



# Involving the new generations in Fermilab endeavors

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In partnership with:



UNIVERSITÀ DI PISA



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# Fermilab S&T Directorates and Centers

## PARTICLE PHYSICS & NEUTRINO

- Design Lab's particle physics & neutrino experiments

## ACCELERATOR

- Develop new accelerator techniques
- Provide beams for Lab's experiments

## EMERGING TECHNOLOGIES

- push boundaries in Quantum, AI, microelectronics

## APPLIED PHYSICS AND SUPERCONDUCTING TECHNOLOGY

- Develop technologies for particle experiments

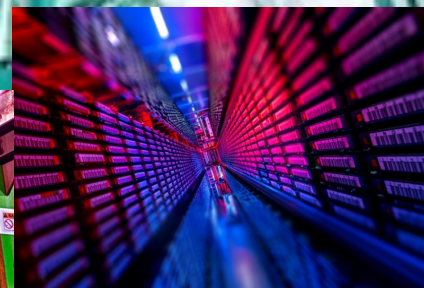
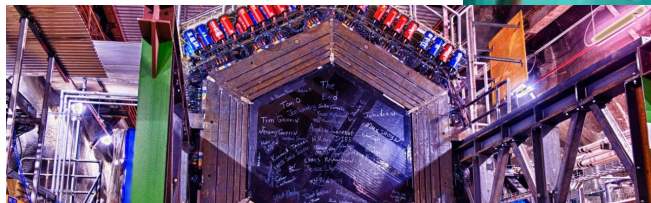
## COMPUTATIONAL SCIENCE / AI

- Provide infrastructures for data handling/analysis

## Superconducting Quantum Materials and Systems

- A DOE National Quantum Information Science Research Center

**~1800 EMPLOYEES +  
THOUSANDS OF VISITORS**





# Italy @Fermilab, some history

## COLLIDER DETECTOR AT FERMILAB (CDF), SINCE EARLY 80s

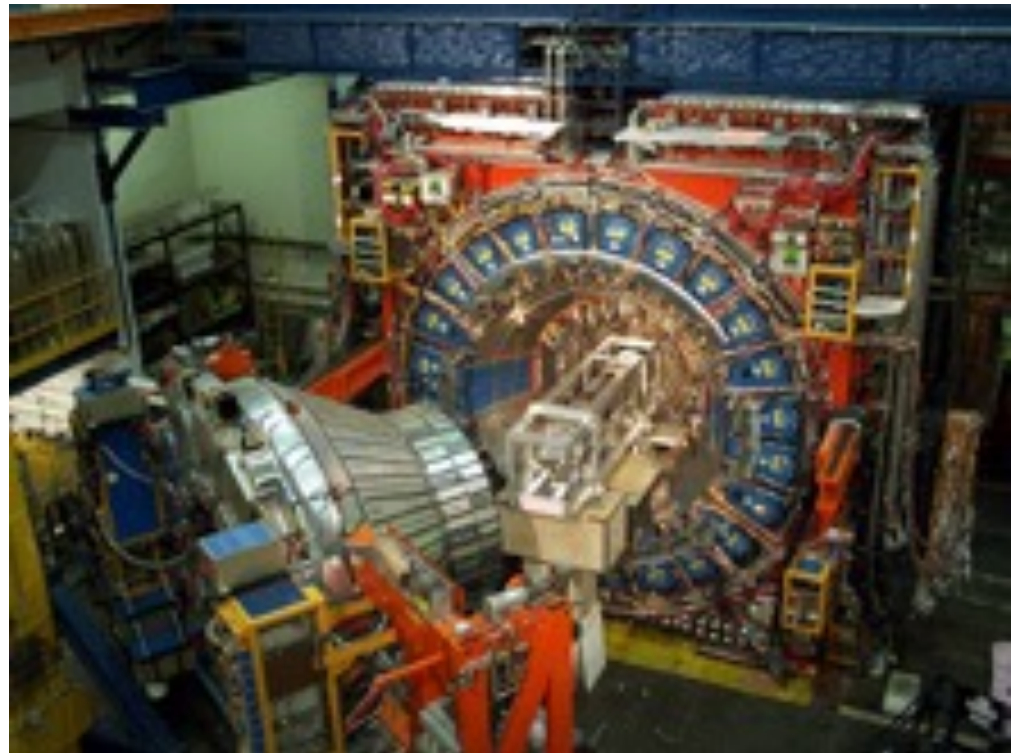
- ~100/600 Italian scientists in the years 2000-2010

