# Guide to Proposal Writing

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*2025 NSLS-II XAS Course*

# DOE National User Facilities



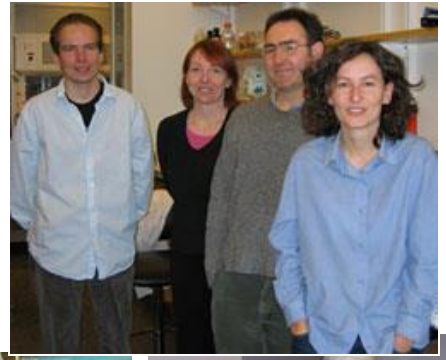
- 27 DOE national user facilities
- Tens of thousands of scientists use them each year
- Access to expertise and instrumentation that is complementary to academic or industrial laboratories
- Examples: supercomputers, particle accelerators, x-ray light sources, neutron sources, nanoscience and genomics facilities

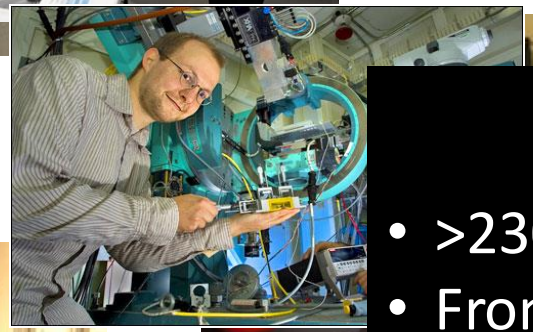
<u>Access to DOE User Facilities:</u>

- Non-proprietary: peer-reviewed access – FREE, >90% of all access
- Proprietary: beamtime and CFN facility full cost recovery
- Other mechanisms
  - Strategic Partnership agreements

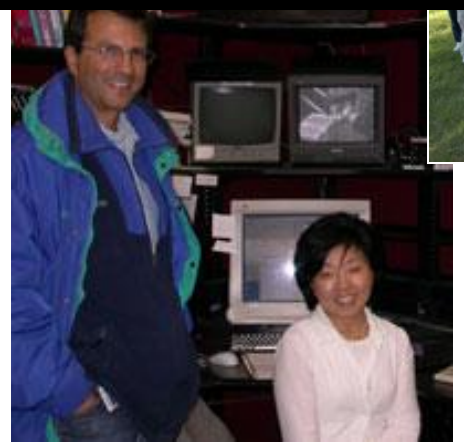
    Collaboration Research and Development agreements

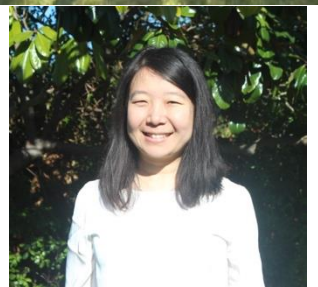




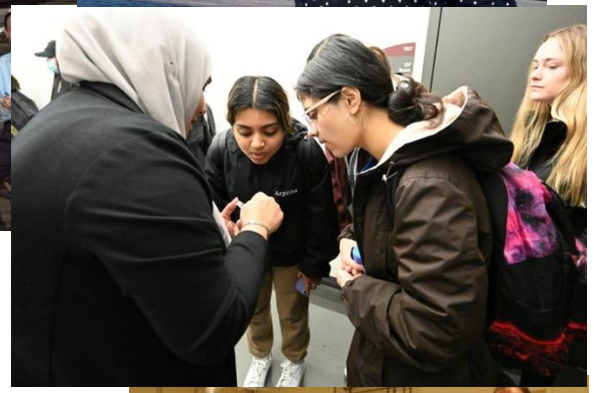
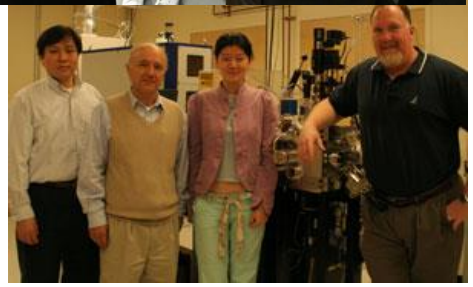








