

FERMILAB INDUSTRIAL AFFILIATES

The Fermilab Industrial Affiliates organization was established in 1980 to improve university-industry research communications and to foster technology transfer from Fermilab. By now the Affiliates number more than 30 institutions including many research-oriented companies in the Fortune 500 list as well as several companies formed by Fermilab staff members and users.

Direct activities of the Affiliates include visits of company representatives to Fermilab and Fermilab personnel to Affiliates. The annual meeting is one of the principal opportunities for such visits. Affiliates also receive selected Fermilab reports and other information about on-going work at the Laboratory.

Affiliate members have direct access to Fermilab staff for information on the work at the Laboratory. They receive copies of significant Fermilab technical publications and are kept abreast of important seminars on technical matters at the Laboratory. Efforts are also underway to stimulate more visits of staff members from Affiliates' institutions to Fermilab and vice-versa. An annual meeting is held in the spring. This Round Table was presented at the third annual meeting. At the meeting the visitors are given a comprehensive presentation of the activities underway at the Laboratory. Tours and individual conferences present an opportunity to see the Fermilab work in detail. A membership fee of \$1000 per year is charged to offset part of the cost of the program.

Specific technology innovations are only one facet of the work of the Laboratory that is emphasized. The "scientific culture" related to particle physics is given heavy weight as well as the long range potential of activities such as the development of superconductivity technology. The participation of more than a hundred universities in all phases of the Laboratory is also important to Affiliate members. Often, an Affiliate's interests in the Laboratory is hard to gauge. A major farm equipment manufacturer turned out to be one of the heaviest users of large computers in the United States.

Fermi National Accelerator Laboratory, by its nature, amalgamates a wide array of engineering and physics disciplines of interest to Affiliate members and industry in general.

The acceleration of particles requires a working together of systems of high voltage electrostatics, high power radiofrequency signals, and rapidly pulsed magnets all under rigid and precise computer control. Beam optics, high vacuum techniques, ion sourcery are also involved. Particle detection adds new areas in terms of spatial and temporal resolution, fast logic circuitry and decision making, techniques of multi-dimensional pattern recognition, signal processing, and efficient number crunching.

A seven year R&D effort in superconductivity has culminated in the construction of a four-mile ring of superconducting magnets with associated cryogenic systems. A substantial fraction of the world helium refrigeration capacity is at Fermilab. Advanced R&D looks to new materials, refrigeration,

and understanding which will lead to pulsed magnets operating with magnetic fields of greater than 100 kilogauss.

Since the scale of Fermilab is so large, four miles of tunnel filled with sophisticated magnets and a 6800 acre site, an important ingredient in much of the R&D has been a search for innovative, cost-conscious designs. Special fabrication techniques such as laminar tooling have been invented in pursuit of precision coupled with economy. Remote and automomous control is important for the same reason. This has led to important developments in large-scale distributed control and data-collection systems.

Technology-related programs at Fermilab include holography, solar energy, and neutron cancer therapy. A brochure is available (Technology Development at Fermilab) with capsule descriptions of all these activities.

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Arco Petroleum Products
Bell Laboratories
Borg-Warner Corporation
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Cherry Electrical Products Corporation
CMD Development
Commonwealth Edison
Deere & Company
Digital Equipment Corporation
Digital Pathways, Inc.
Eaton Corporation
FMC Corporation
General Electric Corporation
The Goodyear Tire & Rubber Company
W. W. Grainger, Inc.
The Harshaw Chemical Company
Hewlett Packard
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International Business Machines Corporation
Johnson & Johnson
Litton Industries
McGraw-Edison Company
Nalco Chemical Company
Nuclear Data, Inc.
NYCB Real-Time Computing, Inc.
Omnibyte Corporation
Raychem Corporation
Richardson Electronics
Shell Development Company
Standard Oil Company (Indiana)
Sunbeam Appliance Company
UOP, Inc.
Varian Associates
Westinghouse Electric Corporation