International Summer Physics Institute

iSPI

July 26-August 8, 2015

research

new dimensions

data

integrity

discovery

community

curiosity

teamwork

cutting-edge physics

Engaging the World

UNIVERSITY OF NOTRE DAME

Dates: **July 26-August 8, 2015**

The University of Notre Dame will be offering the International Summer Physics Institute (iSPI) in the summer of 2015. The iSPI program provides a unique opportunity for 20 promising high school students from around the world to experience cutting edge physics in an international environment at the University of Notre Dame. The two-week program will be jointly administered with the Notre Dame QuarkNet Center and the Department of Physics.

You are invited

to the University of Notre Dame

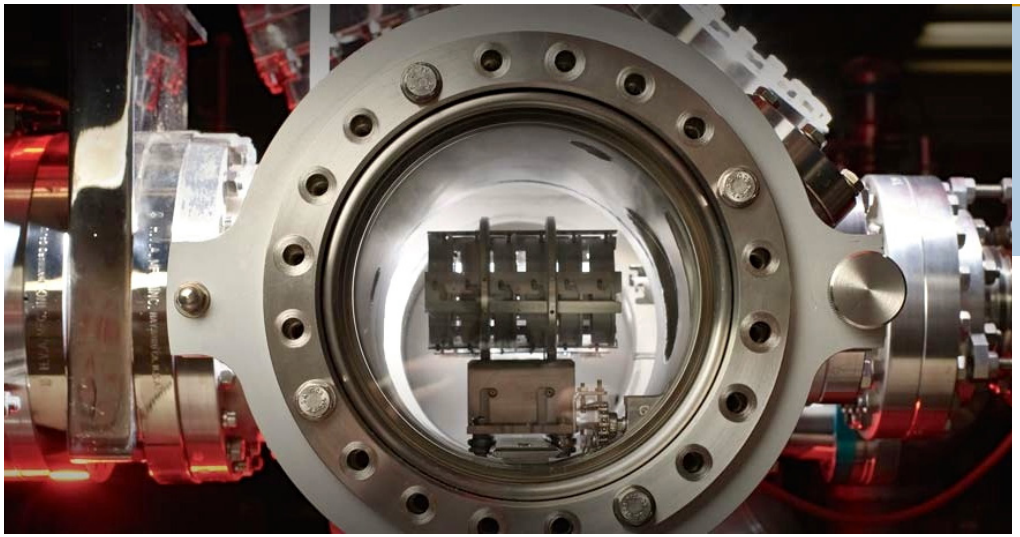
Do you really love science and math? How about physics? Would you like to be a part of a research team with students from all over the world?

iSPI is a summer workshop for students just like you, from all over the world. As part of iSPI, students will focus on the most intense, cutting-edge kind of science: Particle Physics. As part of iSPI, students will not only study particle physics but also use real data from the Large Hadron Collider at the European Organization for Nuclear Research (CERN) laboratory in Switzerland.

The University of Notre Dame is located 100 miles east of Chicago, just outside of South Bend, Indiana. Notre Dame's 1,250 acre campus is comprised of buildings and facilities dedicated to academics, athletics, residential life and spiritual enrichment. Its two lakes, golf courses, hotel and restaurant offerings help make it one of the most beautiful and iconic university campuses in the United States.

University of Notre Dame

During their two weeks at Notre Dame, iSPI students participate in classes, labs, discussions, and lectures and attend interactive talks on particle physics given by Notre Dame faculty. They will take a tour of the FN Tandem Van de Graff Accelerator at the Nuclear Structure Laboratory at Notre Dame and spend a full day at Fermilab in Chicago, Illinois. Participants will even take a virtual look at the Large Hadron Collider in Notre Dame's state-of-the-art Digital Visualization Theater.



Students strengthen their understanding of physics through collaborative problem solving, just as particle physicists do every day. As part of iSPI, participants enhance their ability to think like a scientist, form a network of colleagues and mentors in physics, get a glimpse of college like in the United States and at Notre Dame, visiting world-class facilitates, interact with students from around the world, and improve their skills in science, English, and collaborative problem-solving.