# Our Users

- >2300 researchers at NSLS-II each year
- From academia, industry, & other national labs
- Faculty, postdocs, grad students, undergrads, high school teachers and students
- Typical stay is a few hours/days, but some are longer term “resident” users

# NSLS-II Proposal Overview

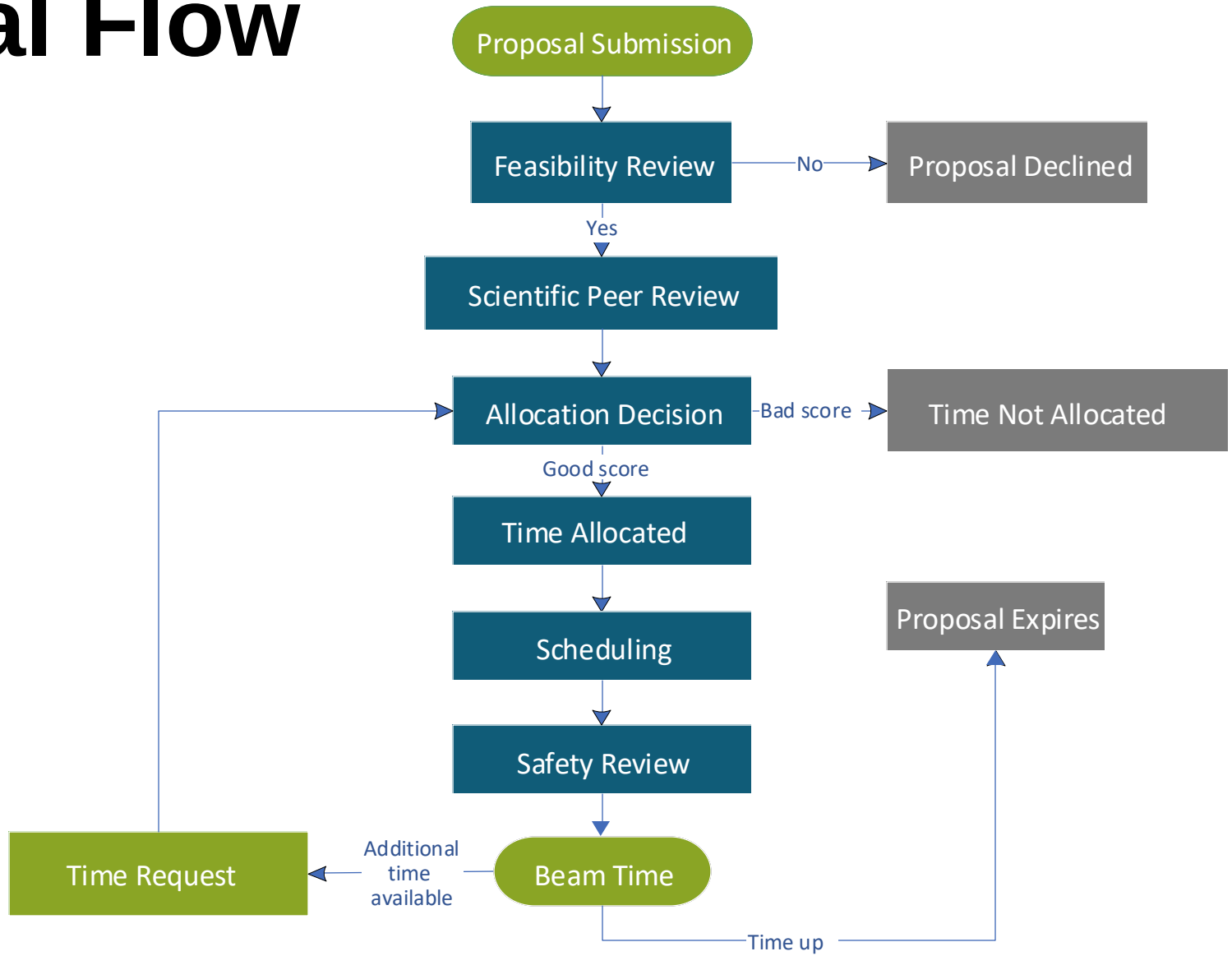
- NSLS-II operate 5000 hours of beam time per year
- 3 proposal cycles per year
  - January – April (proposal deadline Sept 30)
  - May – August (proposal deadline Jan 31)
  - September – December (proposal deadline May 31)
- >1000 proposals / time requests each cycle at NSLS-II
- Proposal lifetime is variable (1 – 9 cycles depending on proposal type)
- A “time request” is required each cycle that beam time is requested.
- Multiple beamlines may be requested in a single proposal, but each beamline requires a separate justification

