



National Superconducting Cyclotron Laboratory Call for Proposals—PAC 37

February 2, 2012

Dear NSCL User:

We invite proposals for beam time to be considered at the next meeting of the NSCL Program Advisory Committee (PAC 37). Proposals for PAC 37 are due by 5 pm EDT on April 13, 2012 in advance of the PAC 37 meeting scheduled for May 21-22, 2012.

PAC 37, like PAC 36, will consider proposals for [GRETINA](#), the next generation gamma-ray spectrometer that will be coupled to the S800 spectrograph starting in Spring 2012 and made available for experiments at NSCL for an extended campaign starting in June 2012. Details of the planned operation of GRETINA at NSCL are referenced in item 6 of the “Notes for PAC 37” below. PAC 37 will also consider experiments for other devices and other experimental halls. We expect to begin running PAC 37 approved experiments around November 1, 2012, although some experiments could run earlier if they do not require development.

General information on NSCL proposal process is available at www.nscl.msu.edu/exp/propexp/.

The timetable for PAC 37 is:

Friday, April 13, 2012	Proposals due at NSCL by 5 pm EST
Monday-Tuesday, May 21-22, 2012	PAC 37 Meeting
Wednesday, May 23, 2012	List of approved experiments posted; call 517-908-7337 for results
Tuesday, May 29, 2012	Letters mailed with beam time allocations

The members of PAC 37 are:

Ani Aprahamian	University of Notre Dame
David Dean	Oak Ridge National Laboratory
Christopher J. (Kim) Lister	Argonne National Laboratory
Paul Mantica	Michigan State University
Augusto Macchiavelli	Lawrence Berkeley National Laboratory
Joseph Natowitz	Texas A&M University
Philip Woods	University of Edinburgh
Alan Wuosmaa	Western Michigan University
Brad Sherrill	NSCL, non-voting convener

Detailed information is requested on your proposed use of NSCL facilities to aid the Program Advisory Committee in assessing the scientific merit and cost of each proposal. Therefore, each proposal submission must contain the following items:

(A) PAC 37 Proposal Cover Form including a proposal abstract of no more than 200 words. The Proposal Cover Form will be available on-line and can be accessed from the “Submit Proposal” link at the website www.nscl.msu.edu/exp/propexp/. The on-line form will be available after February 17th. If you wish to access sooner, please contact [Raman Anantaraman](#).

(B) PAC37 Proposal Elements, available at the same web site. It has the following six parts.

All parts must be completed and pertinent questions addressed.

1. A Description of Experiment (strict text limit for the description: 4 pages, 12 pt font, 1.5 line spacing; no limit on figures or tables). Please organize the material under the following headings or their equivalent:
 - i. Physics justification, including background and references;
 - ii. Goals of the proposed experiment;
 - iii. Experiment details
 - a. what is to be measured;
 - b. technical feasibility of measurement (demonstrated by simulation and/or reference to prior work);
 - c. counting rate estimates (including assumptions);
 - d. basis of time request (include time for experimental device tuning, debugging the experimental setup, calibrations, and any test runs);
 - e. discussion of present state of readiness of the experiment and an estimated earliest date for the run;
 - f. discussion of any technical assistance (design, fabrication, installation, etc.) that may be requested from NSCL;
 - g. apparatus (including drawing);
2. Status of previous experiments completed at the Coupled Cyclotron Facility (CCF) listed by experiment number, with status of analysis, publications, presentations, Ph.D.s awarded, and Master’s degrees awarded
3. Educational impact of the proposed experiment
4. Safety Information Worksheet
5. Spectrograph Worksheet for experiments with the S800 Spectrograph or Sweeper Magnet
6. Beam request worksheet

(C) An electronic copy of the LISE++ files used to obtain rare isotope intensity estimates with the official version of LISE++ (referenced in item 3 of the “Notes for PAC37” below). The LISE files can be e-mailed to the [A1900 Device Contact](#) at the time of submission of the proposal.

Please submit your completed proposal via the “Submit Proposal” link at the website www.nscl.msu.edu/exp/propexp/.

As stated above, proposals must be received at NSCL by 5 pm Eastern time on Friday, April 13, 2012.

