

## Charge to the 2008 FRA Visiting Committee for Fermilab Science

Although Fermilab is a single mission laboratory, its scientific program is quite broad: encompassing experimental particle physics, accelerator physics and particle astrophysics. It includes collider and neutrino oscillation experiments, and the necessary accelerator operations and R&D for improving the existing accelerator complex. In addition, Fermilab plays a leading role in U.S. participation in the LHC, both on the accelerator side and in the CMS detector. The Director chooses specific programs after discussion and advice from the Physics Advisory Committee (PAC). Fermilab now stands as the primary laboratory for high-energy physics research in the U.S. and has been selected as the U.S. site for the International Linear Collider (ILC). Its future and the future of high energy physics (HEP) in the U.S. are now even more closely linked, carrying a primary role in the field as articulated by the HEPAP and P5 panels advising funding agencies. At the same time, it is vital for Fermilab to maintain an active and continuous program of producing physics results.

An advanced accelerator R&D program for future accelerators, focused, but not exclusively, on the ILC, is an important component of the program. The Laboratory is also examining options for a Project X, to pursue other forefront science at the intensity frontier and possibly lead into a muon collider/neutrino factory. The Fermilab Steering Group has deliberated on these issues; their report with conclusions and recommendations is available at [http://www.fnal.gov/pub/directorate/steering/pdfs/SGR\\_2007.pdf](http://www.fnal.gov/pub/directorate/steering/pdfs/SGR_2007.pdf). Extensive presentations were made to the January 2008 P5 Meeting at Fermilab ([http://www.fnal.gov/directorate/Longrange/Steering\\_Public/P5.html](http://www.fnal.gov/directorate/Longrange/Steering_Public/P5.html) ).

In addition, Fermilab pursues an extensive program in experimental astrophysics, and has theory programs both in particle physics and astrophysics. The management of Fermilab was contracted in January 2007 to the Fermilab Research Alliance (FRA).

The FRA Visiting Committee for Fermilab Science is charged with reviewing the broad scientific program and commenting on its quality, soundness, overall balance, and future prospects. The Committee is also encouraged to comment on the Laboratory Director's plans and priorities for Fermilab.

In its response to this charge, the FRA Visiting Committee as part of its review should address the following questions:

- i) How effectively is the Laboratory dealing with ongoing Collider Run II operational issues (for both accelerator and detector systems)? Are the Laboratory's Run II goals appropriate in relation to current and expected collider performance, and in relation to anticipated LHC turn on and operations?
- ii) How effectively is the Laboratory meeting the requirements of the current and recently operating neutrino experiments (MINOS, Mini-

BooNE, and SciBooNE)? Is the Laboratory adequately preparing for PAC-approved neutrino experiments (e.g., NOvA and MINERvA)?

- iii) Are the Laboratory's R&D and strategic planning activities appropriately matched to future opportunities and expectations? Is the Laboratory planning effectively for the transition of the energy frontier to the LHC? Has the laboratory formulated the correct joint strategy for Project X and the ILC? Are appropriate resources available for fulfilling shorter term neutrino programs and approved Project X needs? Is the Laboratory's evolving strategic plan aligned well with the science strategy laid out in the successful FRA proposal to the DOE ([http://www.fra-hq.org/pdfs/Science\\_Strategy.pdf](http://www.fra-hq.org/pdfs/Science_Strategy.pdf))?
- iv) Are the three Centers generally furthering the Laboratory's scientific goals? Does the corresponding program have adequate resources to maintain a leadership role in this exciting and burgeoning field? Is the level of the Laboratory's staff and support appropriate for each of the current and proposed experimental collaborations?
- v) Are there areas of scientific endeavor, where Fermilab has unique capability and could have a significant impact, which the Laboratory should pursue more vigorously? Are there programs in the Laboratory whose efforts require future review in order to determine whether they should continue?
- vi) Are the connections among the various components of FRA working well? In particular, is the relationship between Fermilab and the broader HEP community healthy and positive? Have the connections between Fermilab and University of Chicago and other local universities, including but not limited to joint appointments, developed appropriately? Are the connections between Fermilab and Argonne National Laboratory working well?
- vii) Are the present contract arrangements, as well as the present management and staff organizations, furthering the mission of the Laboratory? Does the Laboratory management provide the scientific leadership needed for Fermilab?
- viii) Is Fermilab responding appropriately to the changes in the high energy physics landscape in the U.S.? Does it fulfill its role as the only laboratory solely devoted to high energy physics, the movement to the LHC, planning for the ILC and potential U.S. siting, opportunities at the intensity frontier, as well as the growing possibilities for nonaccelerator science?

- ix) This year the visiting committee should pay particular attention to Theoretical Particle Physics and Theoretical Particle Astrophysics and indicate whether or not there are any components of the programs which are particularly weak or particularly strong.
- x) This year the visiting committee should pay particular attention to that part of the program classified as Accelerator Science comprising the AARD program and the muon collider/neutrino factory R&D, and should comment on weaknesses and strengths.
- xi) Are there any particular issues requiring special attention by the FRA?