SO YOU WANT TO GET BEAMTIME…

HOW TO WRITE A PROPOSAL

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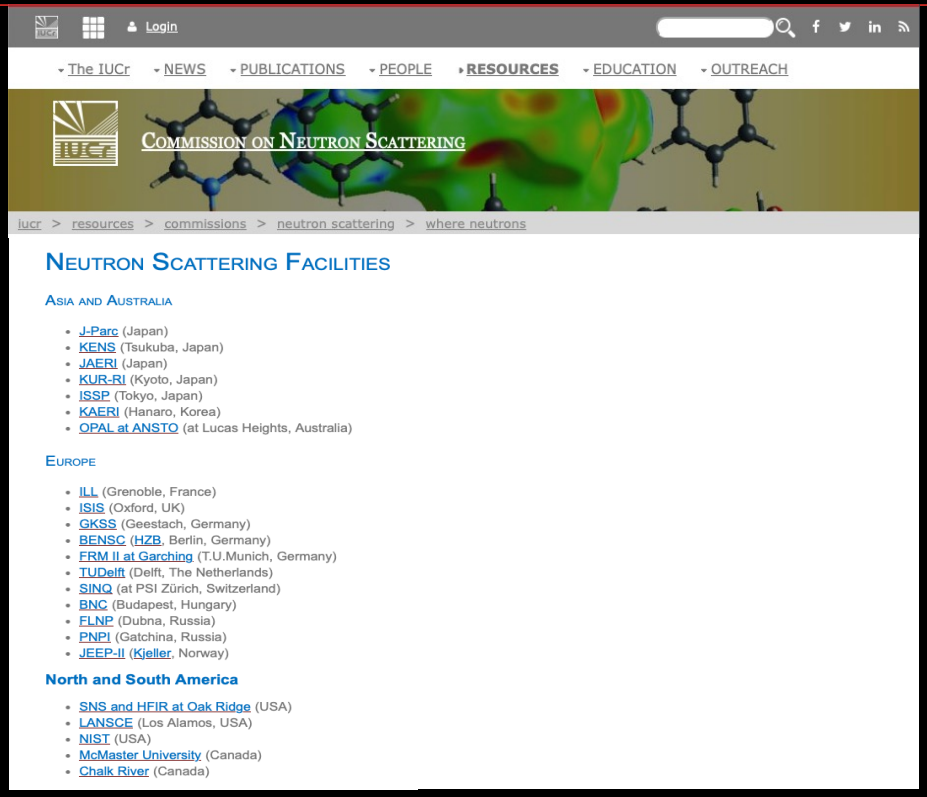
THE PROCESS

- Identify beamline - reach out to beamline/instrument scientists
- Look up proposal deadlines
- Register as a user
- Write the proposal - reach out to beamline/instrument scientists
- Submit proposal
- Proposals are reviewed and scored
- Beamtime allocated
- Plan for beamtime - reach out to beamline/instrument scientists
- Conduct the experiment
- Analyze the data
- Write the paper

