time.
- ✓ Most DOE/NSF funded beamlines provide 80-100% of their time to general users.

SNS/HFIR

- ✓ Amount varies by instrument.
- ✓ ~75% of time will be for general users.



For most, you can search facility websites by technique or by beamline. Quality of proposal websites varies.

Upcoming Proposal Deadlines *www.lightsources.org/deadlines*

X-ray sources (cycles/yr)	**Deadlines**
APS (3)	Oct 27, 2017 (every 4 months)
ALS (2)	Sept 6, 2017 (every 6 months)
NSLS-II (3)	Sept 30, 2017
LCLS (~2)	May 4, 2017
SSRL (3)	~Sept 1, 2017

Neutron sources	
HFIR/SNS (2)	HFIR Oct 11, 2017. SNS down.
NIST-NCNR (~2)	March 14, 2017 (less regular)

- These are hard deadlines.
- APS always at Friday midnight (12:05 → next cycle)
- Inside Tip: Starting APS application process early (save without submitting) gives you a lower ID #.

Users Get Started with Assistance of the Instrument Scientists

- Study instrument web pages
- **Contact an Instrument Scientist to discuss your research**
  - What is the research problem?
  - Which instrument(s) are appropriate? (scores?)
  - How mature is the research project (risk, size)?
  - What is the material – sample composition, form, size, availability?
  - What are the experimental conditions (temperature, pressure, magnetic field, etc)?
  - What will be measured?
  - Probability of success? Impact? Significance?
  - How will results be presented and to whom?
  - What is the timeline?

Instrument Scientists Assist First-time and Returning Users

- **Provide technical advice, guidance, and assistance**
  - Instrument options
  - Sample and experiment preparation
  - Number of experiment days
  - Logistics (scheduling, transporting and storing samples)
  - Proposal preparation tips and assistance
  - Experiment team members
  - Data analysis
  - Publication considerations

In general, consider beamline staff as collaborators, include as co-authors if appropriate.

Submitting a proposal

Facilities have link on home page

BROOKHAVEN NATIONAL LABORATORY — National Synchrotron Light Source II — U.S. DEPARTMENT OF ENERGY

Home | About | For Users & Staff | For Industry | Beamlines | Research | News & Publications | People | Intranet

PASS

Proposal Allocation, Safety, and Scheduling System

NSLS-II

All General User proposals for NSLS-II beamlines must be submitted through the PASS system. For those users familiar with the original NSLS PASS system, it has been retired. Authentication through the new PASS system can be completed with either (1) a BNL domain account or (2) a Google account. If you do not have one of these accounts, you'll need to sign up for a free Google account before continuing.

Enter PASS

Questions

User Administration Office

Once you log in to PASS, you will be able to view a list of your proposals and submit new proposals. You may find it convenient to complete the General User proposal using this MS Word template prior to login, and then copy/paste the information into the proposal form online. (See the NSLS-II User Guide for details of the General User proposal submission process.) Please note that other features of the PASS system, including the Safety Approval Form (SAF) system, are still under development and will be made available to users in time for proposal allocation.

Run	Run Dates	GU Proposal Deadline	Beamlines Available
2015-1	Jan—April 2015	October 27, 2014	CSX1, CSX2
2015-2	May—Aug 2015	February 9, 2015	CSX1, CSX2, CHX, HXN, XPD, SRX
2015-3	Sept—Dec 2015	June 1, 2015	CSX1, CSX2, CHX, HXN, IXS, XPD, SRX

During the first year of operations, the initial suite of seven beamlines at the National Synchrotron Light Source II will be open for General User proposals as indicated in the table above. NSLS-II currently has 30 beamlines under various stages of development. See the beamlines page for details.

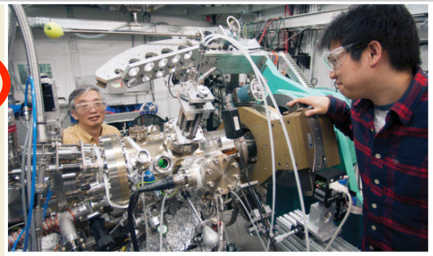
In addition, for those beamline programs that will not be available for several years, NSLS-II has coordinated with other DOE

Argonne NATIONAL LABORATORY — Advanced Photon Source — » an Office of Science User Facility — U.S. DEPARTMENT OF ENERGY | Office of Science

About | User Information | Science & Education | Media Center | Beamlines | Divisions | Industry | Search APS ...

Argonne Home › Advanced Photon Source ›

Welcome
Visitor Information
Job Openings
Apply for Beam Time
Machine Status | Schedule
Conferences
Seminars & Meetings
Publications
Safety and Training
Construction Schedule
Find People
Organization Charts
Email | WebVPN | Intranet
APS Conference Rooms
Suggestion Box
Document Central
Argonne Guest House
Argonne Accelerator Inst.
National User Facility Org.
lightsources.org



The Advanced Photon Source provides the brightest storage ring-generated X-ray beams in the Western Hemisphere to more than 5,000 scientists worldwide.

APS User Portal

APS

EVENTS AND ANNOUNCEMENTS

June 27 : Friday
User Science Seminar
APS Seminar | 401-A1100 @ 12:00 PM

July 11 : Friday
User Science Seminar
APS Seminar | 401-A1100 @ 11:00 AM

Reminders
National School on Neutron and X-ray Scattering
June 14, 2014 - June 28, 2014
Apply for Beam Time - Deadline
July 11, 2014

APS Upgrade Project

APS-U MBA LATTICE WORKSHOP Information

NIST Center for Neutron Research — NIST National Institute of Standards and Technology

Home | UserProposal | Experiments | Instruments | SiteMap

NIST

CALL FOR PROPOSALS
June 2015

Proceed to the following links for details on proposal submission, proposal review, and site access.

- PROPOSAL FORMS
- PROPOSAL INSTRUCTIONS including TIPS ON PROPOSAL WRITING
- PROPOSAL REVIEW AND BEAM TIME ALLOCATION
- OBTAINING SITE ACCESS

The NIST Center for Neutron Research (NCNR) offers neutron scattering and chemical analysis instruments to all qualified users.

******

The next deadline for receipt of proposals is Tuesday, June 16, 2015.

Note that continuation proposals are no longer a separate category, and the deadline applies to all proposals, except for Quick Access proposals. All proposals will be critically reviewed for scientific merit by experts external to the NCNR.

Proposals that are favorably reviewed by referees and recommended by the Beam Time Allocation Committee will be scheduled for experiments from September 2015 through March 2016.

******

For this proposal round:

PROPOSAL SUBMISSION FORM
You must have an account on the new NCNR Information Management System (NCNR-IMS) to submit a proposal. Go to the login link on the upper left hand side of our home page. Login if you have an account, or create an account if you do not. Your email address is your user ID. It may be that you may already have an account of which you are unaware. You will know this if you try to create an account referring to an existing account with the same email address. We can send you your password in the latter case, or if you have forgotten your password. PLEASE do not create duplicate or multiple accounts.