Please note the following:

- Previous PACs have emphasized that particular care should be taken to submit well-written proposals, with the proposed scientific goals clearly presented. In addition, the PAC has urged that proposers strictly follow the specified proposal format rules, including:
 - The proposal text, including the Physics Justification, Goals, and Experiment Details must be kept to a maximum of four pages.
 - References, figures, and tables should follow the text (do not imbed in text).
 - One figure should be a layout of the experiment.
 - A summary (no more than 200 words) of the experiment is required and must be included where indicated as the last entry on the Proposal Cover Form.
 - The Safety Information Worksheet must be completed in full, including the name of the Safety Contact for the proposed experiment.
- The total beam time request for an experiment must include on-target beam time needed to test and debug equipment and to perform calibrations. Each additional beam required for testing and performing calibrations must be listed explicitly. Requests for interruptions in beam time (for example a gap between a test run and the main run or an interruption in the main run to change the experimental configuration) must also be indicated.
- The spokesperson must affirm on the Proposal Form that all collaborators listed on the proposal have read the Description of Experiment part and have agreed to participate in the experiment.
- You must be a member of the FRIB Users Organization (FRIBUO). To become a user, please register at fribusers.org/6_JOIN/join.html.
- If, after uploading a proposal, a revision of the submitted proposal is necessary, we request that you do not upload the revised version but instead send it as an electronic attachment to raman@nscl.msu.edu. That way, there will be no discontinuity in the automatic numbering of the proposals.
- Each proposal must include, in addition to the on-target time request, a separate estimate of the beam delivery time and experimental device tuning time (using guidelines given below). This information will enable the PAC to evaluate the scientific merit of proposals in light of the total impact on NSCL operations.
- The PAC considers the experience and technical and scientific strength of the experimental team, in addition to the physics of the proposal and its technical feasibility. Therefore, please apprise Raman Anantaraman of any changes in experimental personnel after submission and/or approval of the proposal.
- Approved proposals are publically announced by title on the NSCL website. Proposers may wish to carefully consider the title of their work for competitive experiments.

- The role of Spokesperson carries significant management responsibility for the successful completion of approved experiments. Potential Spokespersons should review the expected roles they will play and responsibilities that must be executed in preparing, performing, and after an experiment at NSCL. For example, prior to scheduling of experiments, the Spokesperson must:
 - (1) Complete a *Scheduling and Safety Questionnaire*.
 - (2) Participate in person, by video, or by telephone in a possible conference with NSCL staff to establish the level of NSCL support and to review the final setup.
 - (3) Participate as required in a full safety review of the experiment.

Following the performance of the experiment, the Spokesperson must take responsibility for data management and the active organization of data analysis to facilitate timely publication of results. Additional information about the Spokesperson's responsibilities is available at <http://www.nscl.msu.edu/exp/prepexp/responsibilities>.

If you have any questions or problems, please contact Raman Anantaraman, (517) 908-7337, via email to raman@nscl.msu.edu.

Each proposal will be reviewed by the entire PAC and will be assigned to two PAC members (one primary and one backup) for detailed consideration. The names of the primary and backup PAC members will be sent to you within one week after the proposal due date. You are encouraged to contact the primary PAC member charged with the detailed review of your proposal to address questions he/she may have and/or provide clarifications, afterthoughts, etc. The proposals will also undergo a technical review and a safety review and the results will be communicated to spokespersons and the PAC, as described in items #11 and #12 of the "Notes for PAC 37" given below.

NOTES FOR PAC 37

1. Duration of PAC Approvals: The length of validity for proposals is 24 months from the start of the running period, with the possibility of extension of up to a year if justified. However, the current schedule for GRETINA at NSCL requires the completion of GRETINA experiments by May 2013.

2. Beams: The list of primary beams being offered can be found at www.nscl.msu.edu/exp/propexp/beamlist. This list was developed by the NSCL Operations Staff and with input from the Users' Executive Committee. The quoted intensity estimates are based on current operating experience with the CCF. If an experiment requires a primary beam or maximum beam intensity other than what is included on the list of offered beams, the user is encouraged to contact the [NSCL Operations Department](#) for advice regarding the preferred course of action. Following this advice, the user may follow one of two courses: (a) submit a proposal in the usual fashion, with the recognition that it may be approved on a "reserved" basis, with release of beam time contingent on the successful development of the beam; (b) submit a

Letter of Intent, to get feedback from the PAC on the PAC's assessment of the physics interest in the proposed measurement. The latter course is especially appropriate if a very difficult beam is required.

Rare-isotope beam development is the responsibility of NSCL. Experimenters wishing to use the A1900 as an experimental device should consult and collaborate with the Beam Physicists group. Please contact group leader [Tom Ginter](#) to do this.

