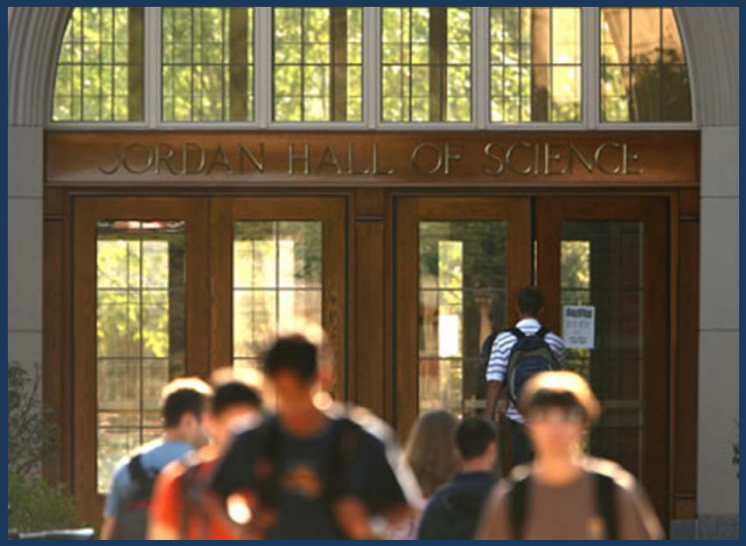
Graduate Studies
Department of Physics
University of Notre Dame

About Notre Dame

Notre Dame is located in northern Indiana, adjacent to the city of South Bend and approximately 90 miles (two hours) east of Chicago.



The university has 1000 faculty members, 8400 undergraduate students, 1900 graduate students and 1500 professional students (Law, M.Div., Business, M.Ed.).

Notre Dame is a private research university, founded in 1842 by the Congregation of Holy Cross (C.S.C.). It is rated among the nation's top 25 institutions of higher learning in surveys conducted by U.S. News and World Report, Princeton Review, Time, Kiplinger's, Kaplan/Newsweek and others.

Department of Physics

The Notre Dame Department of Physics features:

- 38 Teaching and research faculty
- 10 Research faculty
- ~20 Post-doctoral scholars
- ~90 Graduate students
- ~100 Undergraduate physics majors

Research in most major areas of physics:

- Astrophysics
- Atomic Physics
- Condensed Matter and Biological Physics
- High Energy Physics
- Network Science
- Nuclear Physics

Astrophysics

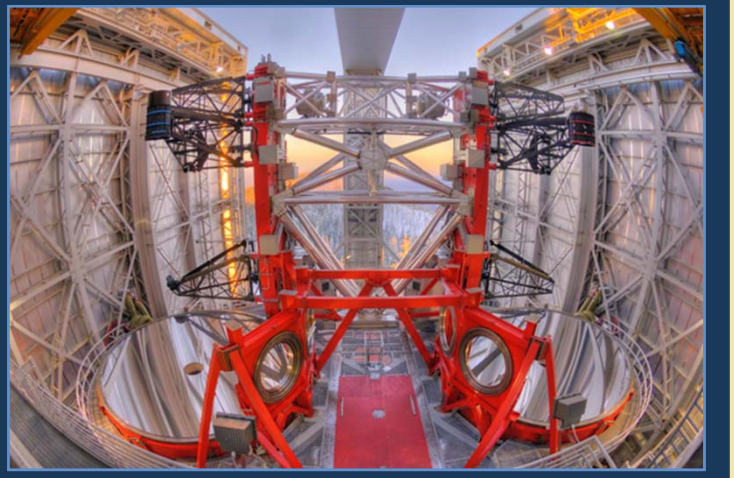
What is the past history and future fate of the universe?

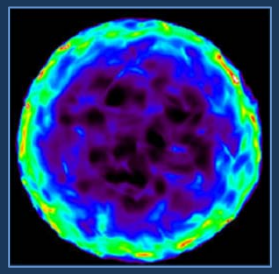
What is the nature of dark energy? Dark matter?

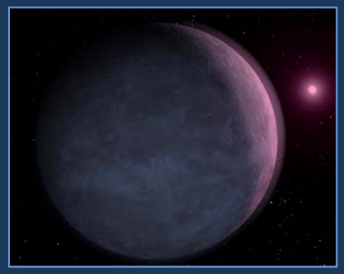
Are there earth-like planets outside the solar system? How are these and other planets formed?