NEW! INCREASED AVAILABILITY FOR THE MULTI-ANGLE CRYSTAL SPECTROMETER (MACS) THIS ROUND
MACS has been relocated from neutron guide NG-0 to beam tube BT9, where it has its own dedicated cold source. The spectrometer is now operating routinely. MACS is a cold neutron instrument featuring 20 individual detection channels, each with its own focusing graphite analyzer. It provides superior data rates for many situations, including magnetic scattering from low-dimensional systems.

NOTE! MAIL-IN SAMPLES FOR POWDER DIFFRACTION
We will accept proposals for experiments on the BT1 powder diffractometer on "mail-in" samples. That is, for approved proposals, samples may be mailed to NCNR staff, who will execute the data collection. Up to 25% of BT1 instrument time may be allocated to such proposals. **NOTE THAT ONLY SUCH MAIL-IN PROPOSALS ARE ACCEPTED FOR BT1.**

SPINS AND NG7 REFLECTOMETER UNAVAILABLE THROUGH PROPOSALS. SPINS, the spin-polarized triple-axis spectrometer on NG-5, is no longer being offered to users through proposals. Likewise, the NG7 horizontal-sample reflectometer is no longer available through proposals. If you wish to use SPINS OR NG7 REFL, you may contact an NCNR staff member to investigate whether a collaborative research project is possible.

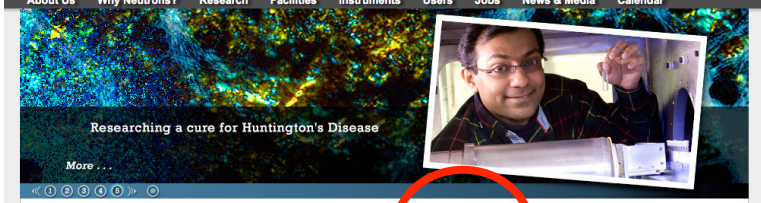
UPLOAD A PDF document of the description of your experiment on our proposal form.
The new feature allows you conveniently to include figures and equations. The uploaded material may be no larger than 600 kb in file size, nor longer than 4 letter-size pages in length. The font size must be 12 point or larger.

ORNL Neutron Sciences

STAFF | STUDENTS | INDUSTRY | COMMUNITY | VISITORS — Home | Find People | Contact Us | Site Map | Search | Go

OAK RIDGE NATIONAL LABORATORY — NEUTRON SCIENCES — SNS — HFIR

About Us | Why Neutrons? | Research | Facilities | Instruments | Users | Jobs | News & Media | Calendar



Oak Ridge National Laboratory is home to two of the most advanced neutron science research facilities in the world, the ***Spallation Neutron Source*** and the ***High Flux Isotope Reactor***.

NEWS & UPDATES | USER INFO | EDUCATION | PUBLICATIONS

Neutron Scattering Science Call for Proposals

Thank you for submitting more than 570 proposals for the current call. The next call deadline will be August 25, 2010.

Let us know what capabilities would you like to see at SNS and HIFR.

More User Information

News Feed

OPERATING STATUS

SNS Beam on target at ~870kW. The plan for Tuesday is Neutron Production without any interruption.

HFIR is operating at 85MW for fuel cycle 429

UPCOMING EVENTS

13 JUN — Goldschmidt™ Conference — Knoxville, TN, USA

19 JUN — National School on Neutron and X-Ray Scattering — Oak Ridge, TN, USA

SNS
HFIR

Different types of proposals allow facility flexibility

Each facility has particular systems or proposal modes:

APS

GUP - General User Proposal. A "rapid-access beamtime request" against a submitted proposal can be considered for any unallocated general user time during the current run.

PUP – Partner User Proposal - Groups whose work involves a greater degree of collaboration with the APS. (e.g. major new instrumentation or technique).

Rapid Access – after deadline, beamline staff can run if time available (quick, high impact)

Mail –in – 11 BM powder XRD accepts both on-site and rapid-access mail-in service. Very easy – they send you capillary tubes. This capability is not obvious on the GUP website.

CHESS – Cornell (NSF)

Express-Mode proposals are for a single visit of limited duration to CHESS to perform a straight-forward experiment. Express-Mode proposals undergo a rapid on-line review process to enable users to quickly gain access to beam time.

Feasibility Study proposals are to test an idea or procedure at one of the CHESS stations.

NSLS ➔ NSLS-II

17 NSLS-II beamlines now accepting General User Proposals

Commissioning on some other beamlines – opportunity to test ideas

Proposal types: General user, Discretionary (staff), Partner, Proprietary, Rapid Access

Different types of proposals allow facility flexibility – cont.

SNS HFIR

General User (majority of proposals – one cycle)
Programmatic (allows >1 cycle, e.g. your thesis)
Mail-in powder POWGEN, NOMAD, and VISION
Proof of principle (feasibility – 1 day)
Sample alignment (add to other proposal) HFIR CG-1B Laue
Rapid Access - high impact, can be submitted anytime

NIST NCNR

MAIL-IN SAMPLES FOR POWDER DIFFRACTION

Accepts proposals for experiments on the BT1 powder diffractometer on "mail-in" samples. That is, samples may be mailed to NCNR staff, who will execute the data collection.

QUICK ACCESS PROPOSALS

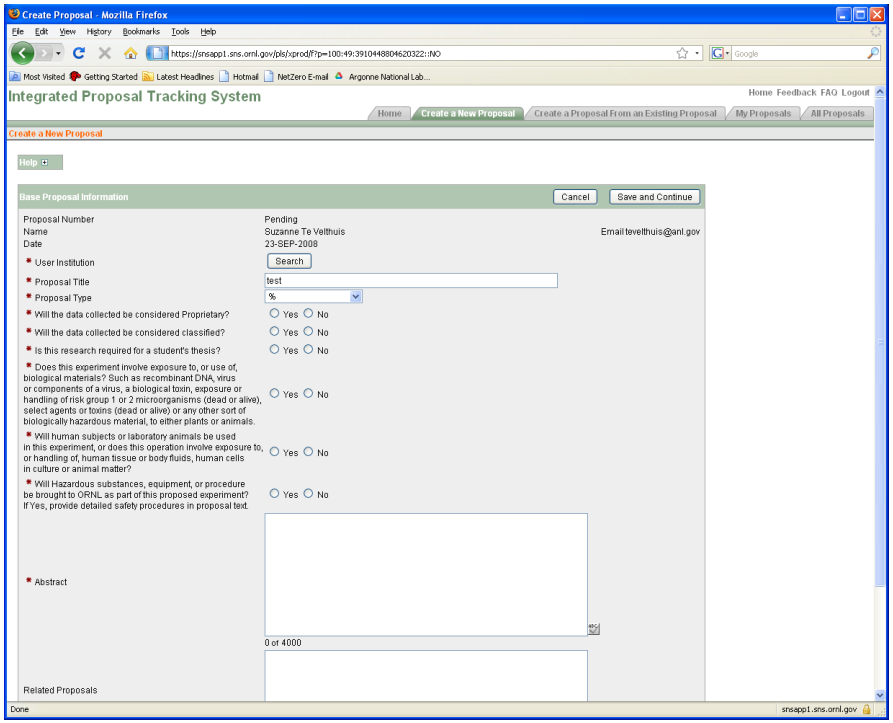
If a user feels that beam time is required very soon to carry out important measurements that cannot be delayed, a proposal may be submitted requesting expedited access. The proposal will be reviewed by the BTAC, and held to a substantially higher standard than regular proposals.