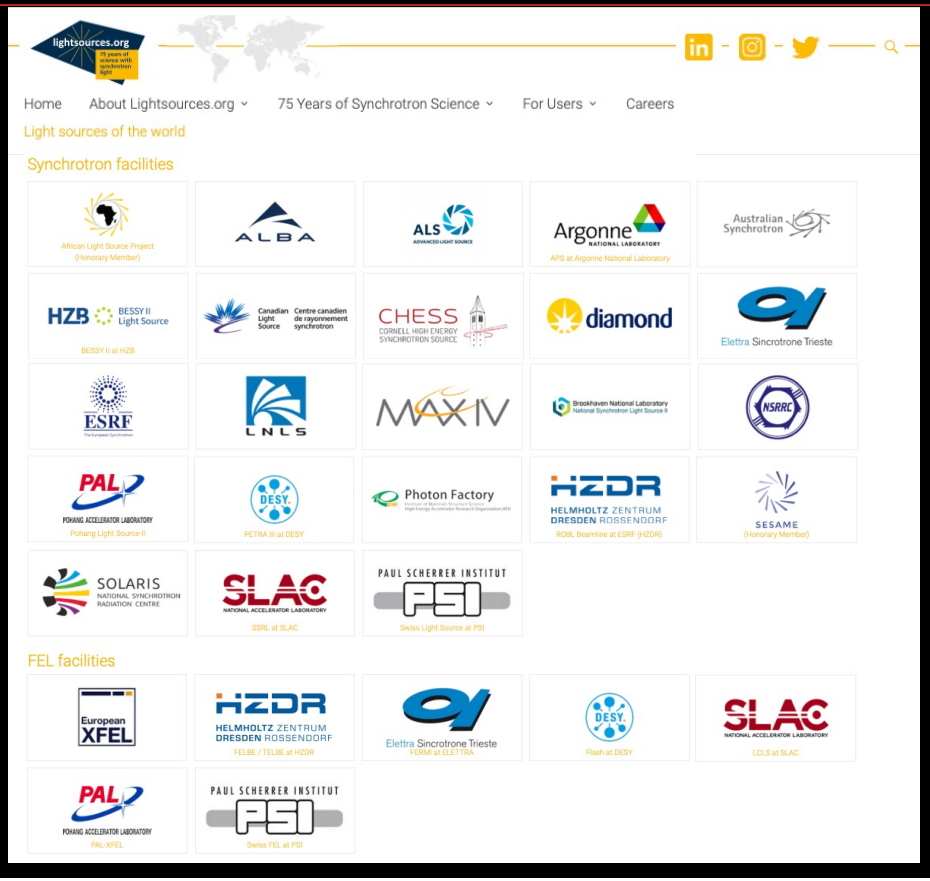
LIST OF FACILITIES

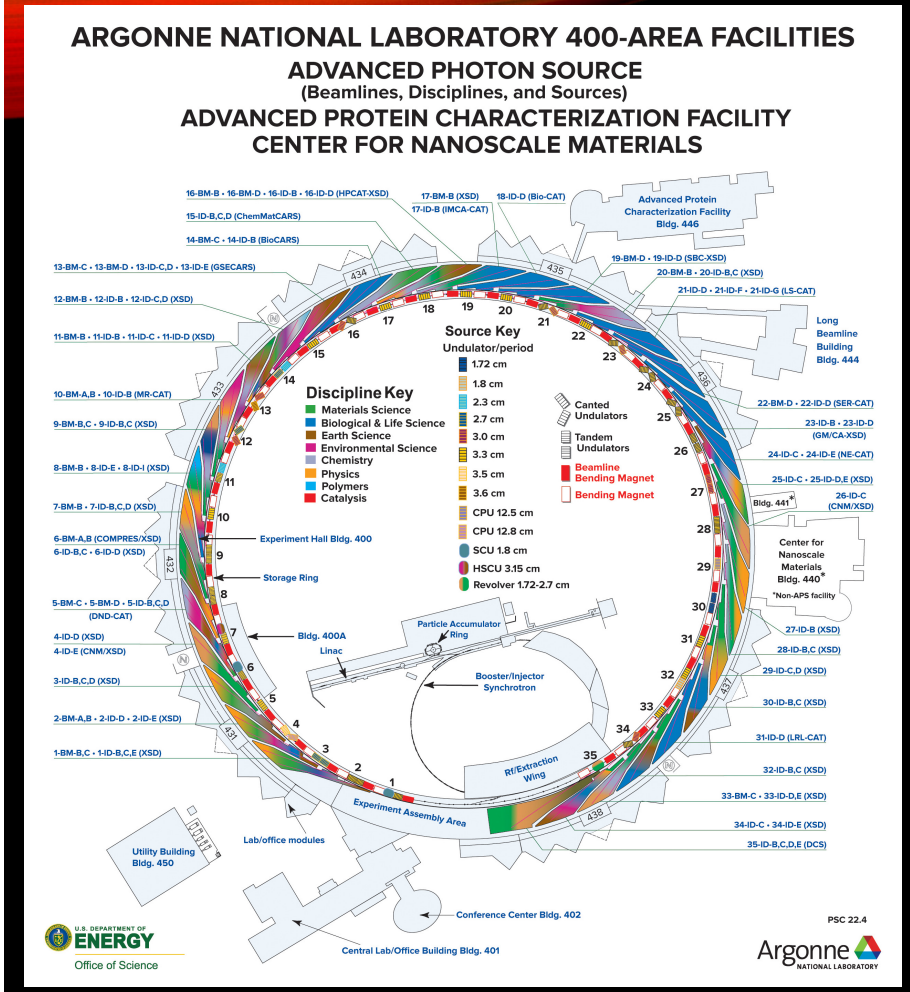
https://www.iucr.org/resources/commissions/neutron-scattering/where-neutrons