What are the origins of the chemical elements?

How do galaxies form and evolve?







At Notre Dame we try to answer some of the most fundamental questions about our Universe using techniques of observational, theoretical, and computational astrophysics.

Notre Dame is a partner in the Large Binocular Telescope, giving us guaranteed access to one of the largest telescopes in the world. We also use other on-campus and international computing and observing facilities.

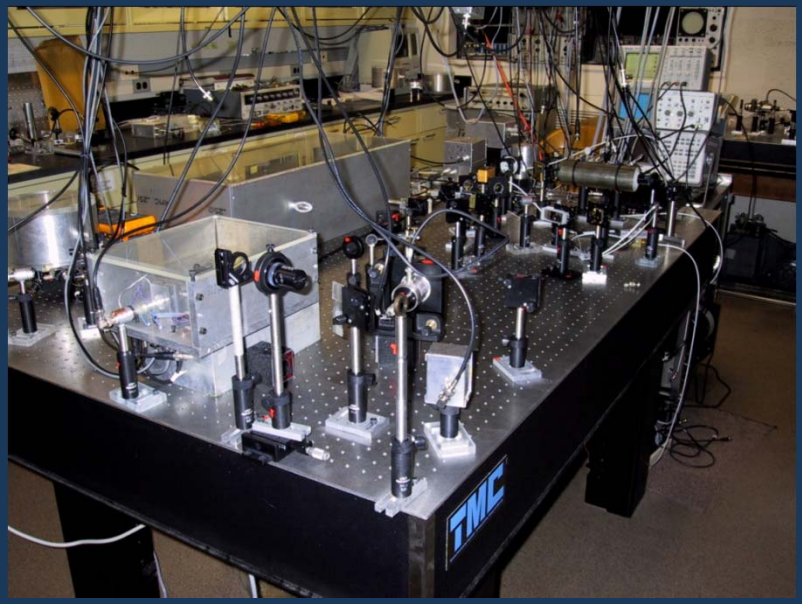
Atomic Physics

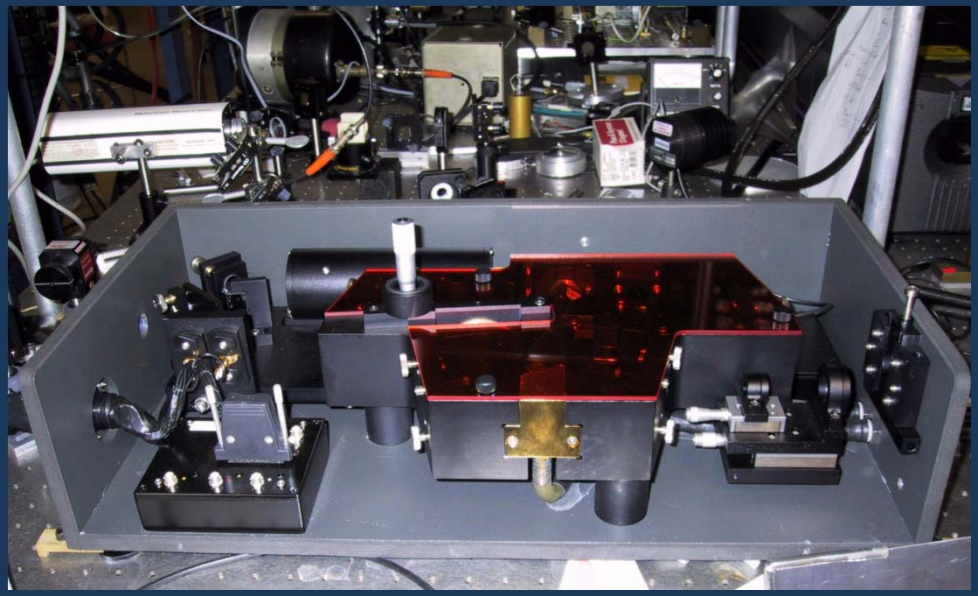
Do we understand the structure of atoms, the building blocks of matter?

How do photons interact with matter?

What are the fundamental constants and are they really constant?

What is time and how do we measure it?