Macromolecular Crystallography is often a separate, self-contained community

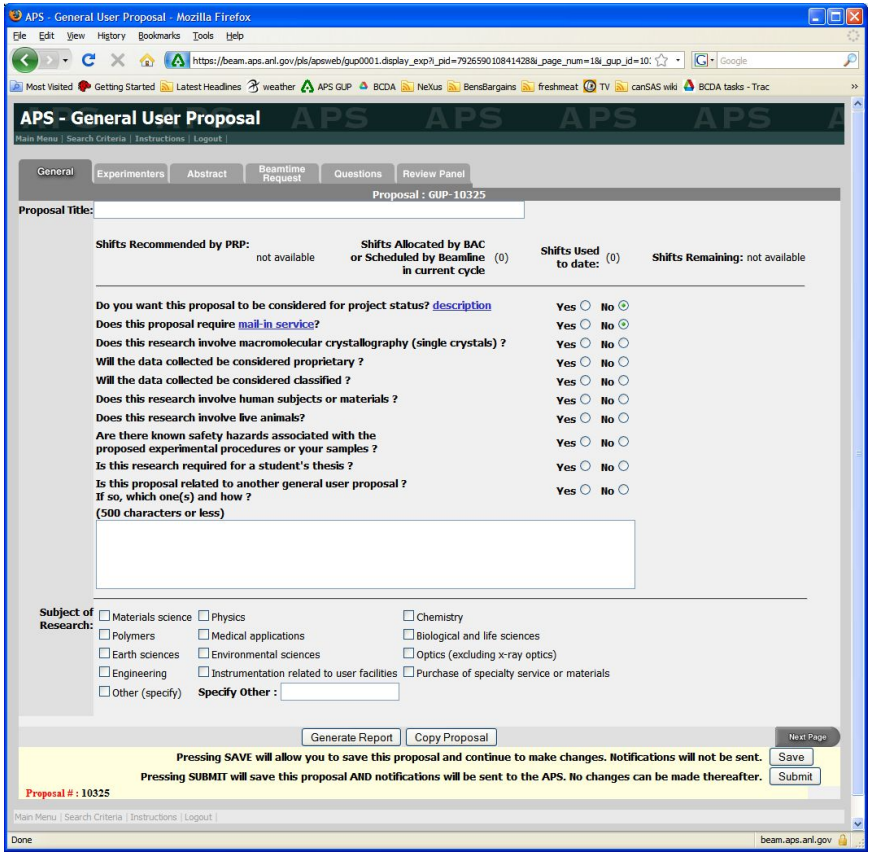
- A separate proposal system at APS.
- Highly automated for mail-in measurements.
- Beamtime relatively available.

Proposal forms at SNS and APS

SNS/HFIR



APS

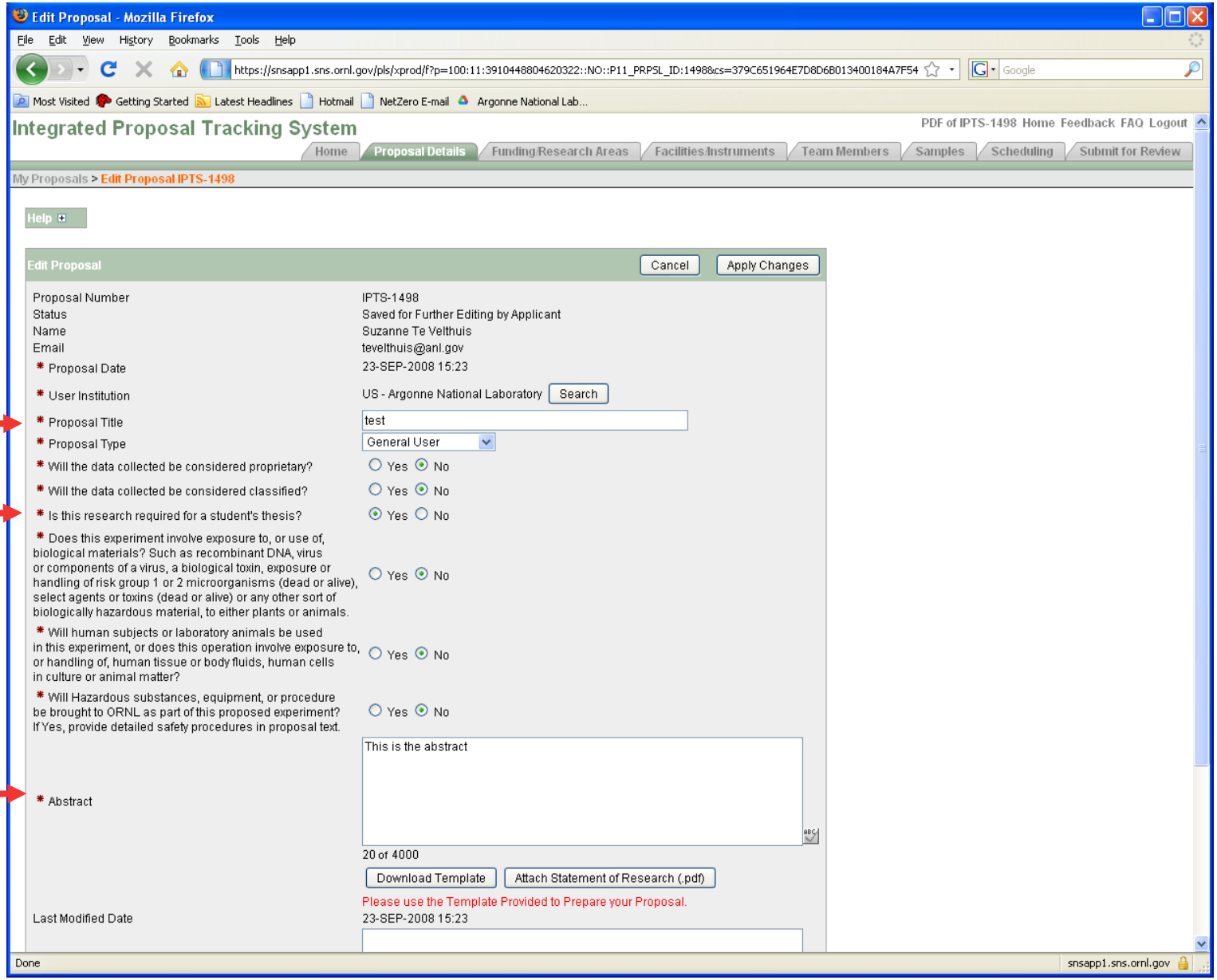


Each proposal system will ask very similar questions

Questions asked

- Proposal Title
- General Info (Title, Experimenters, Funding source, etc.)
- Abstract - What is the ***scientific importance*** of the proposed research?
- Why do you need the facility to do this research?
  - (Neutron vs. X-rays) or (Neutrons + X-rays)?
  - Why do you need an insertion device beamline instead of a bending magnet?
  - Spallation source vs. reactor source
  - Hard X-rays vs. Soft X-rays
- Why do you need the beam line (and/or instrument)?
  - Particular technique or sample environment
- What previous experience / results do you have (pubs important)?
- Describe the proposed experiment(s), including samples and procedures. Show that you're prepared.
- Justification of the amount of time requested. Don't be greedy or unrealistic about time needed. Ask beamline staff.