**BOLOGNA, FRASCATI, PADOVA, PAVIA, PISA, ROMA, SIENA, TRENTO, TRIESTE, UDINE (INFN and UNIVERSITIES)**

- 5 co-spokesperson from Pisa

**~100 MASTER + 35 PhD THESES**

**The 2019 HEP prize of the EPS was awarded to the CDF and D0 Collaborations for the discovery of the top quark (1995)**

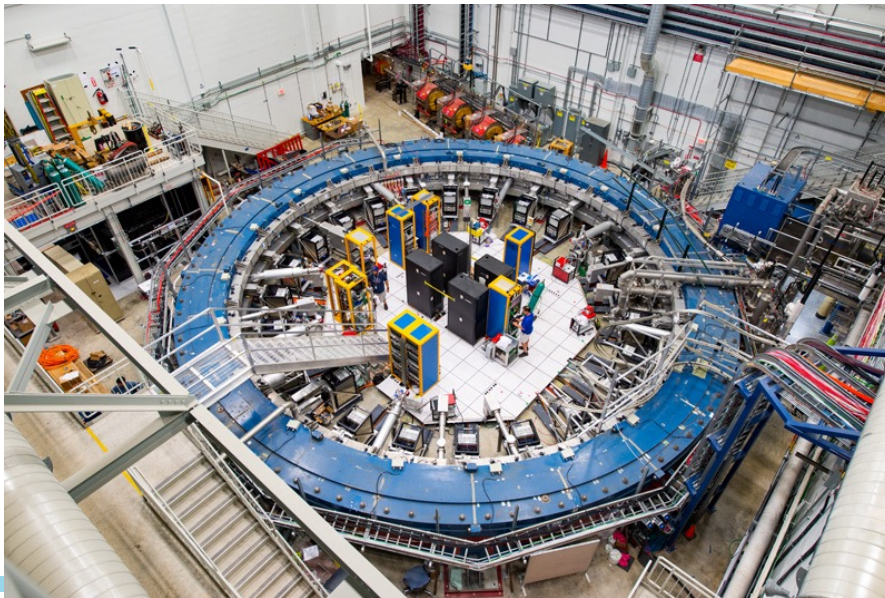


# Italy @Fermilab, as of today

## NEW LAB's ENDEAVOURS

- **Muon (g-2)**: Measurement of the anomalous muon magnetic moment
- **Mu2e**: Muon to electron conversion experiment
- **Icarus, SBN, DUNE**: Short/Long-baseline neutrino experiments
- ~150 Italian scientists

**BOLOGNA, CATANIA, FERRARA, FRASCATI, GENOVA, GRAN SASSO, LECCE, MILANO, NAPOLI, PAVIA, PADOVA, PISA, ROMA, TRIESTE, UDINE (INFN DEPARTMENTS and UNIVERSITIES)**



# Students' Recruitment

## INTERNATIONAL PROGRAM

- Applications from most Italian and some European Universities

## MASTER STUDENTS

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

## ADMISSION

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





# Training Programs

**AUGUST – SEPTEMBER (9 WEEKS)**

## **PROGRAMS FOR PHYSICISTS**

- Design, construction, commissioning of particle detectors/accelerators
- Simulation of particle detectors/accelerators and particle physics experiments
- Analysis of data collected by particle physics experiments