We address the questions above (and more) through theoretical and experimental studies of atomic systems.

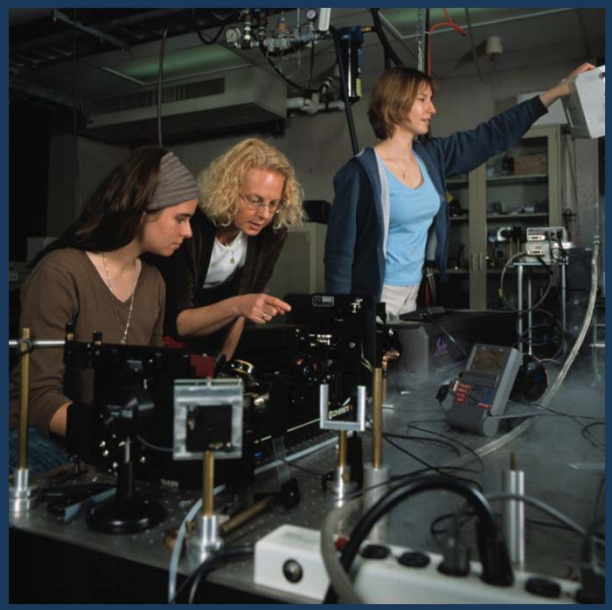
These studies provide fundamental tests of quantum mechanics and the forces of nature.

Condensed Matter and Biological Physics

What are the microscopic mechanisms responsible for emergent macroscopic phases (superconductivity, magnetism, etc.) in materials?

Is it possible to tailor new materials with specific, pre-defined properties for exploring fundamental physics questions or for applications?

How do we apply our "hard condensed matter physics toolbox" to biological or other "soft" systems?



Research in the CMBP group is carried out using both theoretical and experimental methods on a large variety of problems. This is done both on campus and at a number of domestic and international facilities.

Possibilities for interdisciplinary research in areas including chemistry, biology, mathematics and engineering.