General Information



Proposal: General information

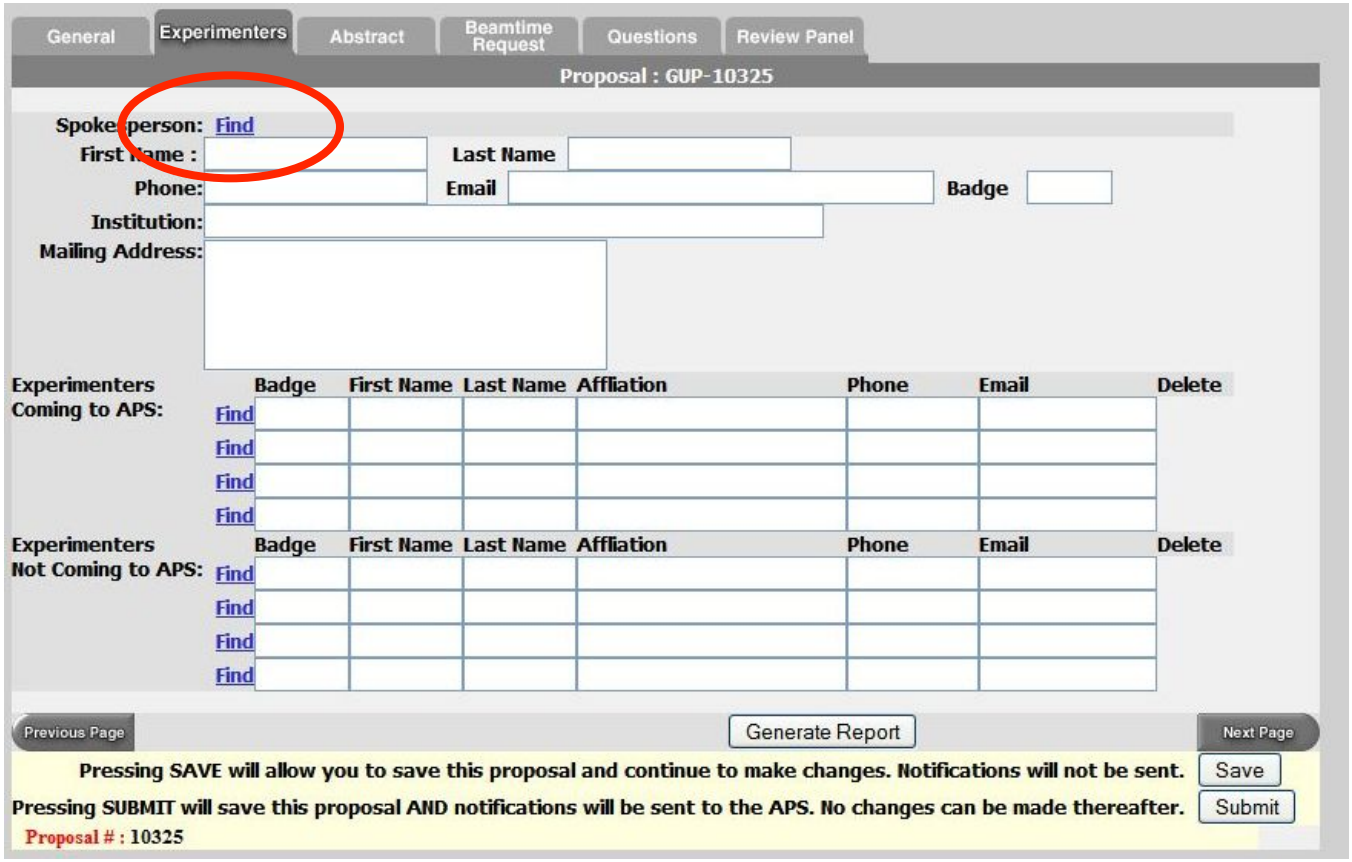
- Pick a good title. Specific and to the point is better than spectacular and vague. Spectacular and specific is fine if credible.
  - Good: “XAS study of Fe valence in CaFe2As2 under pressure ”
  - Bad: “Understanding superconductivity in superconductors”

- Is it thesis related? Is there a deadline?
  - Will push your proposal up if scores are close

- Fill in the abstract - This is where reviewer develops first impression.
  - Do not just upload a PDF document! More work for reviewer.
  - Science impact in abstract is most important criteria for score.