## **PROGRAMS FOR ENGINEERS**

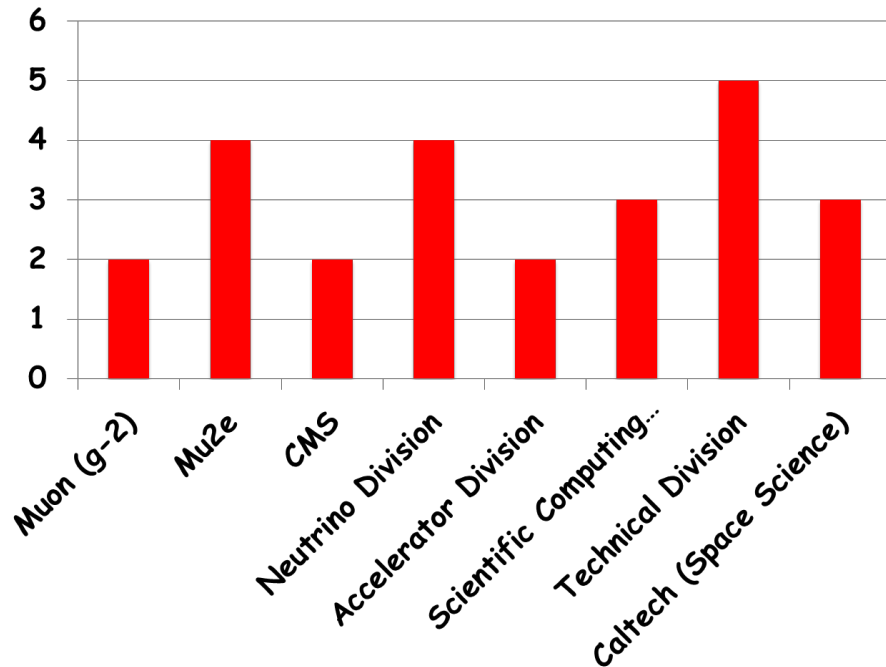
- Design/Test of particle detectors/accelerator components
- Design/Test of superconducting materials and magnets for particle accelerators
- Development of fast electronics components/high precision mechanics
- Development of advanced computing infrastructures

## **UNIVERSITY CREDITS (acknowledged by the UNIPI Summer School)**

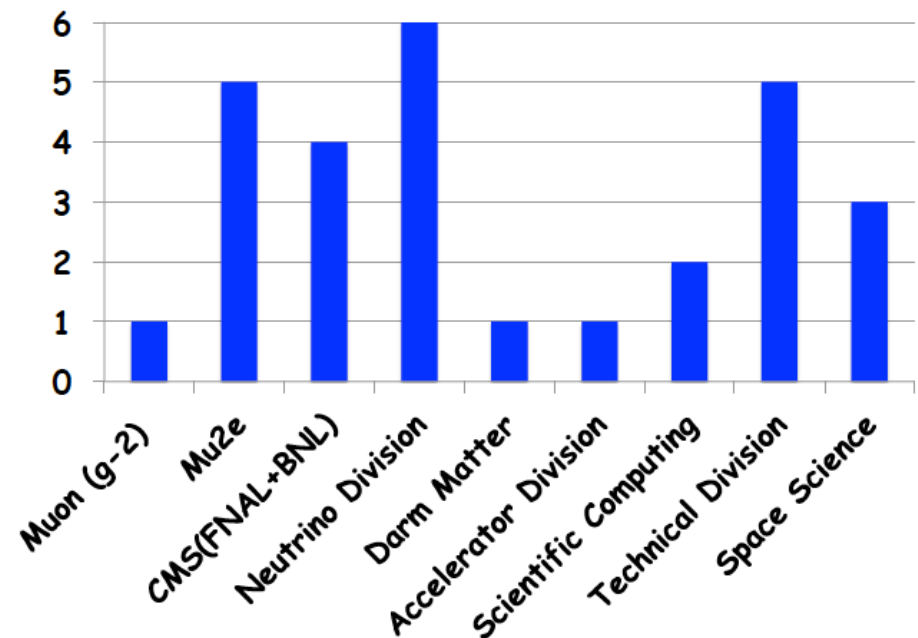
- 6 ECTS credits (ECTS, European Credit Transfer and Accumulation System)

# Training Programs (2018-2019)

## 2018: 10 PHYSICS + 15 ENGINEERING



## 2019: 13 PHYSICS+15 ENGINEERING



# Sponsorships

**0\$ COST FOR THE STUDENT, ~9,000\$ FOR THE SPONSOR**

- U.S. Department of Energy at Fermilab
- INFN - Italian National Institute of Nuclear Physics
- Sant'Anna School of Advanced Studies (Pisa)
- ASI - Italian Space Agency (for internships at U.S. Space Science Labs)
- University of Pisa



# Applicants Benefits

## WHAT FERMILAB PROVIDES

- Weekly stipend: ~600 \$
- Free housing in Fermilab Dorms
- Shared rental car
- Total cost ~9000 \$/student

