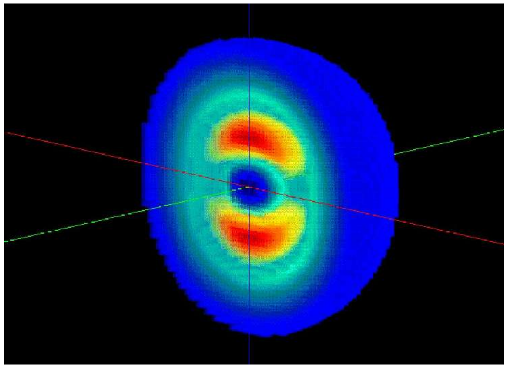
Rutgers Physics and Astronomy Graduate Program

The Department of Physics and Astronomy has long-standing, prominent research programs in experimental and theoretical nuclear physics, high-energy physics (including abstract ``string" theory), astronomy, condensed matter and surface physics. Recent initiatives include physics education and biophysics.

The department puts a strong emphasis on the graduate education experience - keeping graduate students happy! Reviews of the graduate school experience have led to policy changes and revised curricula. Graduate student representatives sit on several department committees. The financial support offered to incoming students is guaranteed for 6 years, as long as the students remain in good standing.

Recent graduate students have established careers in education, basic research, medical physics and finance.



The nucleons within polarized deuterons exhibit femtometer sized structure. High density regions are in red.

Nuclear Physics at Rutgers

There are three nuclear physics research groups at Rutgers, specializing in nuclear-structure experiments, intermediate-energy experiments, and theory. The Rutgers faculty are nationally prominent.

- Six of nine faculty are fellows of the American Physical Society.
- Charlie Glashausser and Noémie Koller are past chairs of the APS Division of Nuclear Physics.
- Wim Kloet, Aram Mekjian, and Larry Zamick have won two Humboldt Prizes and two NATO Fellowships.
- Jolie Cizewski, Charlie Glashausser, and Noémie Koller have served on the Nuclear Sciences Advisory Committee (NSAC), advising NSF and DOE on nuclear physics research priorities.
- Noémie Koller won the Rutgers 2001 Daniel Gorenstein Memorial Award, for outstanding scholarship and service to the university.

Rutgers University Department of Physics and Astronomy

Graduate Nuclear Physics

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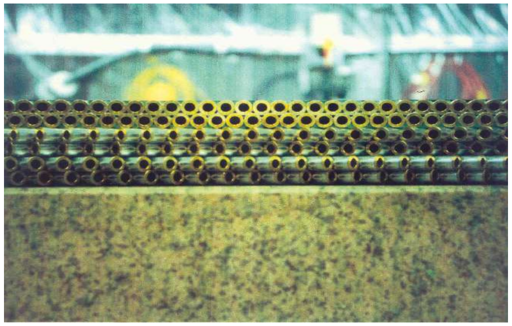
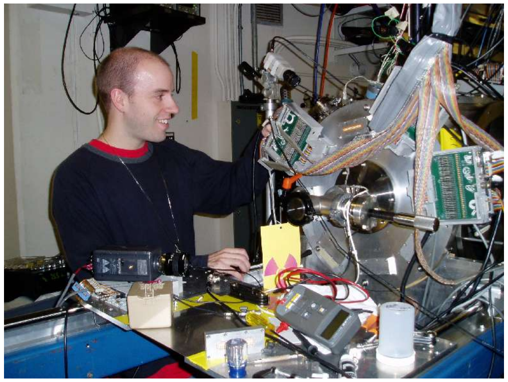


Rutgers University Department of Physics and Astronomy

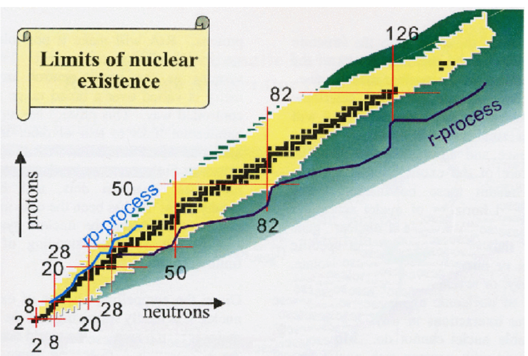
Information on Graduate Education in Nuclear Physics



Nuclear Structure Experiment

Jolie Cizewski and Noémie Koller

The experimental nuclear structure group studies nuclei at the limits of stability. Nuclei with a large neutron excess are produced in supernova, and provide the as-yet poorly understood path through which all heavy elements are formed. Experiments at existing rare isotope accelerators are providing the first insights into the structure of these isotopes. The group specializes in gamma-ray spectroscopy, transfer reactions, and measurements of g factors (magnetic moments).

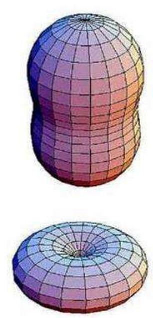


Our knowledge of nuclear structure, based on nuclei in the island of stability, is now starting to be extended to very proton and neutron rich nuclei near the limits of stability.

Intermediate Energy Experiment

Ron Gilman, Charlie Glashausser, and Ron Ransome

The medium-energy experimentalists specialize in using polarization to study the nucleon, few-body nuclei, and nucleons in nuclei. Recent highlights include measuring the proton electric structure, showing an intrinsic deformation of the proton (see below), illuminating the quark structure of nuclei in deuteron photo-disintegration, and finding indications of modifications of the nucleon structure in nuclei. Most recent research has been at Jefferson Lab, but the group is also involved in new neutrino experiments at Fermilab.



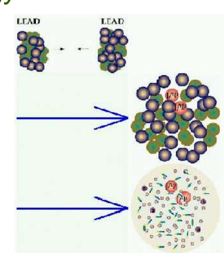
Overall, protons are spherical, but their shape is like a peanut (donut) if a photon strikes a quark with spin parallel (anti-parallel) to that of the proton.

Nuclear Theory

David Harrington, Wim Kloet, Aram Mekjian, and Larry Zamick

Nuclear theory covers a broad range. Harrington studies the nucleon with asymptotic freedom and scaling in electroproduction, and the decrease in the very high energy nucleon-nucleus total cross section due to the excited states of the nucleon. Kloet studies properties of mesons (quark-anti-quark systems, sometimes with gluonic excitations) and matter antimatter annihilation. Mekjian studies collisions of heavy nuclei. He has introduced ideas of chemical equilibrium and statistical theory, developed fast numerical methods, written review articles, and applied similar techniques to biophysics. Zamick studies nuclear structure, including degeneracies, Fermionic symmetries, and relations between spectra of even-even and even-odd nuclei.

High energy nuclear collisions can produce



exotic particles; at very high energies quarks and gluons in nucleons may be deconfined, reproducing conditions in the early universe.