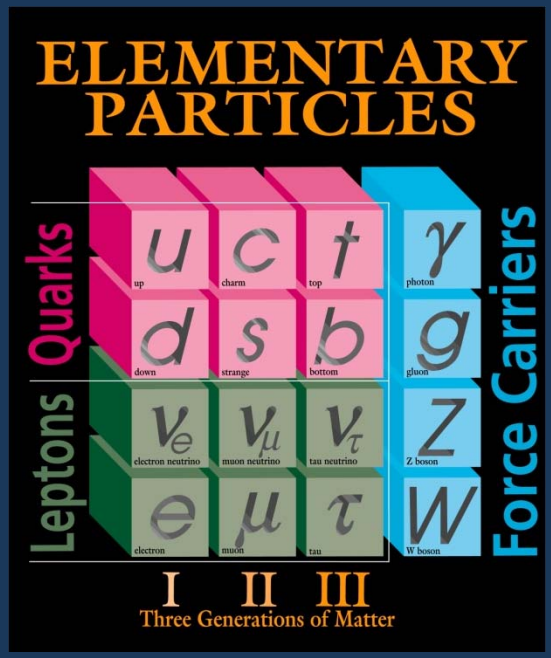
High Energy Physics

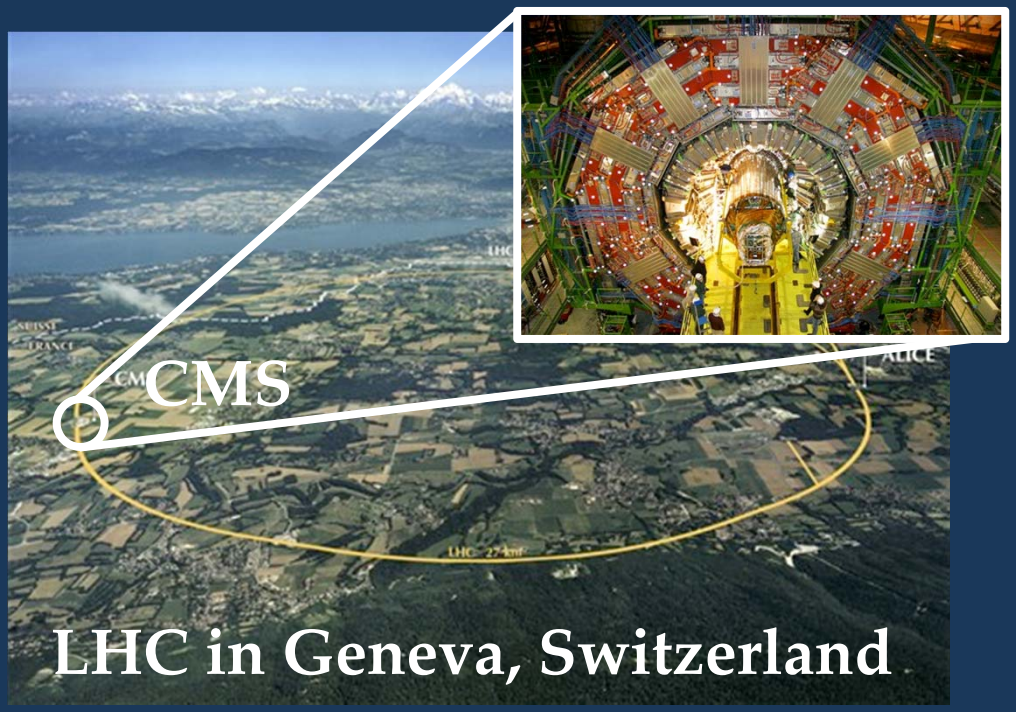
What is mass? Why do different particles have different masses?

Why is there any matter in the first place?

Are there extra dimensions?

What are dark matter and dark energy? Can we make it in the lab?





We try to answer those questions (and more) by creating theoretical models that are then tested at experiments such as the CMS experiment on LHC in Switzerland and the Double Chooz reactor neutrino experiment in France.

Nuclear Physics

How are heavy elements formed in supernovae?

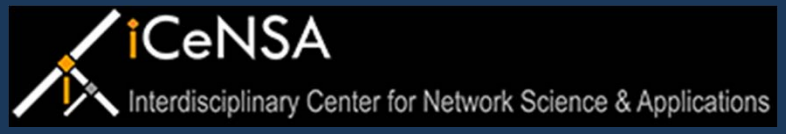
What are the limits of nuclear matter?

How do nuclear rotations and vibrations arise from coordinated motion of protons and neutrons?

The ND Nuclear Science Laboratory offers graduate students extensive and invaluable hands-on experience with designing and using experimental equipment. Our nuclear physics program continues to expand, installing a next-generation accelerator and mass separator at Notre Dame and developing experiments for the Facility for Rare Isotope Beams (FRIB) and Deep Underground Science and Engineering Laboratory (DUSEL).

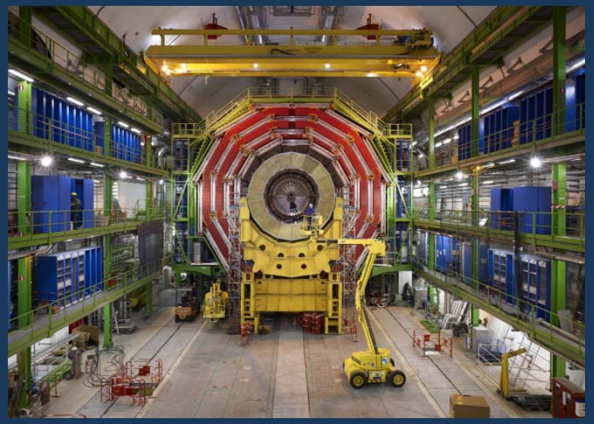
Centers and Institutes

Center for Astrophysics at Notre Dame University (CANDU)
Center for Materials Fabrication & Nanotechnology
Institute for Structure and Nuclear Astrophysics (ISNAP)
Institute for Theoretical Sciences (ITS)
Interdisciplinary Center for Network Science & Applications (iCeNSA)
Interdisciplinary Center for the Study of Biocomplexity (ICSB)
Joint Institute of Nuclear Astrophysics (JINA)
QuarkNet



Facilities

Faculty and students in our department perform research using a number of large facilities both in the US, abroad and in space.



