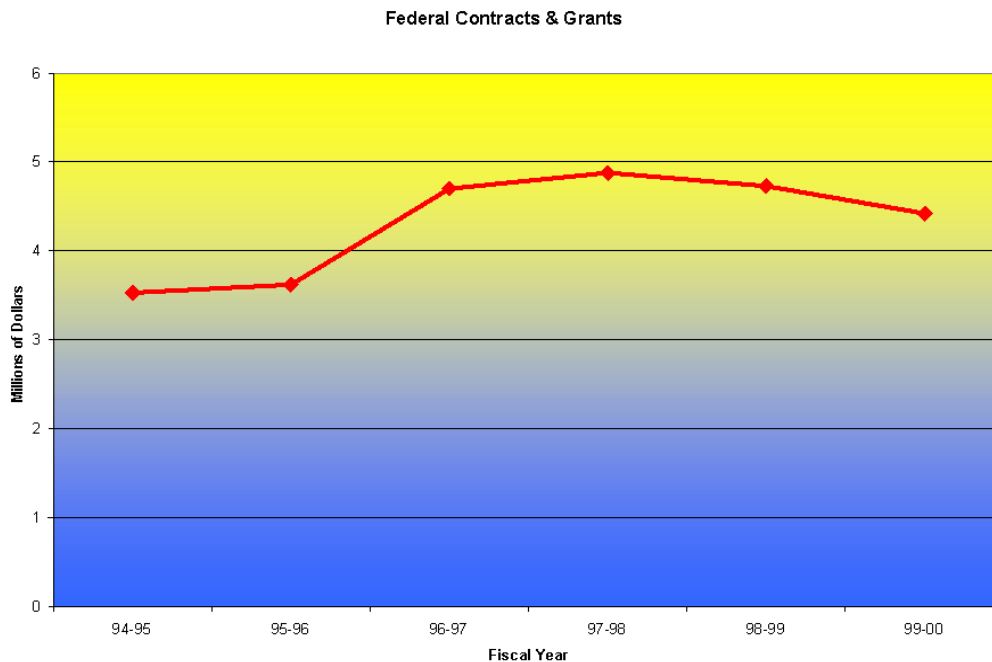




The Department of Physics at NC State has ...

March 2000

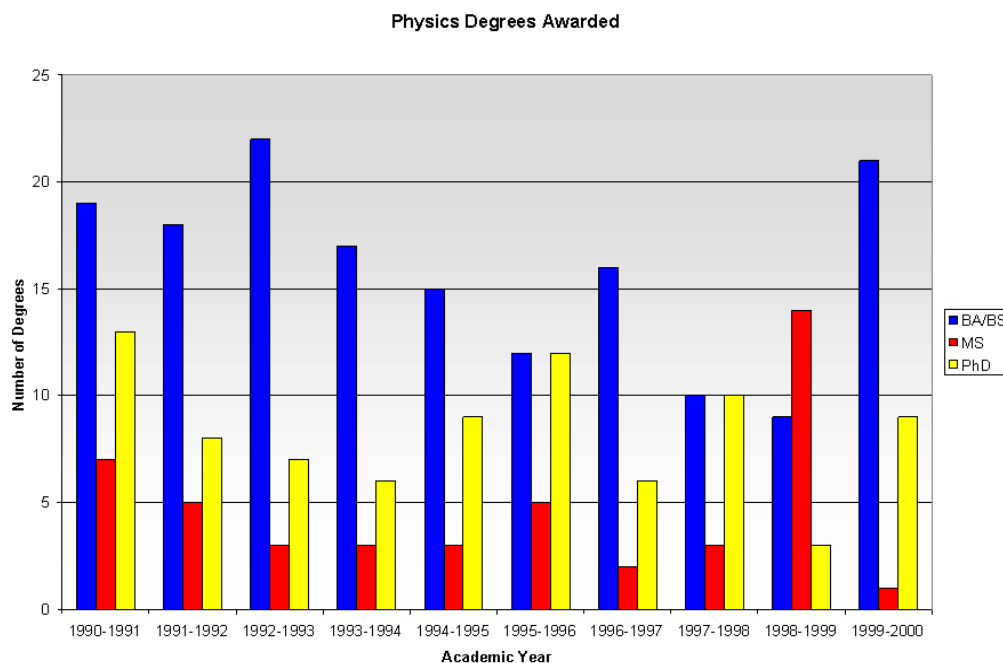
- Thirty Three tenure track faculty.
- Fifteen Fellows of the American Physical Society.
- One member of the National Academy of Sciences.
- Past president of the Materials Research Society.
- One past president and one president-elect of the American Association of Physics Teachers.
- Fourteen members of the NC State University Academy of Outstanding Teachers.
- Three Alumni Distinguished Undergraduate Professors.
- One Alumni Distinguished Graduate Professor.
- Two Distinguished University Professors.
- Three young faculty with National Science Foundation Career Awards.
- One Cottrell Scholar Award recipient.



The Department's federal research funding is second highest in the University

Department educational features include...

