Program Announcement
To DOE National Laboratories
LAB 10-339

Research and Development for Next Generation Nuclear Physics Accelerator Facilities

SUMMARY:

The Office of Nuclear Physics (NP), Office of Science (SC), U.S. Department of Energy (DOE), hereby announces its interest in receiving proposals for Research and Development (R&D) efforts directed at challenges for next generation NP accelerator facilities.

DATES:

Full proposals submitted in response to this Announcement must be received no later than **June 8, 2010**, 11:59 p.m., Eastern Time, to be accepted for merit review and to permit timely consideration for award in Fiscal Year 2010 or early Fiscal Year 2011.

Please see the ADDRESSES section below for further instructions on the method of submission for the proposal.

ADDRESSES and SUBMISSON INSTRUCTIONS:

Have your Lab administrator submit the entire Lab proposal and FWP via Searchable FWP (https://www.osti.gov/fwp). If you have questions about who your Lab administrator is or how to use Searchable FWP, please contact the Searchable FWP Support Center.

Please submit, via Federal Express, a single PDF file of the entire Lab proposal and FWP on a CD along with two hard copies to the address below. This will assist in expediting the review process.

Please send the CD and 2 hard copies via Federal Express to:

Cassie Dukes, SC-26.2
Office of Nuclear Physics
Office of Science
19901 Germantown Road
Germantown, MD 20874-1290
ATTN: Program Announcement LAB 10-339

For further information contact:

Dr. Manouchehr Farkhondeh
Program Manager
Office of Nuclear Physics

Telephone: (301) 903-4398
Fax: (301) 903-3833
Email: Manouchehr.Farkhondeh@science.doe.gov

SUPPLEMENTARY INFORMATION:

Program Objective:

The Nuclear Physics (NP) program supports a broad range of activities aimed at research and development (R&D) related to the science, engineering, and technology of heavy- ion, electron, and proton accelerators and associated systems. NP operates four accelerator national user facilities in accomplishing its mission. These include the Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Laboratory (BNL), the Continuous Electron Beam Accelerator Facility (CEBAF) at the Thomas Jefferson National Accelerator Facility (TJNAF), the Argonne Tandem Linac Accelerator System (ATLAS) at Argonne National Laboratory (ANL), and the Holifield Radioactive Ion Beam Facility (HRIBF) at Oak Ridge National Laboratory (ORNL). In addition, the NP program is constructing a next generation nuclear structure and nuclear astrophysics accelerator facility, the planned Facility for Rare Isotope Beam Facility (FRIB) at Michigan State University (MSU). RHIC is a storage ring-based collider with heavy ion beam energies up to 100 GeV/amu and polarized proton beam energies up to 250 GeV to study Quantum Chromodynamics (QCD) through the study of hot, dense nuclear matter. CEBAF is a 6 GeV multi-pass superconducting continuous wave electron accelerator with simultaneous beam deliveries to three experimental halls used for the investigation of nuclear and nucleon structure based on the underlying quark substructure. CEBAF is undergoing an upgrade to double the beam energy and to add a new experimental hall for photon beams (the CEBAF 12 GeV Upgrade Project). HRIBF and ATLAS are low- energy rare and stable isotope accelerators for studying the origin and structure of nuclear matter, and tests of fundamental symmetries. ATLAS is a superconducting linear accelerator for heavy ions at energies in the vicinity of the Coulomb barrier. HRIBF is a radioactive nuclear beam facility based on the isotope separator on-line (ISOL) method and accelerates secondary radioactive beams to energies up to 10 MeV per nucleon with a broad selection of light and medium mass ions.

Accelerator R&D described in this Announcement supports efforts essential to develop strategies and technologies for next generation NP accelerator capabilities, whether they are needed for new facilities or major upgrades to existing facilities. Some of these challenges were identified by the NP community in various workshops, including the recent symposium "Accelerators for America". As indicated in the 2007 LRP, the NP community has identified the need for an electron-ion collider as a gluon microscope (REF LRP-2007), a collider facility with capabilities beyond those of any existing accelerator complex and has identified corresponding technical challenges associated with such a facility (REF EICAC). Accelerator R&D efforts described in this Announcement do not include ongoing facility construction projects such as those associated with FRIB or the 12 GeV CEBAF Upgrade Project; these projects have their own designated accelerator R&D project funds to address key technical issues and are not part of this Announcement.