Images (clockwise, beginning at the bottom left):

Large Binocular Telescope, Mount Graham (AZ)

Nuclear Science Laboratory at Notre Dame

Compact Muon Solenoid, CERN (Switzerland)

Advanced Photon Source,
Argonne National Laboratory (IL)

Spallation Neutron Source,
Oak Ridge National Laboratory (TN)

Campus and Surroundings

St. Mary's Lake on campus

Chicago seen from Lake Michigan (2 hrs.)

Warren Dunes and Lake Michigan (30 min.)

Typical winter landscape

Frequently Asked Questions

Q: How difficult is it to be accepted into the graduate program?

A: We do not apply strict "cuts" but competitive applications are characterized by a subject GRE ≥ 600 and a Grade Point Average (GPA) ≥ 3.2 (US). For international students a TOEFL ≥ 600 (paper)/250 (computer)/100 (internet) is required.

Q: When do I have to choose a research area and advisor?

A: The choice of research projects and advisors happen during the first year of graduate studies.

Q: What kind of support can I expect?

A: Beginning doctoral students typically work as teaching assistants (~15 hrs/wk) during the academic year and receive a stipend and *full tuition* support. During the summer most students hold research assistantships. The majority of our advanced students work as research assistants funded by external research grants. Applicants with strong academic records are automatically considered for fellowships.

Q: Do you admit more graduate students than there are available research positions?

A: No. All admitted graduate students are expected to obtain a Ph.D. degree.

Q: Do I have to be Catholic to apply to/attend Notre Dame?

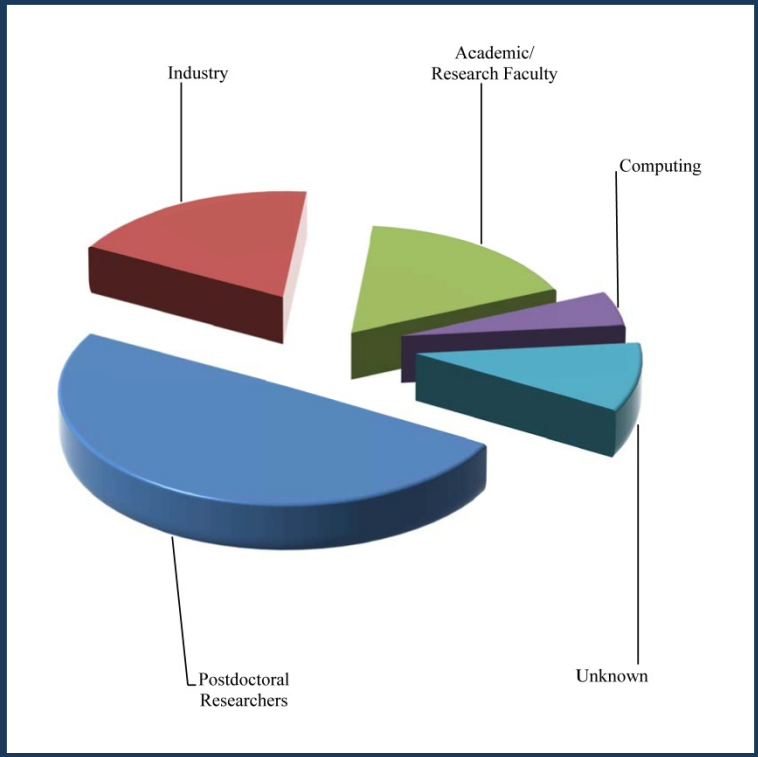
A: No. Your personal religious beliefs (if any) will not influence the evaluation of your application.

What happens after I get my Ph.D.?

There are multiple and diverse career opportunities for students graduating with a Ph.D. in physics and unemployment is essentially unheard of.

The placement of recent students from our program are as follows (first position after graduation):

- **~49 % Postdoctoral researchers**
- **~19% Industry**
- **~17% Academic/Research faculty**
- **~5% Computing**
- **~10% Unknown**



Additional information

More information about the Notre Dame Department of Physics can be found at our web site: physics.nd.edu. You are also welcome to contact anyone of the people below with any questions you may have.

Department Chair

Prof. Mitchell Wayne, mwayne@nd.edu

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Graduate Student Recruitment Committee Chair

Prof. Morten R Eskildsen, eskildsen@nd.edu

Senior Administrative Assistant responsible for Graduate Students

Mrs. Shari Herman, sherman@nd.edu