Summer Students at Fermilab and other US Laboratories

http://www.pi.infn.it/cdf/ss2015/PisaFermilabSummerSchool.htm
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Dr. Carmela Luongo

NEWS General Meeting
Pisa, Thursday, March 14th, 2018

FERMI NATIONAL ACCELERATOR LABORATORY

The most important laboratory in particle physics in USA
Founded in 1967 as the **National Accelerator Laboratory**
Renamed in honor of Enrico Fermi in 1974

- 1750 employees (scientists, engineers, technicians)
- > 3500 scientists and 1000 students from 50 countries
- > 15000 K-12 students on educational programs every year

Wilson Hall

Booster, one of the Fermilab's powerful Accelerators

DISCOVERIES AT FERMILAB

- ✓ 1977: **bottom quark**
- ✓ 1995: **top quark**, CDF and D0 experiments
- ✓ 2000: **tau neutrino**, DONUT experiment

CDF
Collider **D**etector at **F**ermilab
Fundamental contributions
from Italy and Pisa

FERMI NATIONAL ACCELERATOR LABORATORY TODAY

ACCELERATOR DIVISION

- ✓ Development of new accelerator techniques
- ✓ Beams for Lab's experiments

TECHNICAL DIVISION

- ✓ Development of new technologies for particle physics experiments

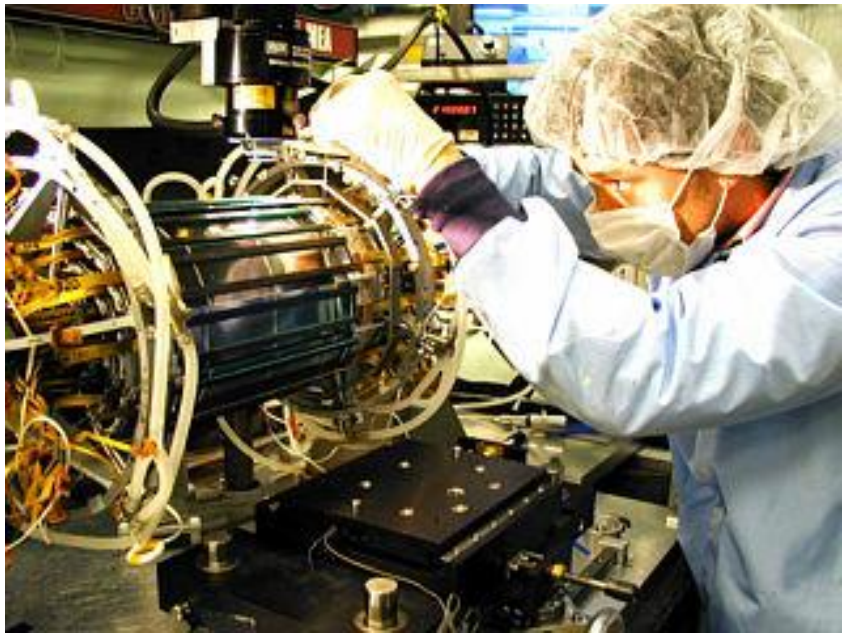
COMPUTING DIVISION

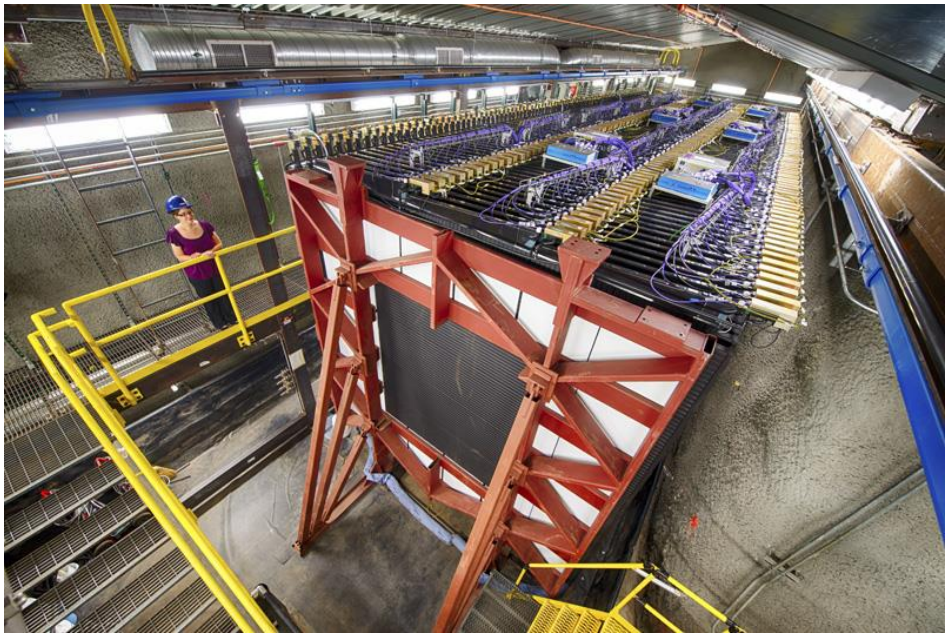
- ✓ Computing infrastructure for data handling and analysis