- NSLS-II User Guide: www.bnl.gov/nsls2/userguide

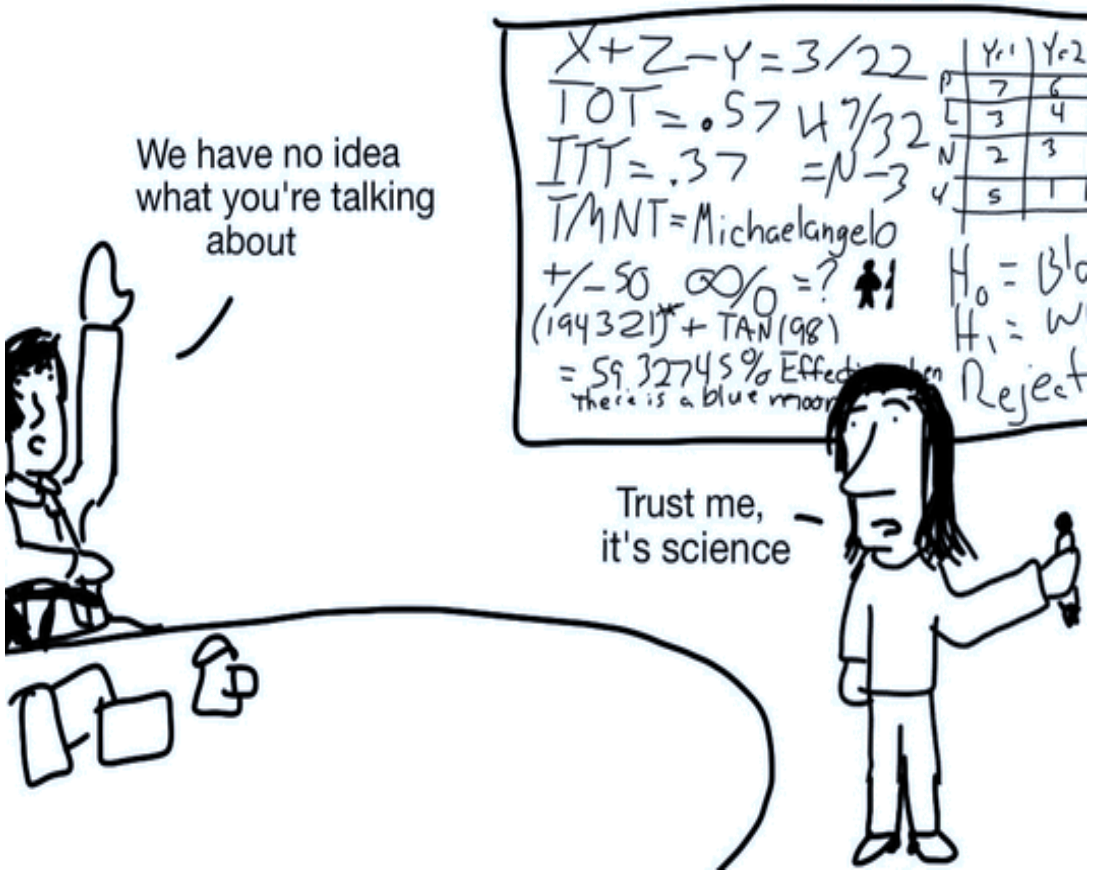
# Types of Proposals

- **General User** (1 year) – most common form of user access for routinely-supported techniques
  - Users may request up to 3 beamlines on a General User proposal. Each beamline request must have a separate justification.
- Rapid Access (1 cycle) – rapid access to instrument time for “hot topics” or for straightforward experiments using routine techniques with a fast turnaround time
- Partner User (up to 5 years) – user groups who also enhance the facility capabilities and/or contribute to the facility operation
- Block Allocation Groups (2 years) – groups of researchers that want to combine their short beam time requests into a single proposal to permit greater flexibility in beam time scheduling
- Proprietary (up to 3 years) – full cost-recovery instrument time

# Proposal Flow



# How to write a (good) proposal




Brookhaven National Laboratory

# First Step

Visit the NSLS-II beamline directory: www.bnl.gov/nsls2/beamlines