## WHAT FERMILAB DOES NOT PROVIDE

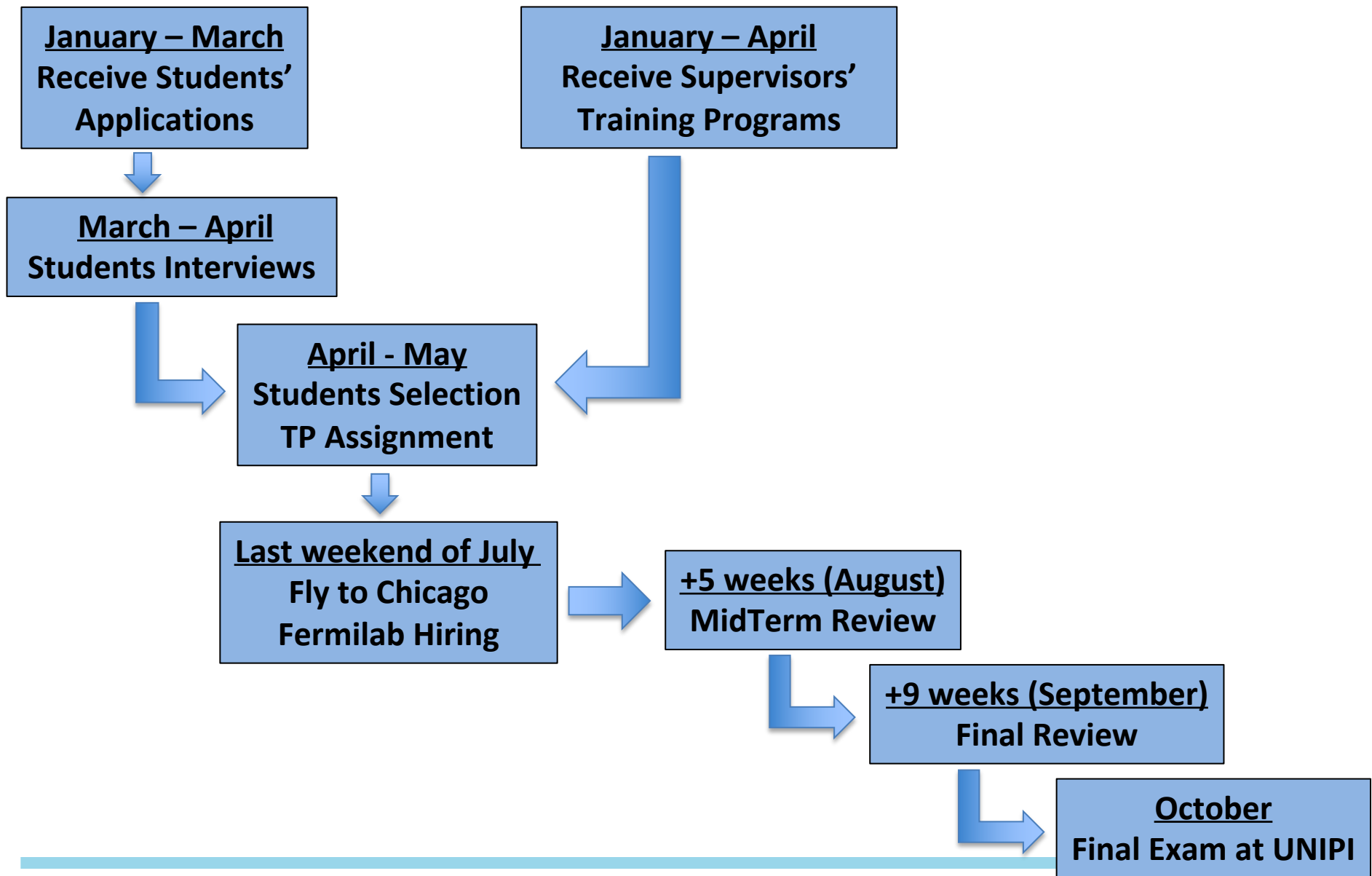
- Round-trip journey from Italy to Chicago
- Health insurance: mandatory

