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Guidance for a Good Proposal

Overview of the proposal process is described here:
https://www.bnl.gov/nsls2/userguide/access/evaluation.php

The score is based on 4 areas: scientific or technological merit, good use of NSLS-II, research plan, and clear description of the work. Please look at what NSLS-II considers as the key features of an excellent proposal: https://www.bnl.gov/nsls2/userguide/access/scoring.php .

NSLS-II scores proposals based on this system: A= 1.0, B=2.0, C=3.0, D=4.0 and F = 5.0. If the score is poorer than 2.5, reviewers will attempt to provide tangible comments for improvement. Proposals with a score of 4.0 or poorer will receive no beam time. It is the reviewers' charge to rate all proposals equally on the content written. Beam time is allocated based on the time available to accommodate the top proposals regardless of the actual score.

What is this panel looking for in a good proposal?

(1) A **good science** question: For example, "We are studying world hunger" with a good bit of background targeted to the scientist non-specialist. Tell the reviewer why your question is important and what is known and not known.

(2) A specific and clearly articulated **hypothesis**, linked to measurements proposed for the NSLS-II: Tell the reviewers specifically what it is that you are testing with the measurements. For example: "We want to measure the Ti pre-edge peak area." If your science is world hunger and the measurement is the Ti pre-edge peak then there has to be a link. "We hypothesize that the Ti pre-edge peak area indicative of tetrahedral Ti helps to retain P in soils and this helps bring nutrients to plants."

(3) **Define your parameters:** Provide literature background, correlative measurements, or other lab work that support your hypothesis. For 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." Use this information to define your parameter space. For example, "We found that soil pH is critical between 6 and 10. Therefore we will measure 5 samples with varying amounts of XXX." Listing many sample parameters without a clear reason will be seen as a "fishing expedition" and will be poorly rated. In addition to defining your parameters, spell out a contingency plan for the current beam time request or for the follow-up experiments. For example: "If the data turns out like X then we know A and we will need to make the following experiments. On the other hand, if the data turns out like Y then we know B." The panel will give you extra consideration for thinking ahead.

(4) **How will you interpret the data?** Describe how the data will be used to test your hypothesis. In the example of the Ti pre-edge peak, you might need to measure a list of standards for comparison or make XANES calculations and/or DFT calculations in conjunction with XANES calculations. If possible, do some of this and provide an example. For example, you can make theoretical EXAFS easily to test many different hypothesizes. Say you want to test 6-fold vs 4-fold coordination. Calculate the EXAFS for these two different situations and show the difference that you will be looking for in the data. You need to demonstrate that you know what to do with the data and that your hypothesis can be tested with the measured data.

(5) **Feasibility through preliminary data** is great for a big research project. Don't hesitate to ask for one shift of beam time to get some preliminary data so that you can then write a good proposal for the complete project. The review panel will appreciate this effort. This is extra critical in difficult experiments where it isn't clear that the measurements are feasible. It is

your job to convince the reviewers that the measurements can be made. Provide the concentrations of the element of interest. Say how the samples are prepared and what detectors will be used, etc. Work up your preliminary data and describe where it leads, just showing some data it is not enough. Describe how you will interpret the data to test your hypothesis. An alternative to preliminary data is to add a description of the characterization that has been done in the lab on the same sample series to help support sample preparation, quality, and behavior of material under similar conditions to those practiced at the beamline.

(6) **Talk to the beamline staff**. Share your research project with them and ask them to review your proposal ahead of time. If you get their support, it will be clear in the quality of the proposal. It is the reviewers' experience that research projects done in collaboration with the beamline staff are much more likely to be successful. If you claim to have talked to the beamline staff but have not, this will not be received well by the review panel.

(7) **Tell us who you are.** Tell the reviewers if you are a first-time user, a student, and/or post-doc. Students should not be the PIs on a proposal. If you are a regular/experienced user, then also provide your publication record in the scientific area of the proposal. When reporting publications, always include the full citation. Providing an extensive description of past work, or stating that you are a long-term user, or telling the panel to "google you" is not appropriate. The proposal is being review based on the planned experiments, not on the past history of the PI.

(8) **Number of shifts**: NSLS-II operates in a pattern of three cycles per year. Each cycle is 4 months long. A proposal is good for one year, i.e. 3 cycles. For each cycle, beam time must be requested. Beam time is allocated in blocks of 8-hour shifts. The review panel will recommend the number of "lifetime" shifts for a proposal, i.e. the amount of time needed to accomplish the project. The proposal will expire when (1) the lifetime shifts are used up or (2) one year has passed – which ever comes first. Therefore, your proposal must justify the amount of time you request for the entire duration of the project. For example, if the proposal describes only one cycle of 3 shifts but asks for a total of 9, the panel will only allocate only 3 shifts. A good proposal will provide sufficient detail to describe how much beam time is needed, e.g. 10 samples, 3 conditions each, 5 scans at each condition of 2 hours each, plus 4 hours set up time, etc.