

The Italian Summer Students Program at Fermi National Accelerator Laboratory

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Since 1984 the INFN groups have been running a 2-month summer training program for Italian students at Fermilab [1]. In 1984 the program involved only a few physics students from the Pisa group, but it was later extended to other groups and to engineering students. Since 2004 the program has been supported in part by DOE in the frame of an exchange agreement with INFN. In 2007 the Sant'Anna School of Advanced Studies (Pisa) established an agreement with Fermilab to share the cost of 4 engineering students each year. In the 34 years of its history, the program has involved approximately 500 Italian students from more than 20 Italian universities and from some European universities. In the years 2010-2017, with the support of INFN, INAF, ASI, ISSNAF and the Cultural Association of Italians at Fermilab (CAIF [2]), 20 students were hosted in several other US laboratories and universities. The Fermilab training programs spanned from data analysis to design and construction of particle detectors and accelerator components, R/D on superconductive elements, theory of accelerators, analysis of astrophysical data. In 2015 the University of Pisa created an ad-hoc Summer School [3]. Fermilab interns are enrolled at the University of Pisa for the duration of the internship. They are required to write summary reports published in the Fermilab and University of Pisa web pages. Upon positive evaluation of a University of Pisa committee, students are acknowledged 6 ECTS credits. In 2017 a new agreement with the summer school "MovingKnowledge17" [4] promoted by Oxford University and dedicated to neutrino physics allowed to 3 Fermilab summer students to spend also 4 weeks at Oxford working with the local groups. The entire program will grow under CAIF management. INFN has granted his sponsorship to CAIF, and an agreement has been negotiated between CAIF and ASI for fellowships in US space science laboratories supported by ASI. The program is also part of the outreach of the European Projects MUSE (H2020-MSCA-RISE-2015, GA 690835) and NEWS (H2020-MSCA-RISE-2016, GA 734303). We report on recruiting method, training programs, and on final students' evaluation.

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1. Recruitment

In January each year we announce the available grants with many posters and flyers, whereby some basic information is given to the applicants. As of now we have not been able to get this information distributed c/o the Italian Minister of University and Scientific Research. We shall continue shooting for this goal, which would allow for a much more efficient transfer of information to all universities. The youngest undergraduate students are excluded by requesting students of the "Laurea Magistrale" courses from Italian universities and, similarly, of the Masters degree from European universities. Computer science skills and good knowledge of English must be stated. Pre-selected candidates are informed that they will have to discuss their case in person or by Skype meeting with representatives of CAIF and of the sponsors. Thorough interviews are performed. The selected students are made available as potential trainees in the months of August and September. Those for whom a good fit and work program are found within a Fermilab team will enter the US with a J1 entry Visa supported by the laboratory. Free housing and rental cars are provided besides a weekly salary. Fermilab (at variance with some other sponsor) does not cover the round trip journey to the US and the health insurance. However, the salary is fully adequate to allow the students to cover the travel as well as all costs encountered in two months of stay. In early spring CAIF members explore the available training programs at the lab, to be matched to the skills and interests of the trainees. Agreement is also found with outside labs for training students sponsored by Space Science agencies. In late spring the winners are selected. As a rule, their training period is from the end of July to the end of September.

2. Logistics

A key action item is contacting research groups and finding out which ones are interested in offering a training program to Italian students. It is essential to find a match between the profiles of the candidates and the interest of the groups. Only students matching an available training program are ultimately selected. The Fermilab Personnel Office is informed and e-mails the students the job offers needed to get the appropriate J1 Visa. Once the offer is accepted the students are responsible for requesting a J1 Visa to an US consulate in Italy. In addition, substantial paperwork is requested from the students by the Fermilab Visa Office. This includes accessing from Italy the FermiWorks website to complete an Onboarding process and filling a New Hire document. The rules for accessing the FERMI computing domain can also be followed from a distance, in order to gain access to the domain immediately upon arrival at the lab. Upon arrival the students are instructed to get a limo from the Chicago airport to the lab, where they can pick up rental cars and room keys. CAIF members are around watching and making sure that the process proceeds smoothly. On the first and the second day at the lab the students convene for an International Orientation session, where they must provide proof of admission and of medical insurance, and are instructed on traffic rules and life in the US, for instance how to open a bank account and get a Social Security number, and specifically on Fermilab policies. They are also instructed on how to get their work certified by

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their supervisor in order to get their weekly salary. A twin mandatory concluding session must be followed shortly before departure at the end of the training period. These students are instructed on how to handle their bank account at later times, how to fulfil US tax regulations and how to adhere to the J1 Visa conditions when coming back to the US. Although this bureaucracy may scare the students at the beginning, experience shows that they are able to learn quickly to fulfil all the requests, and that in a few days they are able to work efficiently in their groups, who are responsible for assigning to them adequate office space and computing power. Since at the end of July not enough lab dorms may be available to accommodate all students, some may be initially housed in nearby hotels. Within at most a month, however they are moved to the lab dorms. Accommodation on the lab site is very convenient for saving time, working more efficiently and living comfortably.

3. Work Programs

The training programs span a very wide range of science and technology. For physicists, they address analysis of experimental data in particle physics and astrophysics, setting-up of particle detectors, particle accelerator theory. For engineers, they include fast digital electronics, design of detectors and of accelerator components, superconducting materials and magnets, high precision mechanics, advanced computing. Students make extensive use of advanced computation means and programming languages, as C, C++, and Java, and apply advanced CAD and technical tools for mechanics and electronics design (MatLab, OrCAD, Ansys, etc.). Physicists develop significant knowledge in statistical data analysis (Root). At Fermilab work is performed within projects, programs and experiments like Mu2e, Muon (g-2), NoVA, MicroBoone, LArAT, LBNF, DUNE, CDF, CMS, and General Accelerator R&D. Outside Fermilab work is performed mostly in astrophysics, space science and technology. The student is integrated as much as possible in his/her research group and is encouraged to interact with as many colleagues as needed in addition to his or her supervisor. The supervisor meets his or her student on an individual basis, with meetings held at least once per week, mostly because of the outstanding productivity of these students. The students also participate in standard meetings, where they often present their results to their group to discuss them in an ampler professional environment. All students are requested to give a mid-term oral presentation and to write a technical report at the end of their stay. These documents are stored in the Fermilab Education Office web archive [5]. Upon successful completion of the final exam with a University of Pisa committee, students are acknowledged 6 ECTS credits.

References

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