

**Office of Science  
Financial Assistance  
Funding Opportunity Announcement  
DE-PS02-07ER07-05**

***Nuclear Physics Research  
and Development  
For the Advanced Fuel Cycles***

The Office of Nuclear Physics (NP), Office of Science (SC), U.S. Department of Energy (DOE), hereby announces its interest in receiving applications for basic Research and Development (R&D) projects relevant to development of advanced fuel cycles (AFC) for nuclear reactors. This research should help provide the nuclear data and knowledge, and related theory efforts required for advanced nuclear fuel cycles. Subject to appropriations, funds are anticipated to be available in the Low Energy and Theory/Nuclear Data programs within the Office of Nuclear Physics (NP) for this program.

A companion Program Announcement to DOE Laboratories (LAB 07-05) will be posted on the Office of Science Grants and Contracts web site at: <http://www.science.doe.gov/grants/>.

**APPLICATION DUE DATE:** January 10, 2007, 8 PM Eastern Time

Applications must be submitted using [Grants.gov](http://www.Grants.gov), the Funding Opportunity Announcement can be found using the CFDA Number, 81.049 or the Funding Opportunity Announcement number, DE-PS02-07ER07-05. Applicants must follow the instructions and use the forms provided on Grants.gov.

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**SUPPLEMENTARY INFORMATION:** *The Nuclear Physics and Related Computational Science R&D for Advanced Fuel Cycles Workshop* was held in Bethesda, Maryland, on August 10-12, 2006, bringing together over 130 participants from universities, national laboratories, the private sector and U.S. government agencies to explore basic research opportunities in nuclear physics and advanced computational science R&D as applied to the Department of Energy's activities in advanced fuel cycles. The workshop was sponsored by the Offices of Nuclear Physics and Advanced Scientific Computing Research, of the Department of Energy (DOE) Office of Science. A principal aim of the workshop was to bring the applied and basic research communities with nuclear expertise together to identify the research opportunities that would be beneficial to the Department of Energy's Nuclear Energy program on advanced fuel cycles (AFC). Primary objectives for the workshop included:

- determine nuclear physics R&D needs of the AFC,
- determine how these 'needs' can be met by existing programs,
- determine what facilities are appropriate for this research, and
- identify computing resource needs for modeling and simulation.

The report of this Workshop outlines the nuclear physics R&D needed for the AFC and serves as a basis of awards for funding from this solicitation. A copy of the report may be obtained from the Office of Nuclear Physics, is available on the Office of Nuclear Physics web site at <http://www.science.doe.gov/np/> and is also available on the Workshop web site at <http://www-fp.mcs.anl.gov/nprcsafc/>. In addition to a summary of the meeting results, the reports of the four working groups, including identified research opportunities are in the report. Furthermore, all presentations given at the Workshop, both in plenary sessions and in parallel meetings of the four working groups can be found on the Workshop web site listed above. In addition, early documents are posted on the Workshop web site to introduce workshop participants to on-going activities in the AFC program.

### **Program Objective:**

The material in the workshop report encompasses a large body of scientific opportunities in nuclear physics and related computational activity relevant to DOE's advanced fuel cycle efforts. As such, it can be used as a resource by the research community to plan R&D efforts in this area.

Some areas of potential R&D highlighted in the Workshop Report are:

- The use of advanced sensitivity analyses has helped clearly identify nuclear data needs due to both the characteristics of AFC reactors (high transuranic content and high fissile-to-fertile ratio in the cores) and the new requirement to consider not only the reactor but also the complete fuel cycle. A number of opportunities for basic research are identified.
- Several experimental and theoretical opportunities were identified that will enable challenging and exciting basic research as well as meeting the needs of the AFC program. High quality measurements will be driven by the new stringent AFC data requirements.
- There is a strong need to produce nuclear data for covariances to support reactor and fuel cycle design and to identify priorities for cross section measurements and improved modeling of nuclear reactions. Precision neutron cross sections (fission, capture and scattering) are needed for both major and minor actinides in several well-defined energy ranges. In addition, consolidation of data for decay properties, delayed neutrons, fission yields and photon production is required.
- To increase reliability of reactor simulation codes that have an impact on safety and economy, a wall-to-wall simulation of the reactor core will require advanced nuclear theory calculations of relevant cross sections. While some tools exist, these cross section calculations will require the development of both theoretical and computational methods to approach the required AFC accuracy.

Applications requesting support for basic research in these broad areas will be evaluated on the basis of the significance and merits of the proposed research to address the needs of advanced fuel cycles; the competence and promise of the researchers; the feasibility of the plans for

carrying out the proposed program; the size and scope of the budget; and the resources and interest of the sponsoring institution. For each task the applications should address the goal of the effort; the method or approach to be taken; a cost-breakdown and schedule of the effort; the manpower to carry out the effort; the deliverable result of the work; and the anticipated benefit to advanced fuel cycles for nuclear reactors. Applications may be for up to three years, with support beyond the first year dependent upon a report of satisfactory progress. Institutional contributions to the effort should be clearly indicated.

### **Collaboration**

Applicants are encouraged to collaborate with researchers in other institutions, such as: universities, industry, non-profit organizations, federal laboratories and Federally Funded Research and Development Centers (FFRDCs), including the DOE National Laboratories, where appropriate, and to include cost sharing and/or consortia wherever feasible. All collaborators should be listed with the abstract or summary. Additional information on collaboration is available in the Application Guide for the Office of Science Financial Assistance Program that is available via the World Wide Web at: <http://www.science.doe.gov/grants/Colab.html>.

Posted on the Office of Science Grants and Contracts Web Site  
November 6, 2006.