https://neutronsources.org/

https://lightsources.org/lightsources-of-the-world/





PICK A BEAMLINE

Beamlines Directory

Beamlines Directory

Beamline	Disciplines	Techniques	Energy Range	Access	Operator	Status
1-BM-B,C	• Materials Science • Physics	• Optics testing • Detector testing • Topography • White Laue Single Crystal Diffraction	• 6-30 keV • 50-120 keV	• On-site • Remote • Mail-in • Beamline Staff	XSD	

Reach out to beamline/instrument staff

- know the strengths and weakness of beamlines all over the world
- can help you design a better experiment

BECOME A USER

- Register
- Learn the lingo
  - **Beamline:** a beam of particles, such as photons, electrons, or neutrons emitted from a particle accelerator – Merriam-Webster. Everything from shield wall to the measurement instruments
  - **Beamtime:** time during which you have access to the beamline and x-rays/neutrons are available
    - Note - allocated beamtime only includes the access to photon/neutrons, plan on additional time for sample preparation and clean up
  - **Cycle:** Review periods, typically 2-3 cycles per year depending on facility
  - **Shift:** Continuous 8-hour chunk by which beamtime is scheduled
  - **Principle Investigator:** (PI) typically advisor
  - **Spokesperson:** member of research team to receives communications

MODES OF ACCESS

- General User Proposals (GU/GUP/Standard Proposals)
  - Proposal call each cycle typically valid for several cycles
  - Peer reviewed
  - Typical access mode
  - Single or multiple cycles
- Rapid Access Proposals (RA/RAP/Quick)
  - Within a given cycle only valid for that cycle
  - Reviewed
  - Not available at all facilities or all beamlines within a facility
  - Short experiments - feasibility/new sample/data needed for publication
- Collaborative
  - Partner/approved user programs
  - Beamline personnel

REVIEWERS

- Peer review: Each proposal is typically review by 2-3 reviewers

- Reviewers: Typically, other users or experts in the field
  - Might be familiar with the technique
  - Might be familiar with the topic
  - Review multiple proposal

- Reviewers: Want the best user program for the facility as a whole
  - Interesting science
  - Good use of resources (technical and personnel)
  - Chance of success
  - Feasible

REVIEW PANEL

- Review Panels
  - Look at many more proposals
  - Topical and consider the overall portfolio of the user program
  - Address discrepancies between reviewers

SCORING

- Each proposal is scored/rated on its scientific and technical merit
- Time is allocated to proposals with the top ratings