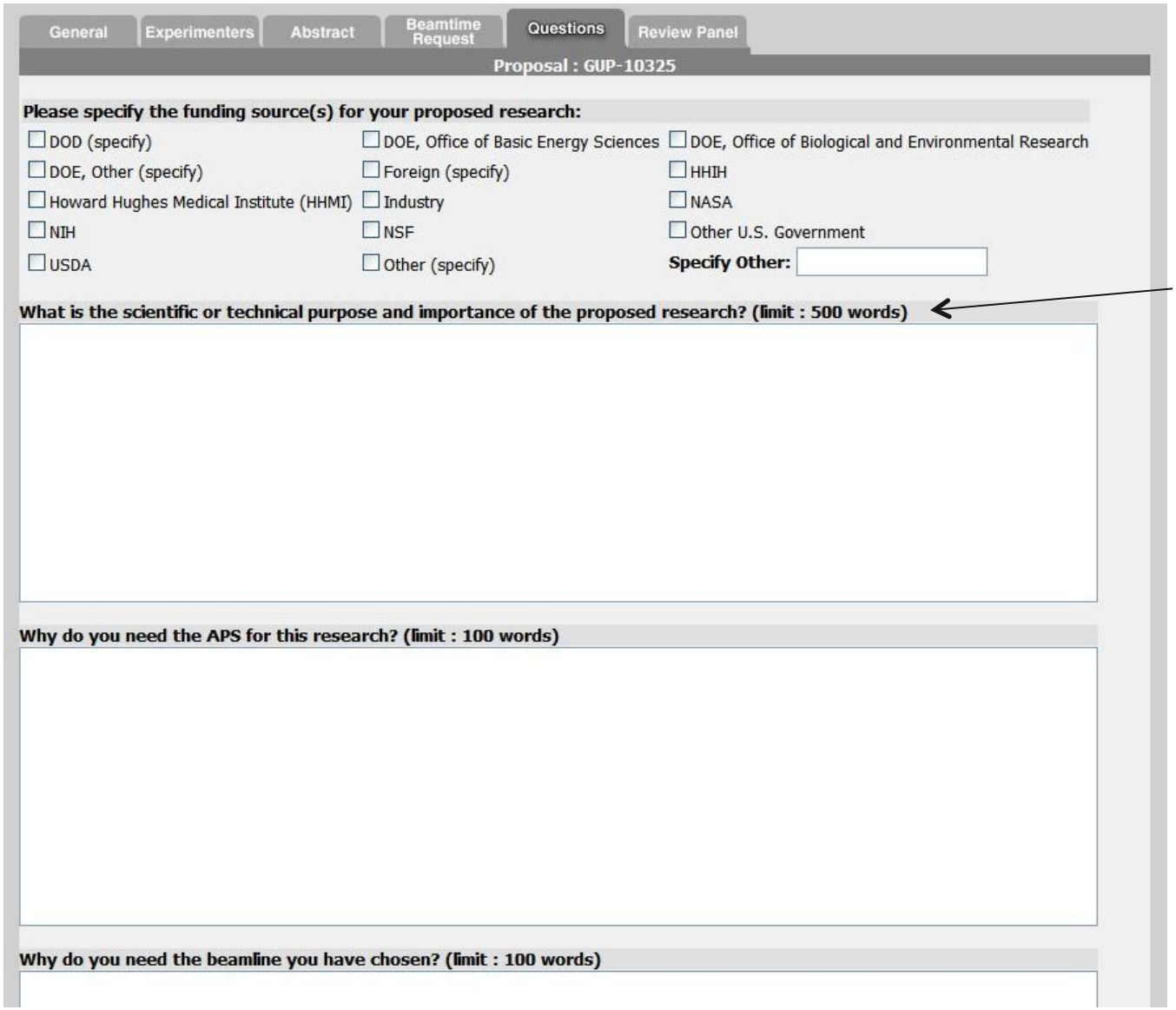
- Do upload a figure/publication from previous work.
  - Shows you made good use of beam time. Becoming more important.
  - Do not upload a 20 pages of supplemental information (figures often help, couple of plots with text OK)

Proposal: Experimenters page



- Use the “find” feature
- List everyone involved in experiment
- Even theorists are useful to show impact and collaborations

Experiment Description



Note guidance!

Don't write one sentence or 1000 words.

Do not use undefined jargon or acronyms that could frustrate reviewer!

Experimental Details

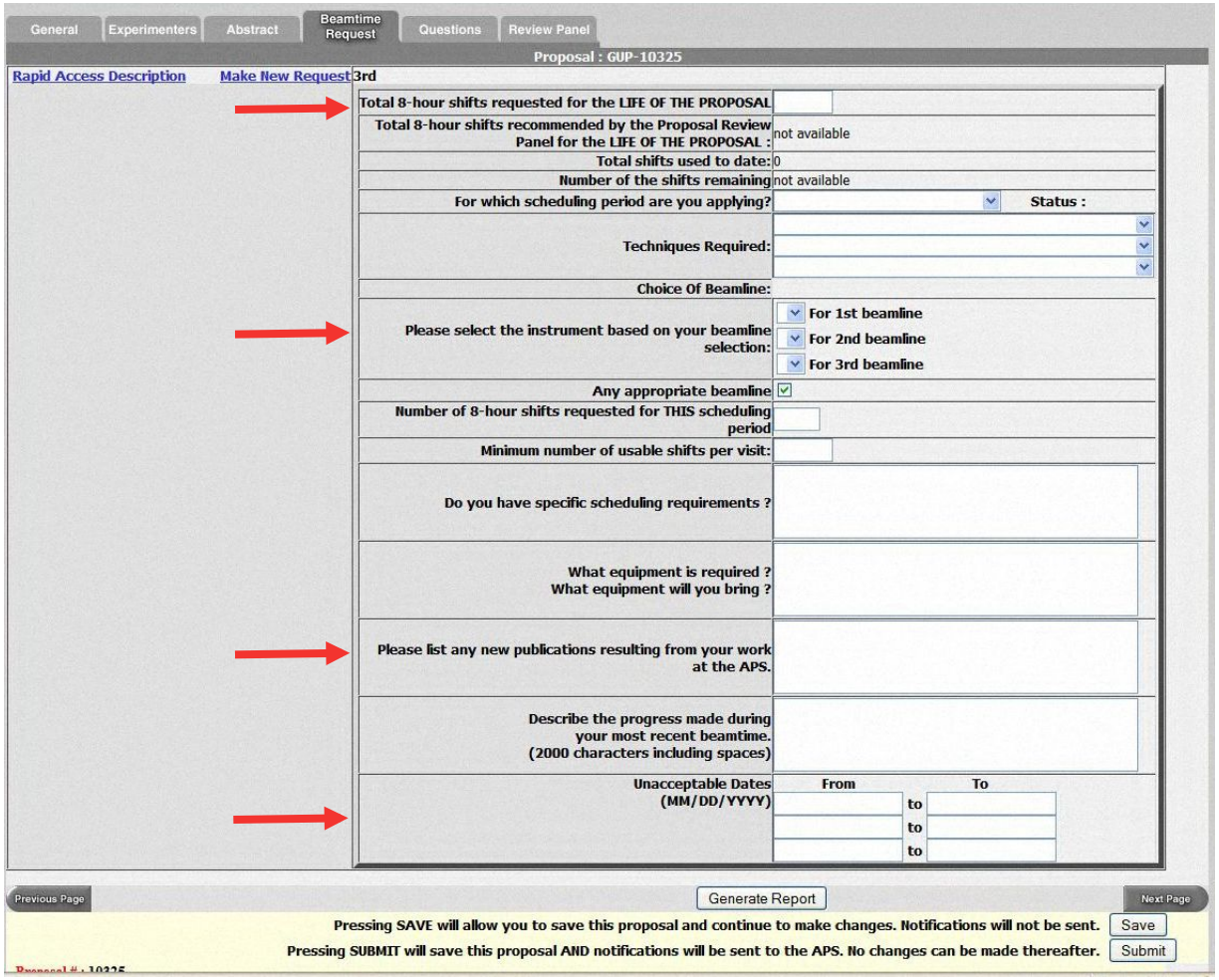
- Give background information why it is important.
  - Science at facilities is very diverse. Reviewer is not necessarily an expert on your subject. Try to capture imagination of reviewer with basic idea.
  - Each committee gets many proposals each cycle. Proposal needs to be clear.