Feynman Computer Center

FERMILAB PARTICLE PHYSICS DIVISION

- ✓ Detector development and Lab's Intensity Frontier experiments
- ✓ Muon to electron conversion experiment (Mu2e)
- ✓ Measurement of the anomalous muon magnetic moment (Muon (g-2))
- ✓ Short/Long-baseline neutrino experiments
- ✓ Collaboration with CMS at CERN Large Hadron Collider
- ✓ Theoretical Physics Department, Astrophysics Department





FERMILAB SUMMER SCHOOL: SPONSORS

- 0 ("zero") cost for the student
- ~9,000 $/student for the sponsor

- Department Of Energy at Fermilab
- Italian National Institute of Nuclear Physics
- Sant'Anna School of Advanced Studies (Pisa)
- ASI (INAF in 2010-2011): internships at Space Science Labs
- University of Pisa

FERMILAB SUMMER SCHOOL: RECRUITMENT

INTERNATIONAL PROGRAM – MASTER STUDENTS

- Physics/Applied Physics
- Engineering, Materials Science, Computer Science

ADMISSION

- Curriculum Vitae
- Recommendation Letters
- Interview
- Good knowledge of English

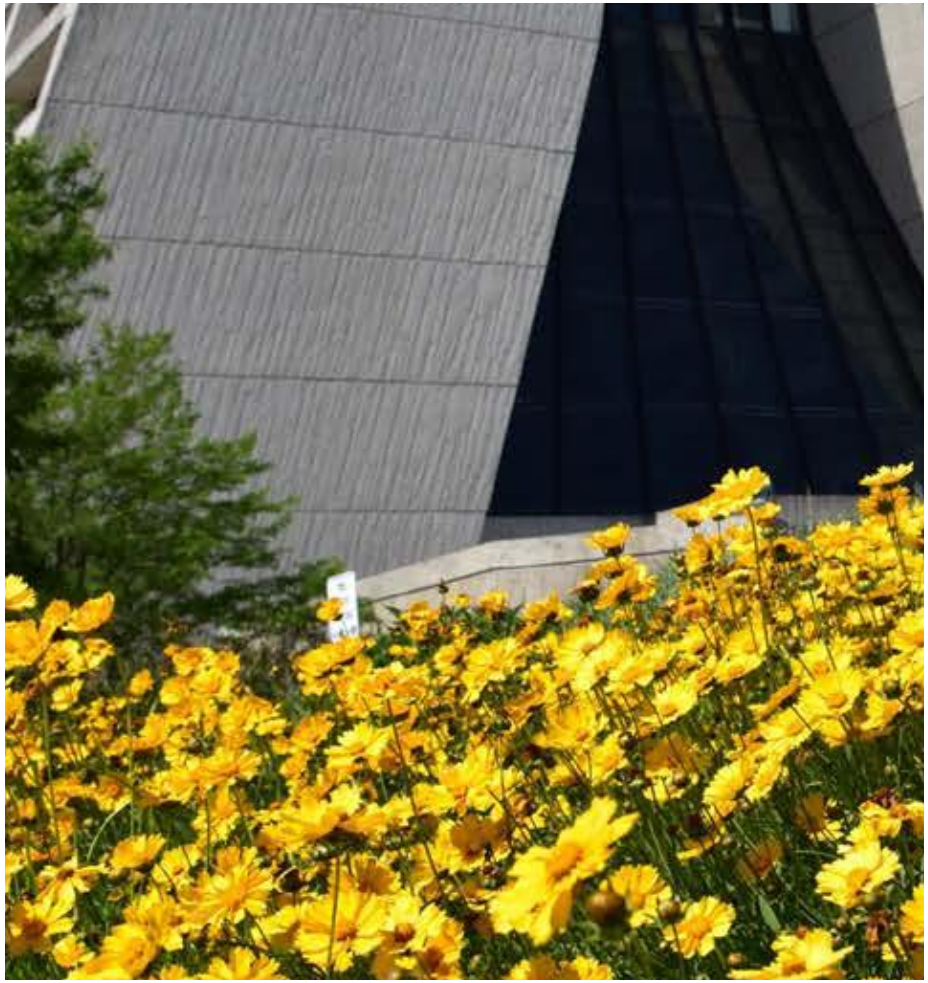
FERMILAB SUMMER SCHOOL: ACTIVITY

- August – September (9 weeks)
- **Programs for physicists**
  - Design of particle detectors/accelerators
  - Simulation of particle detectors/accelerators
  - Analysis of experimental data
- **Programs for engineers**
  - Design/Test of particle detector/accelerator components
  - Design/Test of superconducting materials and magnets
  - Development of fast electronics components/High precision mechanics
  - Development of advanced computing infrastructures

UNIVERSITY CREDITS (since Summer School creation in 2015)

- 6 ECTS Credits (ECTS, European Credit Transfer and Accumulation System)

DEADLINES FOR 2018 EDITION



March 15th, end of term for student applications to the School

March 15th, end of term for training programs to be sent by supervisors to the School

March 31st, end of student interviews in Italy and creation of list of qualified candidates

March 31st, profiles of qualified candidates made available by the School to supervisors

April 20th, candidates of choice indicated by supervisors (in priority order) to the School

May 20th, selections of winners by the School and assignments of students to programs.