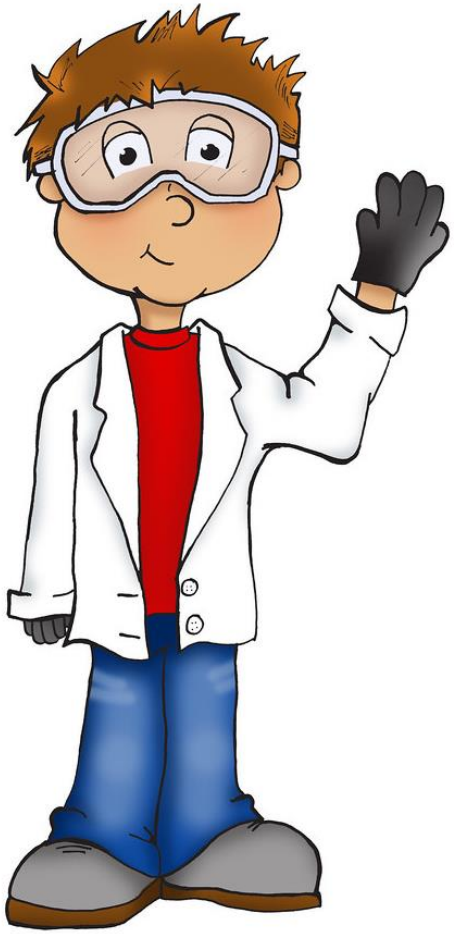
Visit the NSLS-II user guide: www.bnl.gov/nsls2/userguide

- Review the following information:
  - Proposal types and templates
  - Review criteria
  - Proposal deadlines
  - Instructions for user appointments, training, and logistics

Download the proposal template (MS Word):
https://www.bnl.gov/nsls2/userguide/

# Next Step

- Before submitting a proposal, you should first identify the beamline(s) that are needed for your project and contact the Beamline Scientist.
- If you are a new or inexperienced user, it is common to collaborate with the beamline scientist on your project.
- Discuss with the Beamline Scientist:
  - Does the beamline meet the specifications required for your project?
  - Does your project require additional instrumentation or a non-standard configuration?  Can the instrumentation be supplied?
  - The amount of time that would be required to complete your project.
  - Can a preliminary feasibility check be made on your sample?



