# UNIVERSITY OF SOUTH CAROLINA
## Department of Physics and Astronomy

**Physics and Astronomy:**

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|---|---|
| Astronomy Faculty: | 2 |
| Condensed Matter Faculty: | 8 |
| Nuclear Faculty: | 4 |
| Particles and Field Faculty: | 8 |
| Theoretical and Other Faculty: | 4 |
| Graduate Students: | 49 |
| Female Faculty: | 3 |
| Female Graduate Students: | 13 |

**Nuclear Physics:**

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|---|---|
| Graduate Students: | 12 |
| Employment Rate after PhD: | 100% |

**Employment Type:**

| | |
|---|---|
| Nuclear Physics Research: | 70% |
| Education & Industry | 30% |

**Application Deadlines:**
March 1 (Fall), November 15 (Spring)

**Department Website:**
www.physics.sc.edu

**Application Site:**
www.gradschool.sc.edu

**Contact in Nuclear Physics:**
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**General Information:**

The University of South Carolina is home to more than 200 years of history and tradition, rising from a single building in 1805 on what would become the heart of the campus, the horseshoe. The University is expanding in support of its research initiatives in nanotechnology, health sciences, future fuels, the environment, and information and knowledge technologies.

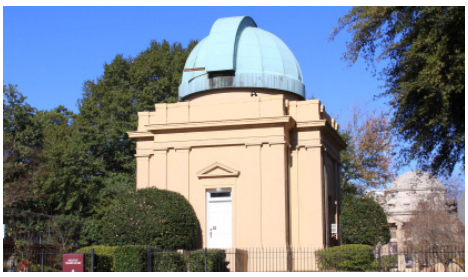
Joining the flagship campus in Columbia are four-year campuses in Aiken, Beaufort, and Upstate. Four two-year campuses in Lancaster, Salkehatchie, Sumter, and Union help the University to cover the state.

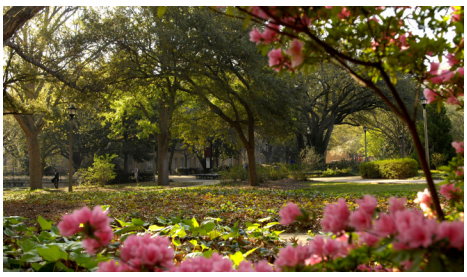
In addition, the University of South Carolina's Columbia campus has over 325 degree programs through its 16 degree-granting colleges and schools. Students have won 786 national awards totaling more than $24 million dollars since 1994.

The on-campus enrollment at University of South Carolina for the 2016 Fall Semester was approximately 34,000, including over 8,500 graduate and professional students.

**Highlights:**

- South Carolina is a part of a select group of public universities listed by the Carnegie Foundation in their highest tier of research institutions in the United States.
- US News & World Report cites USC for its student-enrichment offerings, noting that it has one of the nation's best programs for First Year Experience and Learning Communities.
- USC's Honors College is now ranked number one in the nation and is known for its high-achieving students who earn an average SAT score of 1430.





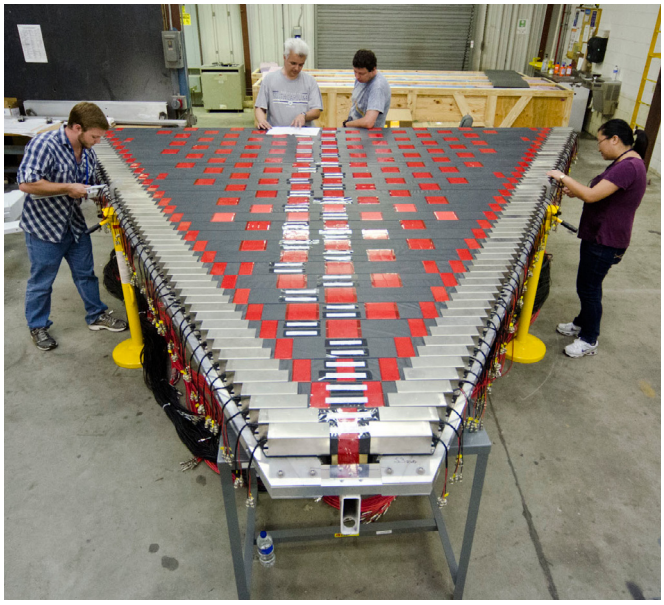
## Nuclear Physics at USC:

One of the fundamental forces in nature, described by Quantum Chromodynamics (QCD), arises from the strong interaction between the building blocks of hadrons, the quarks. Gluons exchanged between quarks are the gauge bosons mediating this interaction. The interest in strong interaction stems not only from the fact that it is responsible for the existence of atomic nuclei, and therefore of ordinary matter, but also because its properties are so very different from the properties of the better-known electro-weak force.

There are two experimentally verified perturbative quantum field theories that describe nuclear phenomena: perturbative Quantum Chromodynamics (pQCD) at small distances which is governed by quark and gluon fields; and Chiral Perturbation Theory (ChPT) at larger distances which is governed by pion and nucleon fields. The non-abelian nature of QCD gives rise to a non-perturbative "confinement regime" at intermediate distances where more than 98% of the mass of normal matter is generated.

## About Columbia:

South Carolina's premier research university is centrally located in Columbia, the state's capital and largest city. As such Columbia offers a wealth of cultural, intellectual, and recreational opportunities. Residents enjoy a nationally ranked zoo & botanical garden, an award-winning library system, two major arts & entertainment districts, and a cultural scene replete with a world-class art museum, six professional dance companies, and three professional theaters. Columbia consistently ranks among the most livable and affordable mid-sized cities.



The main research theme in **Nuclear Theory** at USC is to study hadrons and their aggregates such as nuclei and even neutron stars. Currently, a main thrust of the group's research is directed to the application of chiral perturbation theory to nuclear systems with the view to giving accurate predictions for various hadronic, electromagnetic, and weak-interaction processes.

The research carried out by the **Experimental Nuclear Physics Group** at USC aims at improving our understanding of Quantum Chromodynamics in the confinement regime and of nuclei in terms of quarks and gluons. The group's activities are concentrated on baryon structure and spectroscopy, baryon interactions, the proton-radius puzzle through the MUSE experiment, and in-medium modifications of hadronic properties as well as on large detector construction. The research program of the group is carried out at the Continuous Electron Beam Accelerator Facility (CEBAF) located at the Thomas Jefferson National Accelerator Laboratory (JLab), the J-PARC proton accelerator in Japan, the electron accelerator MAMI in Mainz, Germany, and the Paul Scherrer Institute (PSI) in Switzerland.