Particle Physics

There is the universe that you see all around you, and there is the hidden, more fundamental universe of the incredibly small. At this level, quantum physics rules, and everything is different. At this level, everything is full of mysteries. Are there tiny extra dimensions of spacetime? What are virtual particles, and why are they crucial? It is a strange world, which physicists need powerful accelerators and detectors to explore, and it is the world that makes up you and everything you see around you.

Centrally located on campus next to LaFortune Student Center, Nieuwland Hall of Science is home to the Department of Physics. Nieuwland is also home to a brand new low-energy nuclear accelerator. The accelerator was installed in March 2012 and was the first National Science Foundation-funded accelerator to be installed in over 30 years.

Department of Physics

The Department of Physics includes 40 teaching & research faculty members; 25 research and other faculty members as well as emeriti faculty; a number of specialists and postdoctoral research; more than 100 graduate students and approximately 100 undergraduate physics majors; and a number of supporting staff members. The Department does research in a number of exciting areas including Atomic, Astrophysics, Condensed Matter, Nuclear, and High Energy Physics. Notre Dame physicists are active in collaborations around the globe, including particle physics at CERN, nuclear physics in Japan, condensed matter experiments in France and Switzerland, and telescope observing in South America.

The Digital Visualization Theater (DVT) offers instructors the unique ability to immerse students in high-resolution, high-fidelity images projected on a 50-foot-diameter dome. The DVT boasts 5.1 Dolby surround sound, one of the most advanced projection systems available, and ten computers for the real-time rendering of 3D objects, the state-of-the-art, 136-seat hexagonal theater envelopes students in 360-degree visual experiences, including a viewing of the intricate details of the Large Hadron Collider at CERN.

QuarkNet

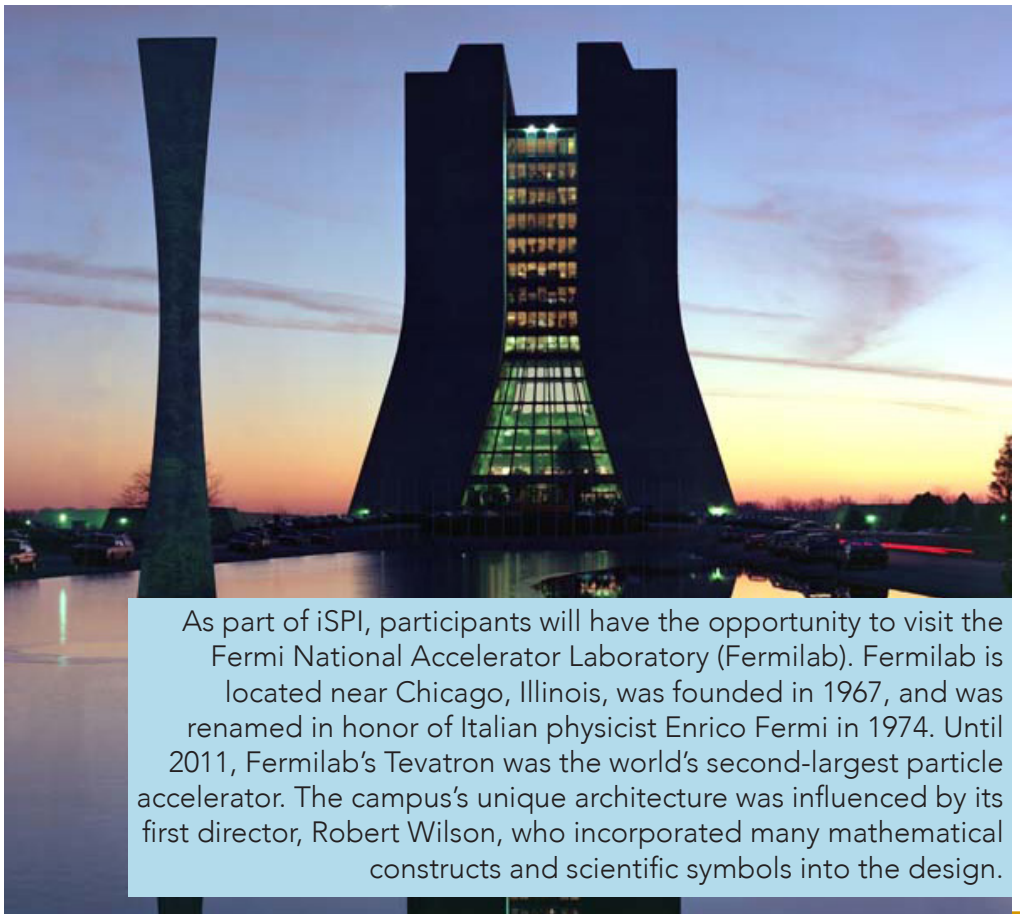
As part of iSPI, students will collaborate with the students, researchers, and teachers at QuarkNet. QuarkNet is an educational program sponsored by the National Science Foundation and the Department of Energy whose aim is to support science education in schools by establishing a nationwide network of science teachers. It provides opportunities for teachers to learn firsthand about cutting-edge physics research at universities and establish mentoring relationships with physicists at universities and national laboratories.