# Write your proposal

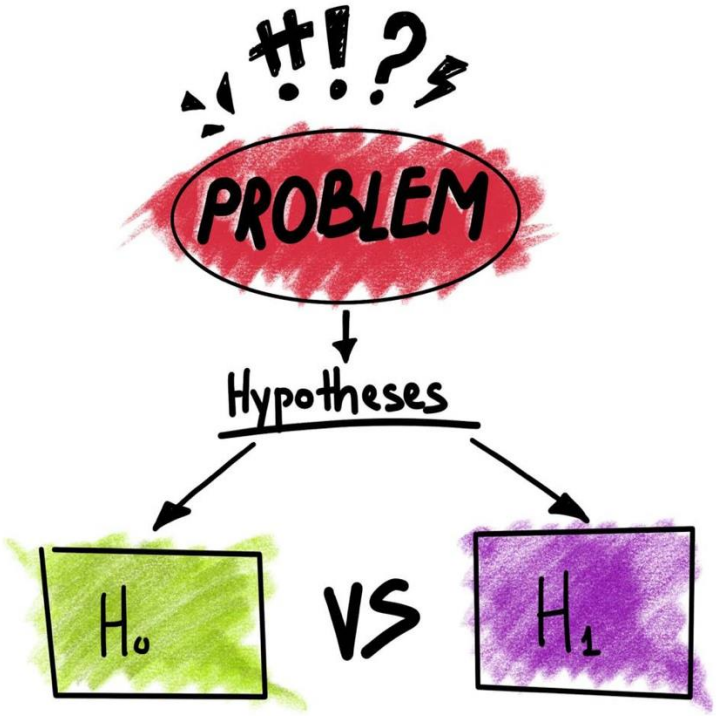
Title and Abstract

- The content of your proposal is treated as confidential except for the proposal title and abstract.  These are sometimes used in reports to funding agencies.
- Abstract should provide a brief overview of the project without revealing any experimental details that you want to keep private.

# Write your proposal

## Scientific Importance

- Explain your **science question** at the level of a scientist, non-specialist. What is known and not known? Why is it important?
  - Example: We are studying world hunger and want to improve plant growth in poor soils
- Give a **hypothesis** that will be tested by your proposed experiments.
  - Example: We want to use X-ray spectroscopy at NSLS-II to measure the Ti pre-edge peak area. We hypothesize that the Ti pre-edge peak area is indicative of tetrahedral Ti, which helps to retain P in soils and this helps bring nutrients to plants.




*Example credit: Shelly Kelly, Argonne*

# Write your proposal

## Research Plan

- Provide literature background, correlative measurements, or other lab work that **support your hypothesis**.
  - Example: We have made measurements in the lab with artificial mixtures of soils varying the amount of $TiO_2$ and treated them with P fertilizers. We found that soil pH is critical between 6 and 10.

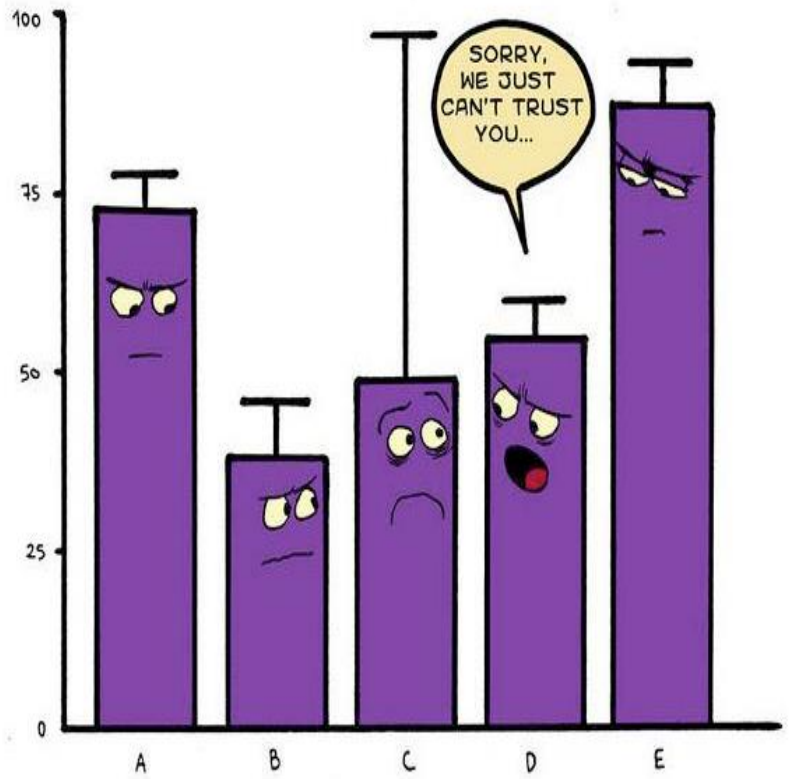

- Explain specifically **what you want to do** in a stepwise fashion.
  - Example: We will measure Ti XAS of 12 samples, at pH 6-10, with varying amounts of Ti and P. If A happens, we'll do this next. If B happens, we'll do this next.