- After allocation, score resets

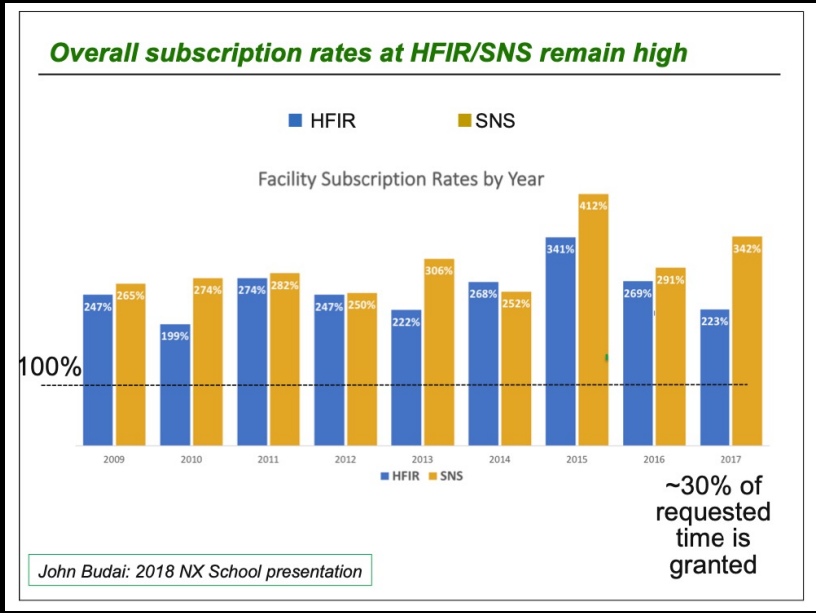
RATINGS

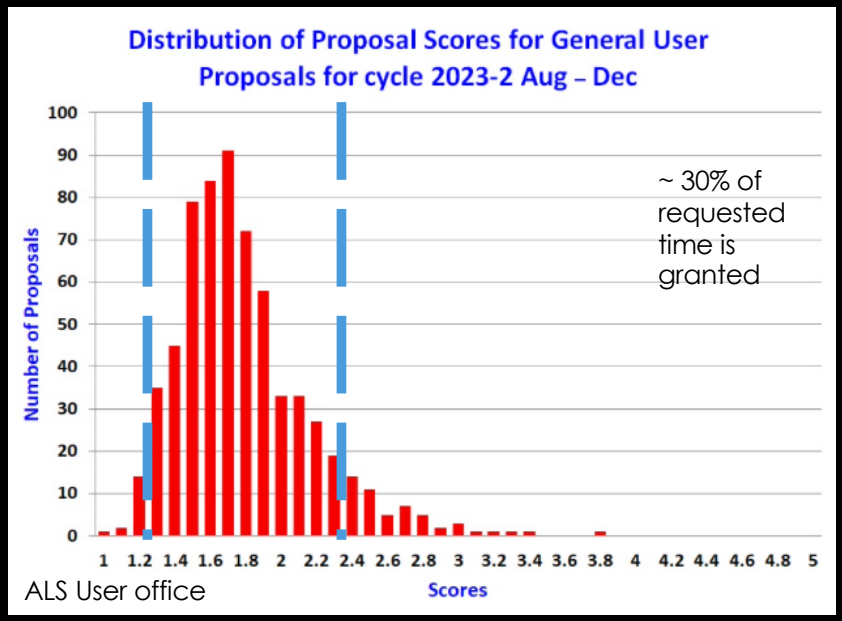
	Rating Criteria for General User Proposals
1 - Extraordinary	The proposal involves highly innovative research of great scientific or technological importance. Proposed research will significantly advance knowledge in a specific scientific discipline/field or create a new technological area. Considerable 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, scientific discipline, or technical development project. The work is cutting edge and likely to be published in a leading scientific journal or lead to advances in a technological area. 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 or incremental technological advances. Impact on a specific field, scientific discipline, or technological area 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 by may not significantly impact a specific field, scientific discipline, or technological area. 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

https://www.aps.anl.gov/Users-Information/About-Proposals/Review-Criteria-for-General-User-Proposals

CUT-OFF SCORES

- Beamtime can be very competitive and varies significantly between techniques and beamlines





LIFETIME AND AGING

- Proposal lifetimes: typically 2 years for GUPs
  - Beamtime Request (BTR) are required each cycle
- Aging: process by which proposal score improves if time was not allocated
  - Varies by facility
  - Designed to help proposals right at the cut-off get time

PROPOSAL STRUCTURE

- Varies from facility to facility:
  - free form narrative
  - Individual question
- Required Content (fairly universal)
  - Abstract – Summary of scientific case, methods and expected outcomes
  - Science Case
  - Experimental Methods
  - Safety Concerns
  - Facility/Beamline Justification
  - Prior Experience
  - References

TITLE & ABSTRACT

- Title: informative but short (summary of proposal)
- Abstract: Stand alone summary of your proposal addressing:
  - **What** do you plan to do?
  - **How** do you plan to do it?
  - **Why** are you doing it?