This Announcement is in support of pre-conceptual accelerator R&D aimed at technological challenges for the next generation NP facilities. Accelerator R&D intended for this announcement should fall in the following general categories:

- Accelerator R&D with the potential for the development of future generation of NP accelerators not under construction or design.
- Accelerator R&D with the potential for major upgrades to existing NP national user facilities that will lead to new capabilities.

Priority will be given to potential initiatives identified by the community as compelling, such as in the NSAC Long Range Plan for Nuclear Science. Relative to a potential electron-ion collider, community sponsored studies and workshops have identified a number of areas where focused R&D and prototyping could develop technical feasibility and advance pre-conceptual design, and priority will be given to these areas of study. The relative priority of R&D for next generation electron-ion collider facility was recently published in the 2009 EICAC report. Relevance of electron-ion collider efforts to the R&D priorities established in this report should be clearly articulated.

Proposals requesting support for research and development in multiple areas of effort should indicate a separate task for each area - this would apply to both different areas of study specific to one facility or unrelated tasks. For each task the proposal should address the goal of the effort; the method or approach to be taken; a cost-breakdown of the effort; the workforce to carry out the effort; the deliverable(s) and performance goals of the work; and the relevance to a next-generation facility or major upgrade. Each task should describe a realistic schedule which includes a minimum of one milestone per quarter. Researchers should note that they will be required to report formally on a quarterly basis regarding R&D expenditures and progress towards achieving the milestones and deliverables of the proposed effort. Institutional contributions to the effort should be clearly indicated.

Include:

- Report of 2007 DOE/National Science Foundation (NSF) Nuclear Science Advisory Committee (NSAC) Long Range Plan. NSAC's report can be found at http://www.sc.doe.gov/np/nsac/nsac.html
- Website of the Office of Science Accelerator symposium "Accelerators for America", October 26, 2009, Washington DC sponsored by the Office of High Energy Physics. http://www.acceleratorsamerica.org/symposium/index.html
- Report of Electron Ion Collider Advisory Committee (EICAC) meeting held at Thomas Jefferson National Accelerator Facility (TJNAF) on November 2-3, 2009, http://skipper.physics.sunysb.edu/~abhay/EIC/2009/EICAC_November/EICAC-Nov09-Report.pdf

Collaboration

Collaborative research projects with other institutions, such as universities, industry, non- profit organizations, and Federally Funded Research and Development Centers (FFRDCs), including the DOE National Laboratories, are encouraged under this Announcement. Proposals submitted

from different institutions, which are directed at a single research activity, should clearly indicate they are part of a proposed collaboration and contain a brief description of the overall research project. However, each proposal must have a distinct scope of work and a qualified principal investigator who is responsible for the research effort being performed at his or her institution. If a university is part of a proposed collaboration, the university must submit a separate proposal that meets all the essentials stated above. It is highly recommended to include on the first page of the proposal narrative a simple table listing every collaborating institution/PI and the amount of funding requested by each. Further information on preparation of collaborative proposals may be accessed via the Internet at: http://www.science.doe.gov/grants/Colab.html.

Program Funding:

It is anticipated that up to $2,000,000 will be available for awards to be made in Fiscal Year 2010, and maintained in outyears, contingent on the availability of appropriated funds. Proposals may request project support for one year only but may present projected outyear budget requests. The number and size of awards will depend on the number of proposals received and selected for award and the availability of appropriated funds. DOE is under no obligation to pay for any costs associated with preparation or submission of proposals. DOE reserves the right to fund, in whole or in part, any, all, or none of the proposals submitted.

The instructions and format described should be followed. You must reference Program Announcement LAB 10-339 on all submissions and inquiries about this program.

OFFICE OF SCIENCE
GUIDE FOR PREPARATION OF SCIENTIFIC/TECHNICAL PROPOSALS
TO BE SUBMITTED BY NATIONAL LABORATORIES

Proposals from National Laboratories submitted to the Office of Science (SC) as a result of this Program Announcement will follow the Department of Energy Field Work Proposal process with additional information requested to allow for scientific/technical merit review. The following guidelines for content and format are intended to facilitate an understanding of the requirements necessary for SC to conduct a merit review of a proposal. Please follow the guidelines carefully, as deviations could be cause for declination of a proposal without merit review.