3. Estimates of Rare-Isotope Beam Rates: Experimenters are required to estimate the expected intensity for each rare-isotope beam requested in the proposal. If experimentally known rates are available, they should be used. Otherwise the rates must be estimated with the program LISE++, version 9.3 (see groups.nsl.msu.edu/a1900/software/lise++/, with the option file "A1900_2010.lopt" and configuration file "A1900_2010.lcn"). Note that the website groups.nsl.msu.edu/a1900/ also provides other useful information for planning experiments with rare isotopes (for example, instructions on using LISE++ for simulating rare-isotope settings in the A1900). Users who would like help with performing LISE++ simulations can contact the [A1900 Device Contact](#). For calculation of yields from ^{238}U fission, start LISE++; from the "File" menu, select "Open"; look in the "Examples" folder; select and open the example file "AF_238U_Be_NSCL.lpp" and use this as the starting point. For simulations with the RF fragment separator, use the NSCL configuration file "A1900_RFFS_2010.lcn". Once rate estimates are made, and before the proposal is submitted, users are encouraged to contact the [A1900 Device Contact](#) for consultation regarding setting optimization and the identification of possible problems. Users must submit or upload an electronic copy of any LISE++ calculation files used for rare-isotope beam intensity estimates together with their proposals to help resolve any questions that may arise during the technical review of the proposals.

The beam line transport efficiency for rare isotope beams between the A1900 focal plane and end stations located in the experimental vaults depends on the optical properties of the beam and can vary from 100% to less than 50%. Please contact the [A1900 Device Contact](#) for consultation regarding your specific application.

4. Beam Delivery Time Calculation: To enable the PAC to evaluate the scientific merit of proposals while weighing total facility use time, each proposal will include an estimate of beam delivery time as part of the overall time request. The beam delivery time estimate is made as follows:

- (a) Preparation time for each occurrence of a coupled cyclotron primary beam tune used in an experiment is 12 hours. (Note that a primary beam isotope delivered at two different energies by retuning the coupled cyclotrons counts as two different primary beams and will require a beam delivery time allotment of $2 \times 12 = 24$ hours; a primary beam delivered with a lower quality and at a lower energy by degrading the beam from the coupled cyclotrons does not cost the extra 12 hours of beam delivery time.) If the primary beam is used at a location beyond the A1900, a time allotment of 3 hours per rigidity setting is

needed to cover the time for beam delivery to the experiment. A single time allotment of 3 hours can be used to cover delivery of more than one beam beyond the A1900 if the rigidities of the delivered beams lie within a range of 10% ($\pm 5\%$).

- (b) The time estimate for rare-isotope beam experiments based downstream of the A1900 will also include preparation time for each rare-isotope setting according to the table below:

Rate (pps/pnA)	Tuning time (hours)		
	$Z_{\text{primary beam}} \leq 12$	$12 < Z_{\text{primary beam}} \leq 36$	$36 < Z_{\text{primary beam}}$
Rate ≥ 1	2	6	12
$0.0001 < \text{Rate} < 1$	6	14	20
Rate ≤ 0.0001	Consult A1900 Device Contact		

The expected rate can be obtained from a LISE estimate or from a previous measurement of the rate at the A1900 focal plane. (A rare isotope delivered from the same primary beam but with two different rigidities or purities would require two developments and thus would count as two rare-isotope settings.)

- (c) A time allotment of 3 hours per rare-isotope setting is also needed to cover the time of beam delivery to the experiment. A single time allotment of 3 hours can be used to cover delivery of more than one rare-isotope setting beyond the A1900 if the rigidities of the settings lie within a range of 10% ($\pm 5\%$).

For example, an S800 experiment requiring primary beams of 140 MeV/nucleon ^{40}Ar and 170 MeV/nucleon ^{24}Mg would need to allocate $(2 \times 12) = 24$ hours for primary beam development. If the experiment also requires two secondary beam settings, one from ^{40}Ar with an expected rate for the isotope of interest of 300 pps/pnA and the other from ^{24}Mg with an expected rate of 5 pps/pnA, the additional time for development and tuning to the S800 target will be $(6+3)+(2+3) = 14$ hours. If the experiment furthermore requires the delivery of degraded primary beam at two rigidities for testing or calibration, the additional tuning time will be $3+3 = 6$ hours. Thus, the total tuning time is $24+14+6 = 44$ hours. (If the rigidities of both degraded primary beams and both rare-isotope settings lie within a range of 10%, the tuning time would be reduced by 9 hours to a total of 35 hours.) The tuning time request in this example is in addition to the beam on target time needed to carry out the experiment.