- Clearly state what you want to measure and how
  - Give some details. Temperature range, X-ray Energy, Sample geometry
  - What sample characterization has been done already? (XRD, SEM, etc.)
  - Reviewer and beamline need to judge if experiment is feasible
    - *Does x-ray energy match laser penetration depth*
    - *% of dilute atoms OK for fluorescence measurements*

- Why use x-rays or neutrons?
  - Neutron vs. X-rays OR Neutron + X-rays?
  - TEM, Mössbauer, Laser Raman, etc.

- Justify the amount of beam time requested (ask instrument scientist!)
  - Be reasonable.

Beamtime Request



- APS proposals are valid for two years, but need to put in beam time request each cycle.
- Chose multiple beamlines.
  - SAXS (12-ID, 5-ID, 15-ID)
  - XAFS (20-BM, 10-ID,12-BM)
  - General Diffraction
- Don't list only one week that you can come. Holidays?
- Special sample environment / detectors will place more constraints on schedule.
  - GE amorphous Si detector
  - Magnet
  - ….

Ratings for APS Proposals

Table 1. Definition of Ratings Used in Reviewing General User Proposals	
1 - Extraordinary	The proposal involves highly innovative research of great scientific importance. Proposed research will significantly advance knowledge in a specific field or scientific discipline. Considerable societal relevance is demonstrated. The radiation characteristics of the APS are highly desirable for the success of the proposed work.
2 - Excellent	The proposed research is of high quality and has potential for making an important contribution to a specific field or scientific discipline. The work is cutting edge and is likely to be published in a leading scientific journal. The radiation characteristics of the APS are important to the success of the proposed work.
3 - Good	The proposed research is near cutting-edge and likely to produce publishable results. Impact on a specific field or scientific discipline is likely. Synchrotron radiation is essential to accomplish the intended goals of the research. The proposed work will greatly benefit from access to the APS.
4 - Fair	The proposed research is interesting but may not significantly impact a specific field or scientific discipline. Publication may or may not result from this research. Synchrotron radiation is required, but the proposed work could be performed at other facilities.
5 - Poor	The proposed research is not well planned or is not feasible. Results would not make important contributions to fundamental or applied understanding, and work is not likely to result in publication. The need for synchrotron radiation is not clear.

APS proposals are rated on a scale from 1 to 5
Average score was ~2.2
Cut off score for receiving beam time varies by beamline (1.5 - 2.2)

Proposal "**ageing**" (score improves by 0.2 each cycle it does not receive time). This is needed for getting time at some oversubscribed beamlines, so long-term planning is needed. But you have to remember to request beamtime again for every cycle.

Pick appropriate panel – Important!

Old APS Panels

High Pressure
Instrumentation
Imaging/Microbeam
Macromolecular Crystallography
Scattering Applied Materials

New Panels

High Pressure
Instrumentation
Imaging/Microbeam
Macromolecular Crystallography
Scattering - Condensed Matter
Scattering - Applied Materials
Scattering – Chem / Biol / Environment
Small Angle Scattering (SAXS)
Spectroscopy
Structural Science
Inelastic X-ray scattering

If multiple possibilities -
Look at members & Ask staff

https://www1.aps.anl.gov/About/Committees/Proposal-Review-Panels

Proposal Review Panels

High Pressure
Przemyslaw Dera, *Chair*
- Ercan Alp
- Maria Baldini
- Bin Chen
- Yoshio Kono
- Lars Ehm
- Ravi Kumar
- Barbara Lavina
- Sang-Heon (Dan) Shim
- Heather Watson

Instrumentation
Keith Brister, *Chair*
- Robert Henning
- Wenjun Liu

Imaging/ Microbeam
Tony Lanzirotti, *Chair*
- Darren Dale
- Matthew Ginder-Vogel
- Xiaojing Huang
- Tracy Punshon
- Dula Parkinson
- Mark Pfeifer
- Martina Ralle
- Xianghui Xiao

Macromolecular Crystallography
John Rose, *Chair*
- Arnon Lavie
- Anne Mulichak

Scattering—Condensed Matter
Roy Clarke, *Chair*
- Eric Dufresne
- Gregory MacDougall
- Steve May
- Michael Pierce
- Christian Schlepuetz
- Hua Zhou

Scattering—Applied Materials
Dillon Fong, *Chair*
- Armand Beaudoin
- Todd Hufnagel
- Dileep Singh
- Mike Toney
- Marcus Young

Scattering—Chem/Biol /Environmental
R. Joseph Kline, *Chair*
- David Gidalevitz
- Sang Soo Lee
- Marc Michel
- Zonghai Chen

Small Angle Scattering (SAXS)
Debbie Myers, *Chair*
- John Flanagan
- Sagar Kathuria
- Suresh Naryanan
- Fan Zhang

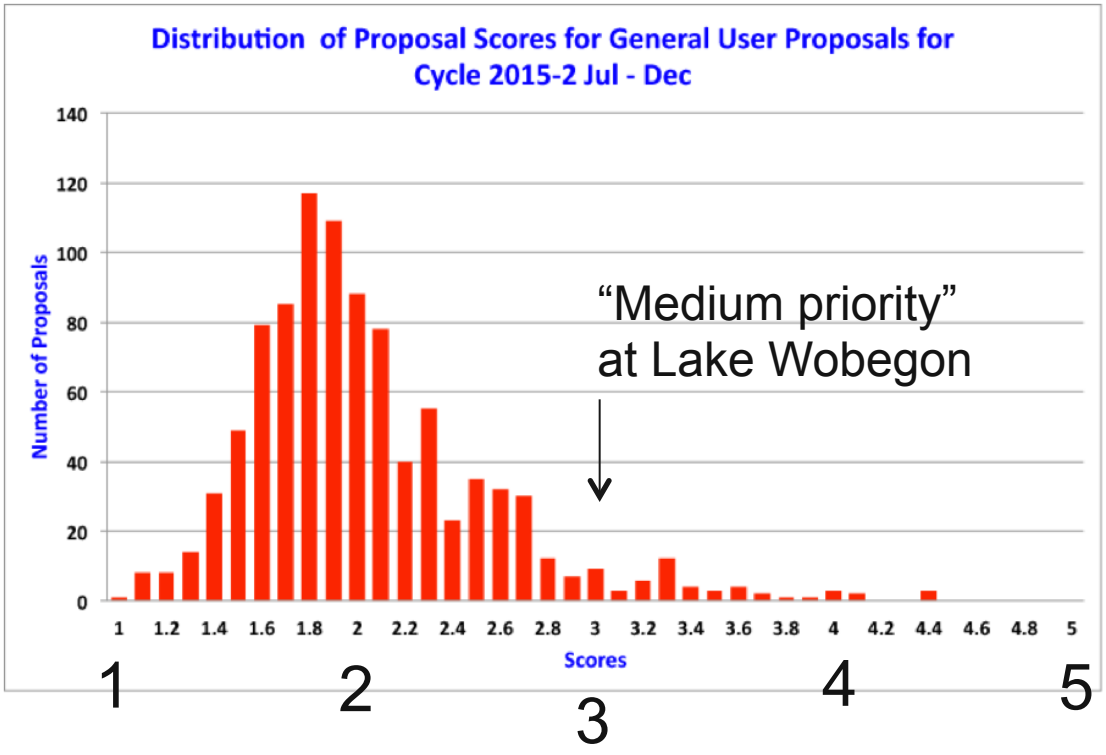
Spectroscopy
Gilles Doumy, *Chair*
- Eli Stavitski
- Yulia Pushkar
- Sungsik Lee
- Todd Luxton
- Sujoy Roy
- Azzam Mansour
- George Sterbinsky
- Conan Weiland
- Jenny Lockard