1. Evaluation Criteria

After an initial screening for eligibility and responsiveness to this Announcement, proposals will be subjected to a formal scientific merit review (peer review). The proposals will be evaluated against the following criteria, which are listed in descending order of importance:

1) Scientific and/or Technical Merit of the Project;
2) Appropriateness of the Proposed Method or Approach;
3) Competency of Researcher's Personnel and Adequacy of Proposed Resources; and
4) Reasonableness and Appropriateness of the Proposed Budget.

The evaluation process will include program policy factors such as the relevance of the proposed research to the terms of the Announcement and the agencies' programmatic needs. Note that

external peer reviewers are selected with regard to both their scientific expertise and the absence of conflict-of-interest issues. Both Federal and non-Federal reviewers may be used, and submission of a proposal constitutes agreement that this is acceptable to the investigator(s) and the submitting institution.

In addition, each proposal should also address these program policy factors:

- Relevance to compelling scientific opportunities identified in the 2007 NSAC Long Range Plan.
- The opportunity for training junior accelerator physicists in accelerator science and technology.
- If appropriate, relevance of proposed electron-ion collider efforts to the R&D priorities identified in the EICAC report.

2. Summary of Proposal Contents

- Field Work Proposal (FWP) Format (Reference DOE Order 412.1A) (DOE ONLY)
- Proposal Cover Page
- Table of Contents
- Budget (DOE Form 4620.1) and Budget Explanation
- Abstract (no more than two pages)
- Narrative (main technical portion of the proposal, including background/introduction, recent accomplishments, proposed research and methods, timetable of activities, and responsibilities of key project personnel)
- Literature Cited
- Biographical Sketch(es)
- Description of Facilities and Resources
- Other Support of Investigator(s)
- Appendix (optional)

2.1 Submission Instructions

Have your Lab administrator submit the entire Lab proposal and FWP via Searchable FWP (https://www.osti.gov/fwp). If you have questions about who your Lab administrator is or how to use Searchable FWP, please contact the Searchable FWP Support Center.

Please submit, via Federal Express, a single PDF file of the entire Lab proposal and FWP on a CD along with two hard copies to the address below. This will assist in expediting the review process.

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3. Detailed Contents of the Proposal

Adherence to type size and line spacing requirements is necessary for several reasons. No researcher should have the advantage, or by using small type, of providing more text in his or her proposal. Small type may also make it difficult for reviewers to read the proposal. Proposals must have 1-inch margins at the top, bottom, and on each side. Type sizes must be at least 11 point. Line spacing is at the discretion of the researcher but there must be no more than 6 lines per vertical inch of text. Pages should be standard 8 1/2" x 11" (or metric A4, i.e., 210 mm x 297 mm).

3.1 Field Work Proposal Format (Reference DOE Order 412.1A) (DOE ONLY)

The Field Work Proposal (FWP) is to be prepared and submitted consistent with policies of the investigator's laboratory and the local DOE Operations Office. Additional information is also requested to allow for scientific/technical merit review.

Laboratories may submit proposals directly to the SC Program office listed above. A copy should also be provided to the appropriate DOE operations office.

3.2 Proposal Cover Page

The following proposal cover page information may be placed on plain paper. No form is required.

Title of proposed project
SC Program announcement title
Name of laboratory
Name of principal investigator (PI)
Position title of PI
Mailing address of PI
Telephone of PI
Fax number of PI
Electronic mail address of PI
Name of official signing for laboratory*
Title of official
Fax number of official
Telephone of official

Electronic mail address of official
Requested funding for each year; total request
Use of human subjects in proposed project:

If activities involving human subjects are not planned at any time during the proposed project period, state "No"; otherwise state "Yes", provide the IRB Approval date and Assurance of Compliance Number and include all necessary information with the proposal should human subjects be involved.

Use of vertebrate animals in proposed project:

If activities involving vertebrate animals are not planned at any time during this project, state "No"; otherwise state "Yes" and provide the IACUC Approval date and Animal Welfare Assurance number from NIH and include all necessary information with the proposal.

Signature of PI, date of signature
Signature of official, date of signature*

*The signature certifies that personnel and facilities are available as stated in the proposal, if the project is funded.