*Example credit: Shelly Kelly, Argonne*

# Write your proposal

## Time Request

- **Justify the beamline(s) and time** requested
  - Example: We will examine 10 samples under 6 conditions for a total of 60 samples. At QAS, each sample takes 10 minutes to collect and 10 minutes to change samples. Therefore, we will need 1200 minutes (20 hours) to collect the data. We'll need about 4 hours for setup time, which is approximately 1 day of time for these experiments.
- Describe how you will **analyze your data** and what you expect to see
  - Example: We simulated 4- vs. 6-coordinate Ti and you can see the differences. Therefore, we are confident that we can use this difference to address our hypothesis.




*Example credit: Shelly Kelly, Argonne*

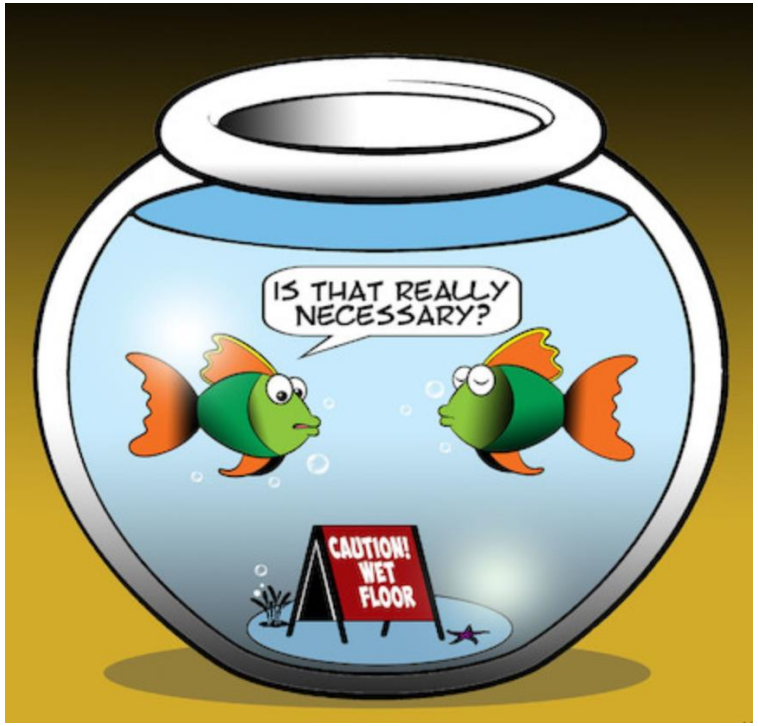
# Write your proposal

Tell us about yourself

- Are you a first-time user? If yes, we encourage collaboration with instrument scientists
- Are you a student or postdoc? If yes, tell us about your Principal Investigator. **Students should not be the PIs on a proposal.**
- Are a regular/experienced user? If yes, provide your publication record in the scientific area of the proposal and describe why you are qualified to do the work.

# Safety Approval Form

- Each proposal is accompanied by a Safety Approval Form (SAF) for every beamline requested.
- In the Safety Approval Form you describe any hazards associated with your proposed experiment (chemical, electrical, environmental). You also provide the names of all the experimenters involved with the project.
- A SAF must be submitted after time is allocated and at least 30 working days prior to the start of beam time.



# Last Step before Submitting

Review by the Beamline Scientist:

If you are a new user, it is strongly suggested that you ask the beamline scientist to review and critique your proposal.  But don't send it at the last minute; they get a lot of these requests!