## STUDENTS' TO-DO LIST

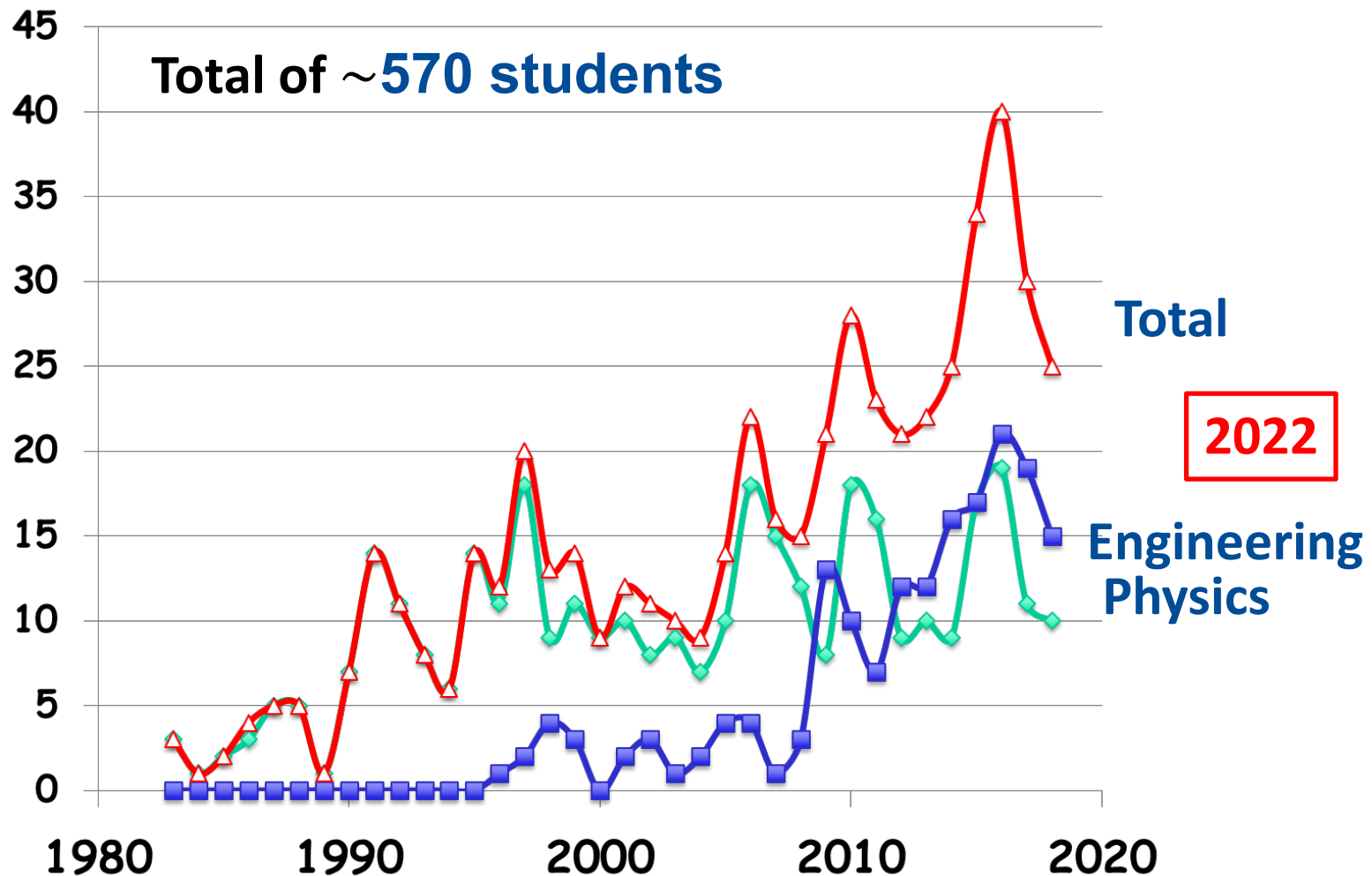
- Valid passport
- Employment and J1 Visa bureaucracy with the help of Fermilab's administrative offices