3.3 Table of Contents

Provide the initial page number for each of the sections of the proposal. Number pages consecutively at the bottom of each page throughout the proposal. Start each major section at the top of a new page. Do not use unnumbered pages and do not use suffices, such as 5a, 5b.

3.4 Budget and Budget Explanation

A detailed budget is required for the entire project period and for each fiscal year. It is preferred that DOE's budget page, Form 4620.1 be used for providing budget information*. Modifications of categories are permissible to comply with institutional practices, for example with regard to overhead costs.

A written justification of each budget item is to follow the budget pages. For personnel this should take the form of a one-sentence statement of the role of the person in the project. Provide a detailed justification of the need for each item of permanent equipment. Explain each of the other direct costs in sufficient detail for reviewers to be able to judge the appropriateness of the amount requested.

Further instructions regarding the budget are given in section 4 of this guide.

* Form 4620.1 is available at web site: http://www.science.doe.gov/grants/budgetform.pdf

3.5 Abstract

Summarize the proposal in no more than two pages. Give the project objectives (in broad scientific terms), the approach to be used, and what the research is intended to accomplish. State the hypotheses to be tested (if any). At the top of the abstract give the project title, names of all

the investigators and their institutions, and contact information for the principal investigator, including e-mail address.

3.6 Narrative (main technical portion of the proposal, including background/introduction, proposed research and methods, timetable of activities, and responsibilities of key project personnel).

The narrative comprises the research plan for the project and is **limited to 25 pages** (maximum), including text and figures, when printed using standard 8.5" by 11" paper with 1 inch margins (top, bottom, left, and right) and font not smaller than 11 point. It should contain enough background material in the Introduction, including review of the relevant literature, to demonstrate sufficient knowledge of the state of the science. The major part of the narrative should be devoted to a description and justification of the proposed project, including details of the methods to be used. It should also include a timeline for the major activities of the proposed project, and should indicate which project personnel will be responsible for which activities. It is important that the 25 page technical information section provide a complete description of the proposed work, because reviewers are not obliged to read the Appendices. Proposals exceeding these page limits may be rejected without review

If any portion of the project is to be done in **collaboration** with another institution (or institutions), provide information on the institution(s) and what part(s) of the project it will carry out. Further information on any such arrangements is to be given in the sections "Budget and Budget Explanation," "Biographical Sketches," and "Description of Facilities and Resources.

3.7 Literature Cited

Give full bibliographic entries for each publication cited in the narrative. Each reference must include the names of all authors (in the same sequence in which they appear in the publication), the article and journal title, book title, volume number, page numbers, and year of publication. Include only bibliographic citations. Principal investigators should be especially careful to follow scholarly practices in providing citations for source materials relied upon when preparing any section of the proposal.

3.8 Biographical Sketches

This information is required for senior personnel at the institution submitting the proposal and at all subcontracting institutions (if any). The biographical sketch is limited to a maximum of two pages for each investigator and must include:

Education and Training. Undergraduate, graduate and postdoctoral training, provide institution, major/area, degree and year.

Research and Professional Experience. Beginning with the current position list, in chronological order, professional/academic positions with a brief description.

Publications. Provide a list of up to 10 publications most closely related to the proposed project. For each publication, identify the names of all authors (in the same sequence in which they appear in the publication), the article title, book or journal title, volume number, page numbers, year of publication, and website address if available electronically. Patents, copyrights and software systems developed may be provided in addition to or substituted for publications.

Synergistic Activities. List no more than 5 professional and scholarly activities related to the effort proposed.

To assist in the identification of potential conflicts of interest or bias in the selection of reviewers, the following information must also be provided in each biographical sketch.

> *Collaborators and Co-editors*: A list of all persons in alphabetical order (including their current organizational affiliations) who are currently, or who have been, collaborators or co-authors with the investigator on a research project, book or book article, report, abstract, or paper during the 48 months preceding the submission of the proposal. Also, include those individuals who are currently or have been co-editors of a special issue of a journal, compendium, or conference proceedings during the 24 months preceding the submission of the proposal. If there are no collaborators or co-editors to report, this should be so indicated.
>
> *Graduate and Postdoctoral Advisors and Advisees*: A list of the names of the individual's own graduate advisor(s) and principal postdoctoral sponsor(s), and their current organizational affiliations. A list of the names of the individual's graduate students and postdoctoral associates during the past five years, and their current organizational affiliations.

