

Proton Radiography Call for Proposals

The Los Alamos Neutron Science Center (LANSCE) is issuing a Call for Proposals for experiments to be carried out at the Proton Radiography Facility during fiscal year 2010 (FY2010). Assuming adequate funding for accelerator operations, this call will cover the run cycle beginning on October 1, 2009 and extending through the end of September 2010—there is a maintenance period planned to begin January 2 and extending through early June 2010. Proposals that have been previously reviewed must be resubmitted for consideration in the FY2010 run cycle, even if they received very high scores in the past.

All experiments whether they are dynamic, static, classified or unclassified must have a corresponding proposal submitted to the Program Advisory Committee (PAC). The PAC is an advisory committee to the LANSCE User Facility Director and not a funding committee. However, the PAC ranking may be folded into programmatic sponsors' decision-making processes and used as a means for Laboratory management to identify potential funding.

All proposals that cover work that is continuing or are an extension of work being done this year (FY2009) must attach either a progress report, a final shot report, or a published paper on the results of that work. An overview of proton radiography capabilities can be accessed at <http://lansce.lanl.gov/pRad/index.shtml> To submit a proposal, please use the accompanying form. The proposals should include the objectives for the experiments, importance of achieving these objectives, why pRad experiments are the best means of achieving the objectives, and show an operationally feasible approach. Technical, operational, and safety risks should all be identified. Proposals should provide a detailed description of the experimental devices, the experimental configurations and beam time requested. Good integration with modeling and validation programs where appropriate will improve proposal ratings.

The following are suggestions for topics that could attract programmatic support. The pRad cost model normally has programmatic sponsors pay for beam time. However, approximately 10% of the run time has been set aside for compelling scientific proposals without programmatic sponsors. For this 10% of proposals, the beam time and operational support at pRad will be provided in a user facility mode, other ancillary costs for personnel not on the pRad team and unique experimental costs must be borne by the user.

Campaign 1

Campaign 1 experimental activities focus on hydrodynamics and implosion issues defining the initial conditions for boost, and on HED and burn issues for boost (issues not generally accessible to pRad experiments). Most material properties-specific issues are addressed in DPE or Campaign 2, but Campaign 1 does address more integrated issues such as mixing and instabilities affected by material strength and damage. In the category of initial conditions for boost are included: 1) selected HE performance issues, especially complex detonation and shock interactions in detonation products, 2) some integrated

damage and recollection issues, 3) instability-produced mixing, and 4) integrated implosion experiments evolving from MOLLI or the HE Cylinder effort.

The PHELIX driver is expected to be commissioned in 2009 (off-line) with integration and initial experiments planned for 2010. The Damage Surface Hydrodynamic experiment is the first experiment to employ PHELIX driver capability, but other applications (for FY-11 and beyond) will be considered.

Campaign 1 will include one or two new experimental activities (perhaps pRad related) from the C1 – Boost Related solicitation. C1 also has direct responsibility for Pu material aging activities, in coordination with DPE, and pRad experiments relating to aging physics can be considered.

Campaign 2

C2 activities are focused on obtaining the necessary thermodynamic (equation-of-state, phase diagram, melt, etc.) and constitutive properties (spall, ejecta, yield strength, etc.) data for plutonium, uranium, beryllium and other metals. Proposed pRad experiments involving direct measurements of phase transformations and their associated kinetics, quantification of strength, quantification of ejecta (single and double shock) and the elucidation of damage mechanisms in Pu, U, and Be are encouraged.

C2 also focuses on the performance and safety properties of high explosives (HE), with the goal of this effort is to provide accurate experimental data to feed models that will ultimately be used for weapon certification. We encourage proposals that would provide a new direction in the quantification of High Explosive Product EOS, that examine the mechanistic details of EBW and DOI detonators, that characterize the hydrodynamics of reactive flow in neat energetics, that characterize reactive flow in damaged energetics, and that use pRad for quantification of detonator/booster/main charge initiation studies at STS extremes.

In both areas (metals and energetics), we encourage close coupling of theory and experiments and we would favor those proposals that have a “predictive” flavor that would be validated with the pRad diagnostic

Campaign 3

C3 has interests in

1. Improving quantitative use and interpretation of image data; particularly multi-time data.
2. Work that supports the weapons complex transformation
 - a. Understanding the relation between manufacturing processes and performance
 - b. Technical work that might allow cost reductions (either in R&D or production)
 - c. Technical work that might allow entirely new and better approaches (in R&D or production)
3. Work that demonstrates, develops or supports understanding the potential role of penetrating radiography for MaRIE

Campaign 4

C4 is interested in two specific areas of investigation related to Secondary Assessment Technologies. Ideas should connect to the issues identified in the Secondary Assessment Plan. For details, please contact Randy Kanzleiter

Dynamic Plutonium Experiments

Proposals are solicited for future Dynamic Plutonium Experiments (DPE) to be fielded at pRad. The DPE program is looking for experimental concepts of three types:

1. Fundamental—where one physical mechanism is being investigated.
2. Mid-scale integral—where a limited number of physical mechanisms are integrated together and investigated.
3. Integral—where experimental results are based on the complex interaction of several physical mechanisms.

All of these types of complexity are important to our efforts to develop new, validated physics models of the dynamic response of plutonium. Ideas should connect to the requirements identified in the Ten Year DPE Plan and the Pu strategy. Copies of these documents are available upon request from Rick Martineau. In addition, the DPE program is interested in fostering the development of new or emerging diagnostics of relevance to DPEs.

Hydrodynamic Experiments

The Hydrodynamic Test Program (HTP) executes specific hydrodynamic tests and maintains the core capabilities and improvements necessary for design, fabrication and execution of these integrated experiments. Major core competencies include the following:

- Design hydrodynamic test devices while optimizing experimental data fidelity and cost effectiveness
- Procure and/or fabricate device hardware (including machining, inspection and non-destructive evaluation).
- Assemble high fidelity test devices.
- Transport test devices on-site.
- Design and execute hydrodynamic test experiments with supporting diagnostics to provide the best data possible.
- Develop hydrodynamic test diagnostics, analysis techniques and the associated infrastructure to optimize utility of hydrodynamic test activities
- Analyze, assess, document and archive hydrodynamic test data to meet customer needs.

In support of the Hydro Program Mission, pRad offers an opportunity for the development and optimization of integral experiments, complementary experiments to help resolve UGT anomalies, a test bed for “continuous imager (aka MOXIE)” tests, and a set of experimental data that can be used for the development of enhanced image analysis. The Hydro Program encourages proposals that address these opportunities.

Unclassified proposals must be submitted to the LANSCE User Office (lansce_users@lanl.gov) no later than **June 26, 2009** using the pRad Proposal Form.

If submitting hardcopies of classified proposals, they may be sent to
Los Alamos National Laboratory
Mail Station 5000
LANSCE User Office c/o MS H803
Los Alamos, NM 87545

or hand carried to
Felicia Archuleta, TA-53, Bldg. 1, Room D146

Electronic versions of classified proposals may be emailed to fulton_robert_d@lanl.gov on the secure network.

The proposals will be peer reviewed by the Program Advisory Committee (PAC) in late June.

For technical questions regarding details of pRad experiments, contact Frank Merrill (fmerrill@lanl.gov). Any other questions should be directed to the User Office at lansce_users@lanl.gov or 505-665-1010.

Proposals are due **June 26, 2009.**