5. NSCL-Supported Experimental Devices: NSCL-supported experimental devices include: the A1900 Fragment Separator, the S800 Spectrograph, the Segmented Germanium Array, the Sweeper Magnet, the RF Fragment Separator, the 53-inch chamber, and GRETINA while it is at NSCL. NSCL strives to make it possible for experiments utilizing facility-supported devices to be conducted without collaboration with MSU researchers by providing technical assistance within existing resources. Each of these devices has a Service Level Description which outlines (a) the standard configuration options available for the device, (b) the NSCL support level that

users can expect for the device, and (c) the responsibilities of users working with the device. Facility support is available for these devices when they are operated in their standard configurations. The Service Level Descriptions are available on the technical information web pages linked from www.nscl.msu.edu/exp/devices. For further information on a device, please contact the appropriate person listed on that website. Users are encouraged to collaborate with members of the A1900 group for experiments requiring the development of a very difficult rare-isotope beam (i.e., in cases where the beam development and identification represent the bulk of the experimental effort), or if the A1900 will be used as an experimental device.

Beam-related device tuning for NSCL-supported devices will be carried out by NSCL staff. The table below gives guidelines for estimating the device-tuning component of the overall beam time request. In general, device tuning is needed only once per experiment but there are exceptions, e.g. a change of optics for the S800 will require a retune. When in doubt, please consult the appropriate device contact person.

S800	Standard experiment: 4 hrs; High-resolution experiment: 12 hrs.
SeGA	2 hrs.
GRETINA	2 hrs.
Sweeper Magnet	8 hrs.
53-inch chamber	0 hrs.
RFFS	4 hrs for first rare isotope; 2 hrs for each additional rare isotope.

Experiments using the A1900 itself should request 4 hours of experimental device tuning time. (Experiments based downstream of the A1900 do not need this time.)

6. GRETINA at NSCL: GRETINA, the next generation gamma-ray spectrometer, is a national resource that will be brought to the NSCL and coupled to the S800 spectrograph starting in Spring 2012. We expect that the device will be available for fast-beam experiments at NSCL for an extended campaign starting in June 2012. Links to the GRETINA Home Page, the expected performance characteristics, the service level description for operation of GRETINA at NSCL, and a gamma-ray spectrum simulation program can be found at www.nscl.msu.edu/exp/devices#gretina. For questions regarding the use of this device at NSCL, please contact [Dirk Weisshaar](#).

7. Other Experimental Devices: Other experimental devices listed on the www.nscl.msu.edu/exp/devices website are available for use in NSCL experiments. These devices also require substantial experience to operate them safely and properly, therefore, collaboration with qualified MSU researchers is necessary for users unfamiliar with running these devices. Users wishing to do experiments with the MoNA-LISA detector should contact the MoNA Consortium Executive Director, presently [Nathan Frank](#), or MoNA-LISA's NSCL

Contact, [Thomas Baumann](#). Experimenters wishing to use the Ursinus College Liquid Hydrogen Target should collaborate with Lew Riley of Ursinus College and Remco Zegers of NSCL; [Remco Zegers](#) should be contacted during the preparation of the proposal. For other devices, the contact persons are as follows:

Beta Counting System (BCS), [Sean Liddick](#);

High Resolution Array (HiRA), [William Lynch](#);

CsI(Na) scintillator array (CAESAR), [Alexandra Gade](#);

TRIPLEX plunger device, [Hiro Iwasaki](#);

Low Energy Neutron Detector Array (LENDA), [Remco Zegers](#);

Summing NaI Detector (SuN), [Artemis Spyrou](#);

Digital Data Acquisition System (DDAS), [Sean Liddick](#).

We anticipate that low intensity, non-accelerated radioactive beams will be available in the Stopped Beam Area (Room 173) sometime in late 2012. The two experimental devices in this area are undergoing off-line commissioning tests with stable beams. Again, these devices require substantial experience and training to operating them safely and properly, therefore, collaboration with qualified MSU researchers is necessary. The contact persons are:

Low Energy Beam and Ion Trap (LEBIT), [Georg Bollen](#);

Beam Cooling and Laser Spectroscopy (BECOLA), [Kei Minamisono](#).

Details about experimental devices are available at www.nscl.msu.edu/exp/devices. The contact persons listed there will be able to provide further information on the devices.

Estimating the device tuning time for non-NSCL-supported devices is the responsibility of the experimenters; NSCL contact persons for these devices may be consulted for input. Proposals should explicitly list the amount of beam time needed for tuning these devices.