Structural Science
Angus Wilkinson, *Chair*
- David Bish
- Omar Chmaissem
- Eric Dooryhee
- Ashfi Huq
- James Kaduk
- Matthew Kramer
- Karen Mulfort
- Craig Bridges

Inelastic X-ray Scattering
Mark Dean, *Chair*
- Jason Hancock
- Ben Larson
- Stephan Rosenkranz

ALS provides cutoff scores – Helps you know what to expect

http://www-als.lbl.gov/index.php/user-information/user-guide/354-proposal-score-statistics.html



SNS/HFIR does not tell you a score or panel members.
You can try asking user office or beamline.

Beamline cutoff scores

Beamline	% Beam Time Allocated / Requested	Cutoff Score	
1.4 (IR)	58	2.34	
2.1 (NCXT)	--	--	
4.0.2 (Magnetic Spectroscopy/ Scattering)	37	1.92	
4.0.3.1 (MERIXS)	23	→ 2.67	easier
4.0.3.2 (ARPES)	23	2.00	
5.3.2.2 (Polymers XAFS)	49	1.88	
5.4 (IR)	69	→ 2.34	easier
6.1.2 (Soft X-Ray Microscopy)	46	1.88	
6.3.1.1 (Magnetic Spectroscopy)	25	2.00	
6.3.1.2 (ISAAC In Situ XAS)	25	1.74	
6.3.2 (Calibration and Standards)	65	→ 2.40	easier
7.3.3 (SAXS)	35	→ 1.67	harder
8.0.1 (SXF)	18	→ 1.70	harder
8.3.1	--	--	
8.3.2 (Tomography)	35	2.00	
9.0.2 (Chemical Dynamics, Coherent Imaging)	60	2.07	
9.3.2 (APSD/AMC, High-Pressure XPS)	25	→ 1.68	harder
10.0.1. (HERS/AMO)	24	1.98	
10.3.2 (Micro XAFS)	44	1.88	
11.0.1.1 (PEEM3)	24	1.88	
11.0.1.2 (Soft X-Ray Scattering)	24	1.68	
11.0.2 (Molecular Environmental Sciences, STXM, ambient pressure XPS)	17	→ 1.58	harder
11.3.1 (Small Molecule Crystallography)	46	2.06	
12.0 (ARPES)	4	2.06	
12.2.2 (High Pressure)	42	1.95	
12.3.2 (Microdiffraction)	38	1.80	
**Total allocation	33		

Tips (see also https://neutrons.ornl.gov/users/tips)

- Give a concise explanation of this specific proposal
  - Provide background on importance (i.e., “bigger picture”)
  - State clearly and exactly what you are going to measure and why.
    - *Reviewer want to assess likelihood of success.*
- Include relevant details to experiment but do not get too verbose
  - Reviewer needs to judge not only scientific importance, but also if the experiment is feasible and if you are asking for the right instrument.
- Talk to the local contact/instrument scientist.
  - Find out about details of the instrument, typical measuring times…
  - Over-subscription rate? Can a less popular instrument do the same measurements?
  - Send them the proposal ahead of time and ask for advice. Collaborate?
- If you have previous results from other experiments include them!
  - Home, other institution, previous experiment.
  - Sample characterization.
- Take advantage of proposal ageing (APS, NSLS-II). Plan ahead!
- Do not submit a bad proposal if you get rushed. Reviewer will not appreciate.

Several common pitfalls

- Proposer assumes committee is familiar with their specialty. Explain impact.
- Proposer writes large general vague proposal asking for multiple weeks of time. Better to write a shorter proposal with a well defined objective. Be realistic with beam time request.
- Proposer submits 2 (or more) similar proposals for related materials thinking that multiple proposals increases chances. Reviewer may not appreciate.
- Proposal deadline (for next cycle) is before scheduled beam time this cycle.

Common Reviewer comments:

- “Proposers could improve their score by including more experimental details, attaching previous results and expanding on the purpose and importance of the research.”
- “Hasn't the proposed research been published previously?”
- “We do not feel that granting 20 shifts/cycle for 2 years is consistent with the history of publication of this work.”
- “Proposer should perform initial characterization with lab sources or TEM.”

After submission

- Allow time for review and revisions
- Expect feedback several weeks from the call close
- Be ready to schedule experiment if approved
  - Identify participating team members
  - Respond to facility access approval information
  - Facilitate execution of user agreements
  - Complete required training. (APS electrical safety)
  - Confirm sample availability and description and laboratory needs
- Consider reviewer comments if not approved and plan to resubmit this proposal or a new proposal in the next call. Opportunities (# of facilities and beamlines/facility) continue to grow.

Scientific and Funding Opportunities

As a student

- Attend neutron & x-ray school and other workshops. Knowledge and connections have long-term impact. Collaborations are essential.
- Join SNS HFIR User Group (SHUG) and other facility user organizations
  Advocacy group, learn about and influence new developments
- Explore DOE and NSF internships, fellowships, and research programs
  SCGSR, ORISE/ORAU (HERE, GO!). Local contacts help (a lot).
- Invite scientists from national labs to your campus, e.g. for seminar