3.9 Description of Facilities and Resources

Facilities to be used for the conduct of the proposed research should be briefly described. Indicate the pertinent capabilities of the institution, including support facilities (such as machine shops), that will be used during the project. List the most important equipment items already available for the project and their pertinent capabilities. Include this information for each subcontracting institution (if any).

3.10 Other Support of Investigators

Other support is defined as all financial resources, whether Federal, non-Federal, commercial, or institutional, available in direct support of an individual's research endeavors. Information on active and pending other support is required for all senior personnel, including investigators at collaborating institutions to be funded by a subcontract. For each item of other support, give the organization or agency, inclusive dates of the project or proposed project, annual funding, and level of effort (months per year or percentage of the year) devoted to the project.

3.11 Appendix

Information not easily accessible to a reviewer may be included in an appendix, but do not use the appendix to circumvent the page limitations of the proposal. Reviewers are not required to consider information in an appendix, and reviewers may not have time to read extensive appendix materials with the same care they would use with the proposal proper.

The appendix may contain the following items: up to five publications, manuscripts accepted for publication, abstracts, patents, or other printed materials directly relevant to this project, but not generally available to the scientific community; and letters from investigators at other institutions stating their agreement to participate in the project (do not include general letters of endorsement of the project).

4. Detailed Instructions for the Budget
(DOE Form 4620.1 "Budget Page" may be used).

4.1 Salaries and Wages

List the names of the principal investigator and other key personnel and the estimated number of person-months for which DOE funding is requested. Proposers should list the number of postdoctoral associates and other professional positions included in the proposal and indicate the number of full-time-equivalent (FTE) person-months and rate of pay (hourly, monthly or annually). For graduate and undergraduate students and all other personnel categories such as secretarial, clerical, technical, etc., show the total number of people needed in each job title and total salaries needed. Salaries requested must be consistent with the institution's regular practices. The budget explanation should define concisely the role of each position in the overall project.

4.2 Equipment

DOE defines equipment as "an item of tangible personal property that has a useful life of more than two years and an acquisition cost of $50,000 or more." Special purpose equipment means equipment which is used only for research, scientific or other technical activities. Items of needed equipment should be individually listed by description and estimated cost, including tax, and adequately justified. Allowable items ordinarily will be limited to scientific equipment that is not already available for the conduct of the work. General purpose office equipment normally will not be considered eligible for support.

4.3 Domestic Travel

The type and extent of travel and its relation to the research should be specified. Funds may be requested for attendance at meetings and conferences, other travel associated with the work and subsistence. In order to qualify for support, attendance at meetings or conferences must enhance the investigator's capability to perform the research, plan extensions of it, or disseminate its results. Consultant's travel costs also may be requested.

4.4 Foreign Travel

Foreign travel is any travel outside Canada and the United States and its territories and possessions. Foreign travel may be approved only if it is directly related to project objectives.

4.5 Other Direct Costs

The budget should itemize other anticipated direct costs not included under the headings above, including materials and supplies, publication costs, computer services, and consultant services (which are discussed below). Other examples are: aircraft rental, space rental at research establishments away from the institution, minor building alterations, service charges, and fabrication of equipment or systems not available off- the-shelf. Reference books and periodicals may be charged to the project only if they are specifically related to the research.

a. Materials and Supplies

The budget should indicate in general terms the type of required expendable materials and supplies with their estimated costs. The breakdown should be more detailed when the cost is substantial.

b. Publication Costs/Page Charges

The budget may request funds for the costs of preparing and publishing the results of research, including costs of reports, reprints page charges, or other journal costs (except costs for prior or early publication), and necessary illustrations.

c. Consultant Services

Anticipated consultant services should be justified and information furnished on each individual's expertise, primary organizational affiliation, daily compensation rate and number of days expected service. Consultant's travel costs should be listed separately under travel in the budget.

d. Computer Services

The cost of computer services, including computer-based retrieval of scientific and technical information, may be requested. A justification based on the established computer service rates should be included.

e. Subcontracts

Subcontracts should be listed so that they can be properly evaluated. There should be an anticipated cost and an explanation of that cost for each subcontract. The total amount of each subcontract should also appear as a budget item.

4.6 Indirect Costs

Explain the basis for each overhead and indirect cost. Include the current rates.