THE TWO COMMANDMENTS

THE BEST STUDENT

FOR

THE BEST TRAINING PROGRAM

NEVER COMPROMISE ON QUALITY

BUT

ALWAYS COMPROMISE ON MONEY

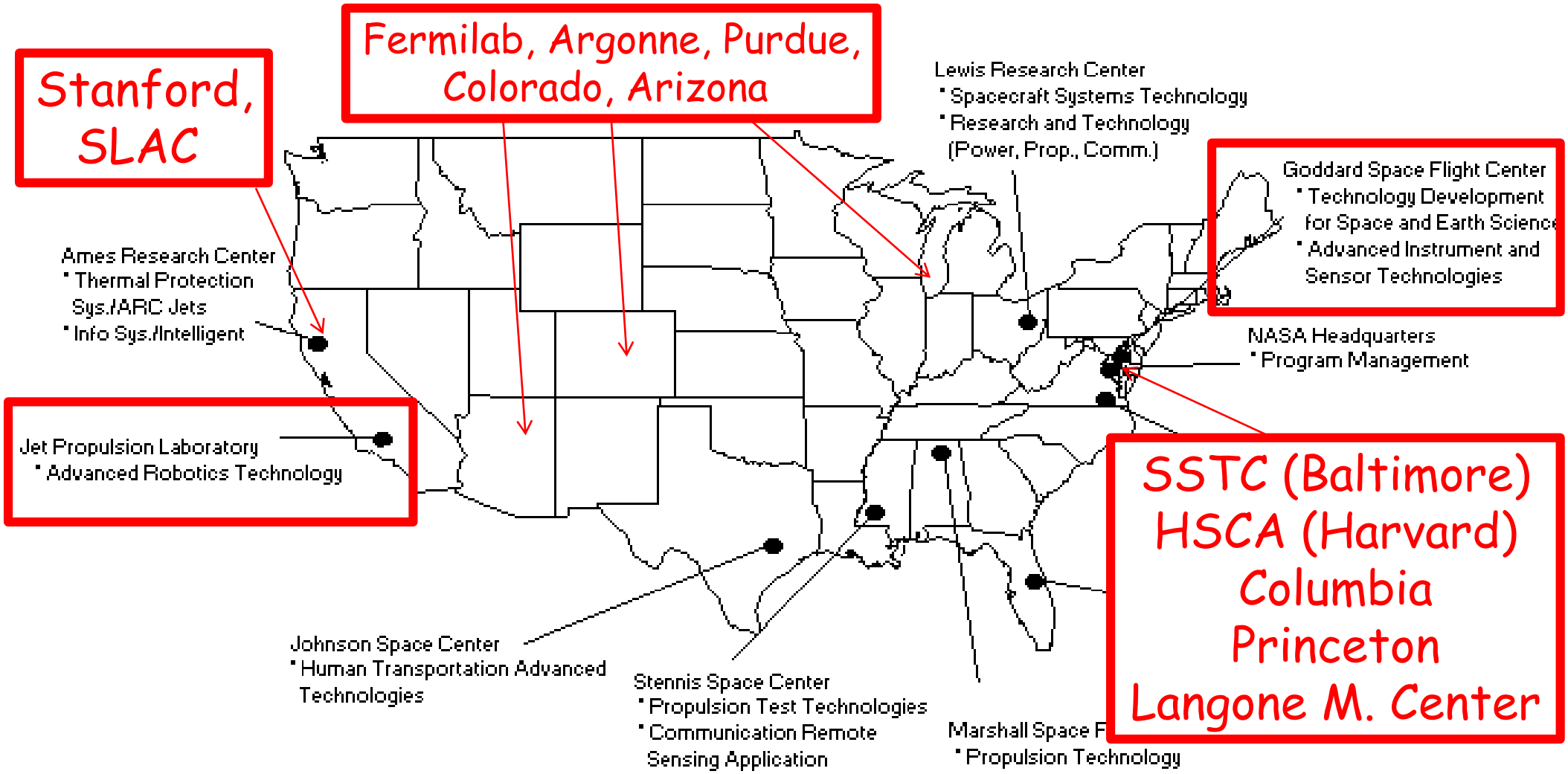
FERMILAB SUMMER SCHOOL: LOGISTICS

- July 27-28, 2018: students fly to Fermilab
- July 30, 2018: Orientation Session, Training Session, students are introduced to their supervisors
- August 27-31, 2018: Mid-term Review, ~20 slides
- Labor Day
- September 24-28, 2018: Final Review, ~20 slides
- Summary for FNAL and UNIPI, 20 pages
- Pisa: 6 CFU exam with UNIPI board

MORE THAN 500 STUDENTS SINCE 1984
AND
SOME NUMBERS FOR THE LAST 10 YEARS

Year	Accepted	INFN & FNAL groups	SSSA	ASI	INAF	CNI	No. Physicists	No. Engineers
2008	20	14	6				12	8
2009	22	18	4				9	13
2010	24	18	2	2	2		16	8
2011	23	17	4		2		16	7
2012	21	14	5	2			10	11
2013	23	16	4	2		1	11	12
2014	25	15	4	2		4	9	16
2015	35	28	3	3		1	17	18
2016	40	33	4	3			21	19
2017	30	24	3	3			15	15

INTERNSHIPS AT OTHER US LABORATORIES



25 Summer Students outside Fermilab in the years 2010-2017
Financial support from ASI, INAF, INFN (ISSNAF, CAIF)
3 financed by ASI in 2018
Access to NASA Laboratories **IS** complicated, managed through Contractors (i.e. Caltech for JPL, University of Maryland for Goddard)

NEWS OUTREACH TOWARDS FNAL SUMMER STUDENTS (I)

- Task written in the Grant Agreement