8. Non-standard Configurations for Experimental Devices: Descriptions of the standard experimental equipment configurations, for devices that are supported by NSCL staff (A1900, S800, SeGA, Sweeper Magnet, RF Fragment Separator, 53-inch chamber), are given in the Service Level Descriptions available on technical information web pages linked from www.nscl.msu.edu/exp/devices. If your experiment requires a non-standard configuration, please discuss in your proposal the amount and sources of effort required to change configurations. Proposals for experiments that require changes to the standard A1900 hardware/detector configuration must also include a request for the time necessary to modify and restore the A1900 setup since NSCL will be unable to deliver beam to other experiments while the changes are taking place; contact the [A1900 Device Contact](#) for help with an estimate of the time required for the A1900 changes you wish to make.

9. Letters of Intent: Letters of intent (LOIs) will also be considered by the PAC. The general format of LOIs must include:

- a description of the proposed program and the scientific motivation;
- a description of the necessary research equipment;

- some examples of beams and reactions (if applicable) that might be used for the study;
- the approximate beam time per year that is expected to be needed and the estimated duration of the program.

Proposals for experiments with NSCL's ReA3 reaccelerated beam facility (www.nscl.msu.edu/exp/sr) will be considered at the earliest during the following PAC (PAC 38), which will meet about 6-9 months after PAC 37. However, we will continue to accept LOIs for experimental programs based on reaccelerated beams. Details of the ReA3 and the expected beam properties are available on the NSCL website. Proposers should use the look-up table available at www.nscl.msu.edu/exp/sr for the estimated yield for reaccelerated beams, with the understanding that, given the absence of operational experience, the estimated yields might be uncertain by an order of magnitude. Proposers should contact [Jeff Blackmon](#) for the Si-barrel ANASEN, and [Daniel Bazin](#) for the active target time projection chamber (AT-TPC). For other devices, please use the contacts provided above. Contact [Raman Anantaraman](#) if you need additional information for preparing your LOI.

10. Beam Lines and Optics: The typical minimum beam spot diameter at the experiment location is a few millimeters for primary beams and about 1 cm for secondary beams. The size can be reduced further with slits, at the expense of rate. In general, NSCL beam lines can transport beams with rigidities in the range of 1.0 to 5.0 Tm for almost all optical solutions. Higher rigidities up to 6.0 Tm are possible for some endstations, but require a review of the optics. If your experiment requires high rigidities or special optics (e.g. low-divergence optics), please include a description of your needs in the proposal. Proposals requiring new optics to be developed either within or downstream from the A1900 must include a request for the beam time necessary for testing and debugging the new optics. For more instructions or for an estimate of the time required for the optics development, please consult the [A1900 Device Contact](#).

11. Technical Review: Prior to the PAC meeting, technical experts on NSCL staff will review each proposal to assess its technical feasibility from the points of view of device usage and beam delivery. During this review, the beam preparation time estimate will be verified and revised, if necessary. Any issues identified in the technical review will be communicated to the spokesperson of the proposal, and the issue(s) along with response(s) from the spokesperson will be distributed to the PAC.

12. Safety Review: NSCL users must perform their experiments safely. To allow us to assess any safety issues, the Safety Information Worksheet that is part of the proposal package must be completed in full. MSU and NSCL safety experts will review all proposals upon receipt for safety issues. The Committees' findings will be communicated to the spokespersons of the proposals and to the PAC. If the experiment is approved, NSCL requires the experimental group to appoint a safety representative who will participate in a more detailed safety review prior to scheduling the experiment. The duties of the safety representative are available at www.nscl.msu.edu/exp/safety/users. Any specialized or non-commercial equipment brought to NSCL will be subject to a Preliminary Safety Assessment to document potential hazards and

planned mitigation strategies. Transportation of all radioactive source materials and activated materials (targets) must comply with MSU regulations and must go through the University's Environmental Health and Safety (EHS) office.

13. Liaison with NSCL: All requests for assistance required by the experimenters should be directed to [Raman Anantaraman](#). The level of support provided for an experiment by NSCL will be based on available resources to address the requests in the proposal and on a detailed questionnaire submitted by the spokesperson at least six months prior to the experiment being scheduled. Decisions regarding assistance reside with the NSCL Director or his/her designee, and the delegation of tasks to appropriate NSCL technical personnel will be completed by Raman Anantaraman. It is assumed that experimenters will provide any special equipment needed for their experiments.

C. Konrad Gelbke
Director