# Reviewer Evaluation Criteria


Proposals are rated on a score of 1 – 5 (1 being the best), based on the following criteria

- **Scientific, technological, industrial, and/or national security importance (45%, score 1-5)**
  - Does the proposed research address critical questions or significantly advance knowledge in the specific field of research and development?
- **Quality of the experimental plan (40%, score 1-5)**
  - Is the proposed experimental plan well developed to address the scientific questions?
  - Is the choice of beamlines appropriate?
  - Does the proposal team have sufficient resources, expertise, and/or collaboration to execute the proposed work?
- **Indirect societal impact (15%, score 1-3)**
  - Does the proposed work have significant broader indirect societal impact, in such areas as economic competitiveness, workforce development, education and outreach, and/or engagement with user communities new to synchrotron research? See examples (PDF).

*https://www.bnl.gov/nsls2/userguide/access/scoring.php*

# Some Examples of Indirect Societal Impact

- **Economic Competitiveness**:
  - Small start-up company wanting to test a new X-ray emission spectrometer that they have developed. The spectrometer concept is not new, but testing will allow the company to improve their products, and the data collected are intended to be published.
  - Testing new packaging for improving the safety of well-established Li ion battery technology
- **Education, Outreach, and Workforce Development**:
  - Hands-on XAS workshop at QAS and BMM
  - Proposal for a summer intern project
  - Workforce development in a targeted science community, e.g., advanced manufacturing
- **New User Communities**:
  - User group from an area of science new to synchrotron research
  - Experimenter(s) that are experts in non-synchrotron methods that will complement their research by using synchrotron techniques for the first time

# Some Useful Guidelines

- Scientific merit: Why is this important?
- Hypothesis: How will the proposed work address my hypothesis?
- Likelihood of success of the experiment
  - Team's experience and track record
  - Homework (e.g. lab XRD, TEM, NMR, Raman, ATG, modeling)
  - Well characterized samples (synthesis, delivery, preparation)
  - Clear work plan (samples # and ID, environmental and instrumental parameters, run time per sample, etc.)
- Clear outcome with impact


"Agreed. We fund only those proposals we can understand."

# Pitfalls


- Samples unidentified, or poorly described (composition, number)
- Set-up requirements missing (e.g. sample cell, beam size, energy)
- Workflow or work plan not described
- Data processing and analysis tools are not specified
- Amount of beam time not justified
- Unclear what new information will be obtained/learned
- Avoid generic statements like “*The measured data will be analyzed to obtain valuable information”.*
- Place experiments in context: other methods, modeling

# Proposal Logistics

- All proposals are submitted online through the NSLS-II PASS system: https://pass.bnl.gov
- Download a Word version of the proposal template, complete, and then copy/paste into the proposal system.
- Login through InCommon, Gmail, or BNL Credentials (ORCID coming soon)
- Complete all tabs and Submit.
- Reminder for proposal deadlines:
  - January 31 for May – August beam time
  - May 31 for September – December beam time
  - September 30 for January – April beam time

# Proposal Logistics

## My Proposal

| Proposal ID | Title | Proposal Type | Principal Investigator | User Facility | |
|---|---|---|---|---|---|
| 315189 | GU-315189: Characterizing Microplastic Biodegradation by Algae using Synchrotron Infrared Microspectroscopy | General User | Lisa Miller | NSLS-II | |

General | Experimenters | Research | Attachments | Time Request | Progress Report | Submit | Summary | Notes | Emails

Title: Characterizing Microplastic Biodegradation by Algae using Synchrotron Infrared Microspectroscopy

Primary Field of Research: Environmental Sciences

Funding Sources:

| | Funding Source | Specifics | Grant Number | |
|---|---|---|---|---|
| | DOE, Office of Basic Energy Sciences | | DE-SC0012704 | |

Expiration Date: 5/1/2025

### Proposal Keywords (for new proposals only)

Bioremediation ✕ | Biological cells and tissues ✕ | Biomass ✕ | Polymers ✕
Infrared microspectroscopy (FTIRM) ✕

# Questions?


*Isaac Newton struggles to write the economic impact section of his 'gravity' proposal.*