# Important Actions/Dates



# Summer Students Statistics (1983 – 2022)





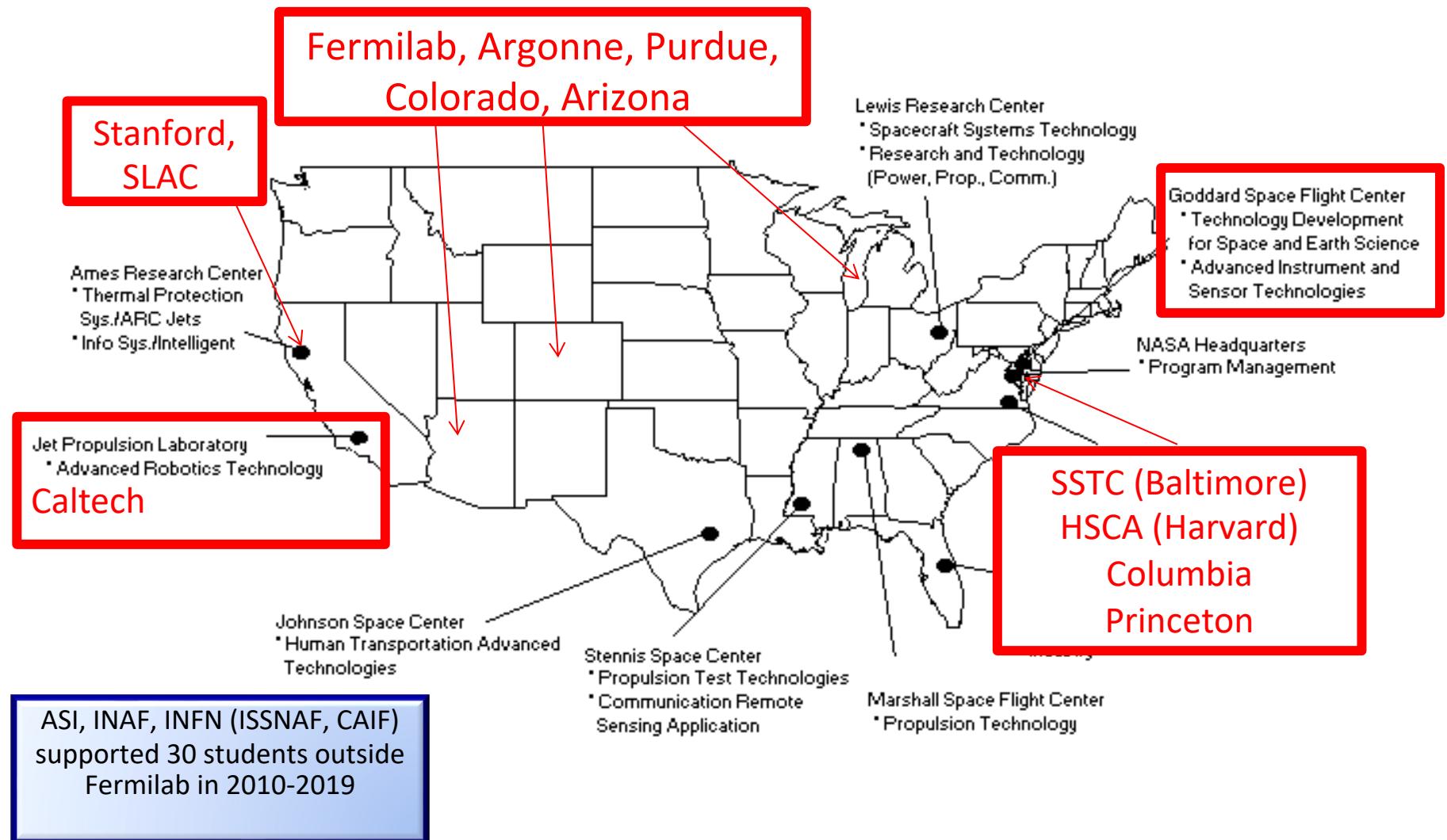
# Summer Students Statistics (1983 – 2022)

Involved Universities (1984-2022)	570 students
Pisa	52%
Roma	10%
Padova	8%
Milano	8%
Bologna	7%
Torino	2%
Trieste	2%
Napoli	2%
Ferrara	1%
Cassino	<1%
Udine	<1%
Siena	<1%
Firenze	<1%
Parma	<1%
Messina	<1%
Lecce	<1%
L'Aquila	<1%
Ancona	<1%
Bari	<1%
International	1%



Training Programs (2008-2022)	290 students
Particle Physics Division	62%
Technical Division	20%
Accelerator Division	10%
Scientific Computing Division	8%

# Internships at Space Science Labs



## Topical Workshop

### *Involving the new generations in the future Fermilab endeavors*

(August 2-4, 2021)