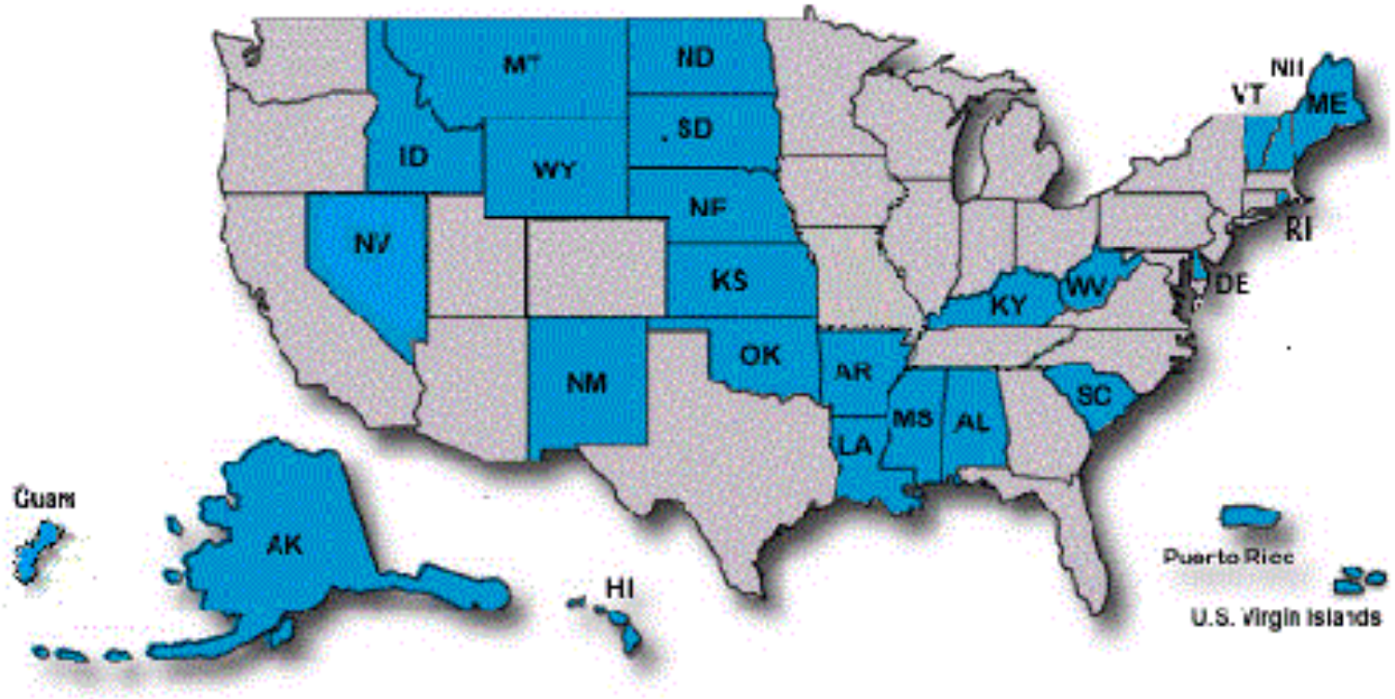
As a young professional

- Continue to use “free of charge” user facilities
  New faculty and industrial users can be favored in reviews
- Volunteer to be a reviewer on proposal panels
- Consider EPSCoR programs if located in an a participating state
- Apply for Early Career award – looks great on tenure application

Experimental Program to Stimulate Competitive Research

- EPSCoR State Institutions are eligible for grants to support research
  - http://www.nsf.gov/div/index.jsp?org=EPSC
  - http://www.sc.doe.gov/BES/EPSCoR/about.html

~24 states, Puerto Rico, Guam, and the U.S. Virgin Islands are eligible to participate in the DOE EPSCoR program, but the list changes with federal funding.



Office of Science Early Career Research Program

(for your future – very good for tenure)

- **Purpose:** To support individual research programs of outstanding scientists early in their careers and to stimulate research careers in the disciplines supported by the Office of Science
- **Eligibility:** Within 10 years of receiving a Ph.D., either untenured academic assistant professors on the tenure track or full-time DOE national lab employees (no postdocs)
- **Award Size:**
  - University grants $150,000 per year for 5 years to cover summer salary and expenses
  - National lab awards $500,000 per year for five years to cover full salary and expenses
- **FY 2010 (Inaugural Year) Results:**
  - 69 awards funded via the American Recovery and Reinvestment Act
  - 1,750 proposals peer reviewed to select the awardees
  - 47 university grants and 22 DOE national laboratory awards
  - Awardees are from 44 separate institutions in 20 states
- **FY 2017:**
  - 59 scientists funded (typically ~700 applications), 20 National Labs + 39 Universities
  - Usually pre-application in Sept, Full applications from those encouraged in November.

http://science.energy.gov/early-career/

Proposal Resource: "Basic Research Needs Workshop..."

~50 reports in past ~20 yrs; Participants from academia, industry, and DOE labs

2002-2017

BRN to Assure a Secure Energy Future (BESAC 2002)

- ***BRN on Energy and Water (2017)***
- ***BRN on Next Generation Electrical Energy Storage (2017)***
- ***BRN on Innovation and Discovery of Transformative Experimental Tools (2016)***
- **BRN Synthesis Science for Energy Relevant Technology (2016)**
- **BRN on Future Electron Sources (2016)**
- **BES Computing - Exascale Requirements Review (2015)**
- **BRN Quantum Materials for Energy Relevant Technology (2015)**
- **Sustainable Ammonia Synthesis (2016)**
- **Neuromorphic Computing (2015)**
- **BRN for Environmental Management (2015)**
- **Challenges at the Frontiers of Matter and Energy (2015)**
- **Controlling Subsurface Fractures and Fluid Flow (2015)**
- **X-ray Optics for BES Light Source facilities (2012)**

http://science.energy.gov/bes/community-resources/reports/

Focused on current & future, not a scientific review article – good source of science motivation

You can help plan future Scientific User Facilities

BESAC evaluation
Report released late 2003

Available at
www.science.energy.gov/bes/archives/plans/FFS_10NOV03.pdf

- Under construction at the time of the evaluation
  - *Spallation Neutron Source* — *operating*
  - *5 Nanoscale Science Research Centers* — *operating*
  - *SSRL (SPEAR3) upgrade* — *operating*
- Facilities underway since the evaluation
  - *TEM Aberration Corrected Microscope* — *operating*
  - *Linac Coherent Light Source* — *operating*
  - *National Synchrotron Light Source - II* — *operating*
- Facilities rated longer-term priority at the time of the evaluation
  - *Spallation Neutron Source power upgrade (delayed)*

  - *Spallation Neutron Source 2nd target station*
  - *Advanced Light Source upgrade*
  - *Advanced Photon Source upgrade* — *Restarted 3 times!*
- What's next in planning?
  - *Ongoing BESAC Future Science Needs and Opportunities Evaluations*

Next Generation Light/Neutron Sources continuously debated

BESAC = Basic Energy Sciences Advisory Committee

BESAC Report on Facility Upgrades, 2016 http://science.energy.gov/bes/besac/reports/

Facility Upgrade	Criteria 1	Criteria 2
APS-U	Absolutely Central	Ready to initiate construction
ALS-U	Absolutely Central	Ready to initiate construction
LCLS II-HE	Absolutely Central	Ready to initiate construction
Proton Power Upgrade	Absolutely Central	Significant scientific/engineering challenges to resolve before initiating construction
SNS Second Target Station	Absolutely Central	Significant scientific/engineering challenges to resolve before initiating construction

Many competing choices

- Storage ring vs Free electron laser
- APS/ESRF based on MAX IV Low-emittance MBA lattice
- Energy recovery linac (ERL)?
- High rep rate, Hard/soft FEL?
- Spallation rep rate, resolution?
- Neutron target material/lifetime, power options?

Impact of large Scientific User Facilities has grown significantly in the past ~25 yrs.
They represent ~55% of BES budget and growth will continue.
They enable powerful new techniques, but researchers (you) have to drive the science.

Need good science, enthusiasm, politics, luck & perseverance

GOOD LUCK AND HAVE FUN!

QUESTIONS?