SCIENCE CASE

- Experimental background
  - What scientific questions are you trying to answer and why does it matter?
    - Are you trying to answer a fundamental science questions?
    - Are you looking to improve a technology?
    - Can you settle a long-standing debate?
  - How will the results impact the field?
    - What communities will be interested?
    - Where will you publish?
  - How does this build on the existing knowledge?
    - Cite the literature including preprints
    - Include preliminary data and predictive modeling

EXPERIMENTAL METHODS

- What are you planning on measuring/experimental strategy?
  - Technique and setup: special requirements
  - Samples: details and quantity (how have you already characterized them)
  - Experimental conditions

- Show the reviewers that you are ready and prepared
  - How will the data you obtain answer your science questions?
    - What does a positive result look like and what does it mean?
    - What does a null result look like and what does it mean?
  - What is required for data analysis?

SAFETY

- Clearly state any potential safety concerns
  - Are your samples hazardous?
    - Toxic
    - Radioactive
    - Nanomaterials
  - Do you need some processing or a specific sample environment? What are the associated hazards?
    - Use of chem lab
    - High/low temperatures
    - Applied fields
    - High/low pressures
  - Do you plan to bring your own equipment? Details

JUSTIFICATION

- Why do you need a synchrotron/neutron facility?
  - Sample environments and extreme conditions
  - Cross-sections
- Why do you need this specific beamline?
  - Flux/Coherence/Resolution
  - Sample Environment
  - Energy range
- Is this experiment technically feasible at the beamline?
- Rational for requested time, reference experimental details?

PRIOR EXPERIENCE

- Within the scientific scientific field
- Familiarity with synchrotron/neutron techniques

REFERENCES

- Pick a few of the most relevant
  - Provides motivation: review articles or high-profile papers
  - Justify the technique if nonstandard
  - Shows level of your research
  - Do NOT expect reviewers to read all reference – include all essential information within the text of your proposal.

ADDITIONAL TIPS

- Tell a story: help the reviewer imagine the beamtime and resulting publication
- Proposal must be self-contained - it's your job to tell them what's important
- Proofread and follow the template format
- Show preliminary data and/or theory
- Figures – a picture is worth a thousand words
- Point out any weak points and address them (they'll figure it out anyway)
- Avoid being vague and overly broad or use too much jargon
- Don't expect beamline staff to read your proposal the week of the deadline, contact them well ahead of time

ALLOCATION

- Talk to beamline staff about
  - Logistics
  - Sample handling
  - Scheduling
- Complete required training

BEAMTIME

- Come prepared
  - Have a plan and backup plans
  - Have enough samples
  - Have enough people
  - Plan for sample preparation, training, set-up before beamtime
  - Plan for clean-up and data transfer after beamtime
  - Do your training
- Conduct your experiment
- Have a plan for data analysis and publication

TAKE HOME MESSAGE

- Contact beamline/instrument staff – they are your allies
- Reviewers want you to succeed - show them:
  - You have a plan - from sample to publication
  - It's scientifically interesting and important
  - What you want to measure will tell you what you want to know
  - You've done your homework
    - You have samples and understand them
    - You know the field and are up on the literature
- What annoys reviewers
  - Typos and inconsistences
  - Having to read between the lines or check references to infer what they think you're saying

ADDITIONAL INFORMATION

- ESRF → Applying for beamtime → Advice on writing a good proposal
- CLS → How to write your best proposal
- ALS User Meeting – Light sources 101 workshop

BEAMLINE SCIENTISTS

- Experts in the field – known science and technical capabilities
- Want the best science
  - know the strengths and weaknesses of beamlines all over the world and can point you in best direction
  - can help you design a better experiment
- Know what review panels typically are looking for
- Be open and talk to them early

Please provide your feedback
Proposal Writing – Jessica McChesney

Thank you for your attention

QUESTIONS?