CERN: The European Organization for Nuclear Research

While at Notre Dame, iSPI students will have the opportunity to work with real data from the Large Hadron Collider at the European Organization for Nuclear Research (CERN) in Geneva, Switzerland. The Large Hadron Collider is the world's largest particle collider, and is part of a large-scale, worldwide collaborative project. CERN streams data collected by the LHC to scientists and laboratories all over the world for distributed processing of the information.

Nuclear Science Laboratory

The FN Tandem Van de Graff Accelerator of the Nuclear Science Laboratory at the University of Notre Dame has been in service since its installation in 1968. The fundamental principles of the FN Tandem accelerator are straightforward. A centralized metal electrode, known as the terminal or spinning, is charged to a very high positive potential. A negatively charged ion beam, produced by ion sources external to the accelerator, is transported in vacuum toward the terminal, accelerating to high energy as it approaches the terminal. As the beam enters the region which houses the terminal, it passes through a thin carbon foil which strips electrons from the ions in the beam, leaving the beam positively charged. This positively-charged beam accelerates away from the high positive potential at the terminal, and exits the accelerator at very high energy. The name "Tandem" arises from the two accelerations (one before stripping and one after) that the ion beam experiences.



As part of iSPI, participants will have the opportunity to visit the Fermi National Accelerator Laboratory (Fermilab). Fermilab is located near Chicago, Illinois, was founded in 1967, and was renamed in honor of Italian physicist Enrico Fermi in 1974. Until 2011, Fermilab's Tevatron was the world's second-largest particle accelerator. The campus's unique architecture was influenced by its first director, Robert Wilson, who incorporated many mathematical constructs and scientific symbols into the design.

Residence Life

While at Notre Dame, iLED participants will live in a supervised, on-campus residence hall in a double bedroom with a roommate. Staff is available on-site 24 hours a day to assist students. Residence halls are an important part of community life at Notre Dame. Approximately 80% of Notre Dame students live on campus, and many stay in the same hall all four years.

Participants also receive a meal card for the duration of the program that can be used at South Dining Hall, located on campus.

to apply:

Eligibility

- Rising high school juniors or seniors
- Outstanding academic transcripts
- High level of English language proficiency (TOEFL IBT score of at least 80 preferred; other evaluations of English language proficiency considered; interviews may be required)
- Students should possess exceptional motivation, emotional maturity, and a high aptitude for adapting to new environments

Program Cost

US$3,500, which includes:

- Tuition
- Room and board
- All program-sponsored activities
- Medical insurance (for the duration of the program only)
- Airport pick up and return from Chicago O'Hare (ORD)

Note: Visa application fees and airfare are the applicant's responsibility. The University of Notre Dame will issue program acceptance letters as required for visa applications.

Application

The online application for iSPI 2015 opens on October 1, 2014. The last participants will be admitted by March 1, 2015.

Students should go to *http://international.nd.edu/collaboration-exchange-programs/short-term-programs/iSPI* and submit:

1) A completed online application form

2) An official high school transcript

3) Proof of English language proficiency (TOEFL score preferred but not required; TOEFL requirement may be waived if high school curriculum is in English)

Important Dates & Deadlines

October 1: Online application available

November 1: Rolling admissions begin

March 1: Application deadline

April 1: Last applicants admitted to the program

May 1: Confirmation deadline with a non-refundable $500 USD deposit

May 15: Visa letters issued by the University of Notre Dame

July 26: Arrival at the University of Notre Dame

August 8: Departure from the University of Notre Dame

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