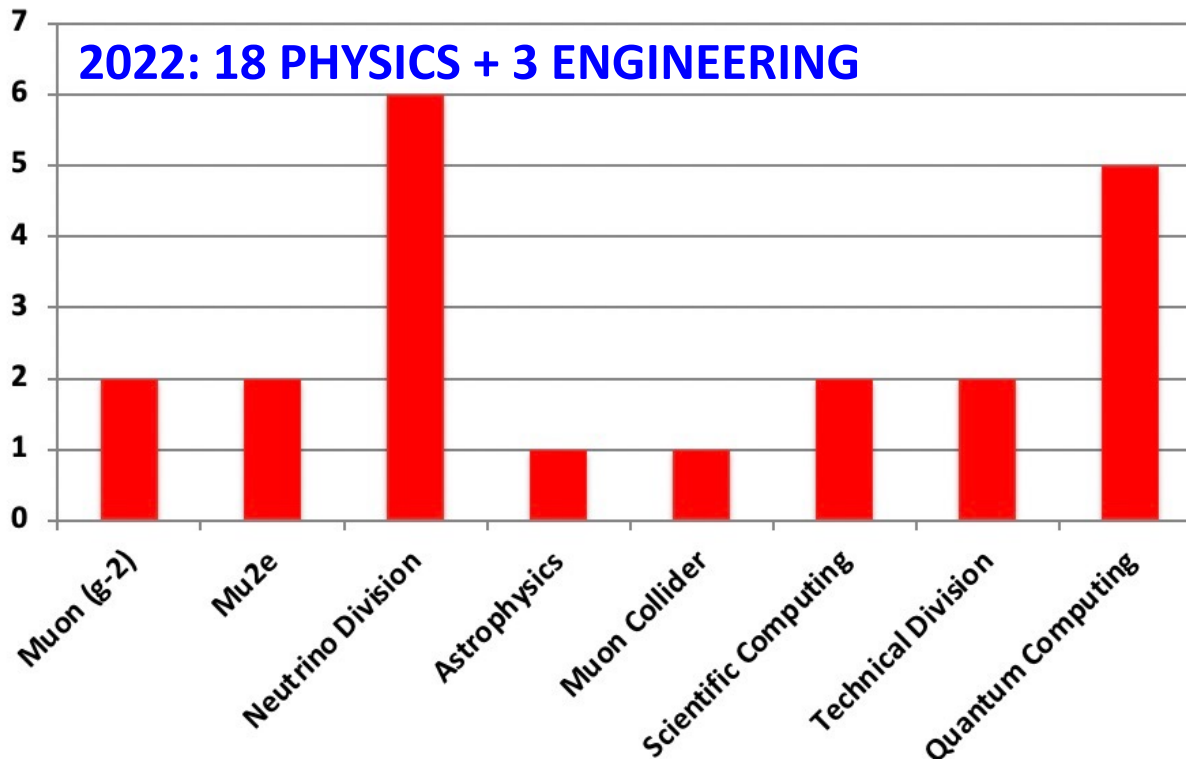
#### **3-DAY FULL IMMERSION WORKSHOP**

- **25 PHYSICS/ENGINEERING STUDENTS HOSTED AT INFN – LNF**
- **SEMINARS OF FERMILAB EXPERIMENTS / TECHNOLOGIES**
- **VISITS TO LNF INFRASTRUCTURES / HANDS-ON TRAINING BY INFN EXPERTS**



# Year 2022, we were back at Fermilab

- 21 SUMMER STUDENTS WILL BE AT FERMILAB ON JULY 25 FOR 9 WEEKS  
3-DAY FULL IMMERSION WORKSHOP AT UNIFI AND INFN PISA  
(JULY 18-20, 2022)
- SEMINARS OF FERMILAB EXPERIMENTS / TECHNOLOGIES AND ORGANIZATION
- VISIT TO THE EUROPEAN GRAVITATIONAL OBSERVATORY AND VIRGO



Pisa	9
Padova	3
Napoli	3
Bologna	2
Catania	1
Trieste	1
Milano	1
Amsterdam	1

# Conclusions

## THE ITALIAN SUMMER STUDENTS PROGRAM AT FERMILAB

- A multi-disciplinary 9-week internship for Physics and Engineering students
- Hands-on training on Fermilab high-tech research
- 2023 program under way

## ~570 SUMMER STUDENTS IN THE PROGRAM SINCE 1983

- Many former Summer Students then developed their career at Fermilab with a Master Thesis and a PhD