T9.4: Summer School at FNAL and other US Laboratories (ALL): Organize a three-day training on the project research activities for the students of the "Summer School at FNAL and other US Laboratories". Effort will be made to give the students the opportunity to meet researchers of the non-academic Partners and discuss the prospects of working on research and development in European private companies.

- Deliverable

D9.1 : Summer Students at US Laboratories [12]

Seminars on the NEWS activites and visits to the laboratories will be organised for the students of the Summer School "Summer Students at FNAL and other US Laboratories". These will take place in M12, M24, M36, M48.

NEWS OUTREACH TOWARDS FNAL SUMMER STUDENTS (II)

- We have to organize Trainings on NEWS Research Activities
- Some ideas:
  - 1 day in Italy on Gravitational Waves/Astroparticle
  - 1 day at Fermilab on Mu2e, Muon (g-2), Superconductors
  - Invite Speakers from Caltech/Stanford to give seminars at Fermilab
  - Involve INFN-SNF summer students at Ligo
    INFN-DOE summer students at Slac

SINERGY WITH MUSE

"Muon Campus in US and Europe Contribution"

Year 2016

Year 2017

CONCLUSIONS AND PROSPECTS

- UNIPI/INFN/FNAL Summer School

  Multidisciplinary program for Physics/Engineering students
- Students get a hands-on training and contribute to FNAL high-tech research

ALL POSSIBLE OUTREACH INITIATIVES

WILL BE TABLEN

TOWARDS FNAL SUMMER STUDENTS