- 3 BS tracks: Physics, Materials Physics, & Marine Physics, and one BA track.
- graduates currently attending 10 of the top 20 physics graduate programs.
- strong employment opportunities for BS recipients locally and nationally.
- over 2/3 of undergraduate majors participating in research.
- 86% American citizens in its graduate student body.
- the 6th highest female percentage in the US in its graduate student body (1995 NRC study).
- the Society of Physics Students named a national outstanding chapter 5 years of the last 7.
- the leading scientific lecture series in NC, the annual L. H. Thomas Lecture.
- an educational observatory regularly open to astronomy laboratories and public viewing.
- **WebAssign**, one of largest web-based homework offerings in the US.
- a well received (75% satisfaction level) introductory physics instructional program, the ninth largest in the US in the 1996 American Institute of Physics ranking.



The Department of Physics' research has experienced decade-long steady growth. Programs fall into seven thrust areas. A representative sampling of recent highlights from each includes the following:

In **Astrophysics** Blondin and Borkowski model supernovae (SN) explosions. Their studies have predicted the subsequently observed behavior of SN1987A. In studies of shock waves, Ellison has solved a century old mystery on the origins of cosmic ray material. Brown investigates gravitational wave emission in supernova collapse.

In **Computational Physics** Bernholc and Roland use massively parallel computers to describe the electronic structure and predict the

phenomenal mechanical strength of fullerene nanotubes.

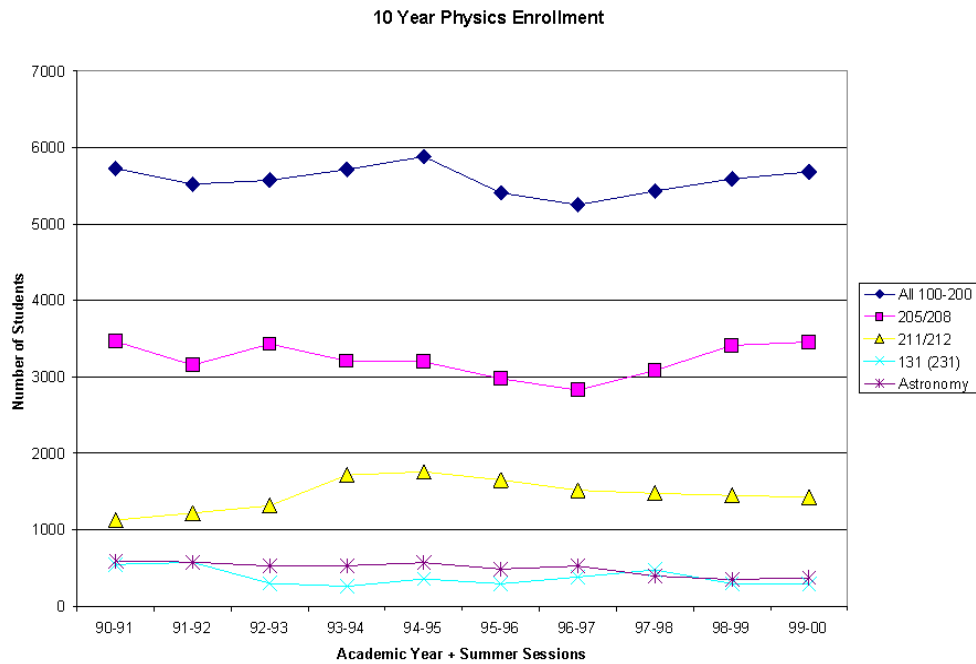
In **Physics Education**, Beichner and Risley have driven developments in integrated lab/lecture projects and in web delivered homework.

In Nuclear Physics the Triangle Universities Nuclear Laboratory (TUNL) is home to NC State physicists Mitchell, Gould, and Haase. Investigations include chaos in nuclear structure, spin-polarized nucleon-nucleon scattering, and neutrino mass studies. Tilley and Kelly lead the national "**A=3-20**" nuclear data project.

In **Optics**, near-field studies by Paesler and Hallen take microscopy beyond the diffraction limit to view and study sub-wavelength structures. X-ray microscopy investigations by Ade on polymers are performed using synchrotron radiation. New medical imaging techniques are studied by Sayers in collaboration with the UNC Medical School.

In **Particle Physics**, Ji and Cotanch focus their attention on quarks, gluons, hadrons, and nuclei. This group provides broad support for the Thomas Jefferson Nuclear Accelerator Facility. In **Atomic Physics**, Chung makes precision calculations of multiply-excited systems of interest in atomic storage ring experiments

Materials Physics studies of blue-green lasers and diodes by Schetzina include an industrial collaboration that demonstrated the first nitride blue laser emission in the US. Investigations by Nemanich of new materials and wide bandgap semiconductors indicate a potential to emit electrons at room temperature. Studies of semiconductor interfaces by Aspnes and Lucovsky feature real time monitoring and control of surface growth as well as characterization of thin film electronic materials. Experiments by Krim with quartz crystal balances have led to a new understanding of atomic scale friction and tribology.



The Department of Physics' long term goals include ...

- high performance computing in basic and applied physics.
- programs in nanotribology, complex materials, and biomaterials.
- innovative educational programs recognized state-wide and nationally.
- greater recruitment of under represented groups among students and faculty.
- a top 25 National Academy ranking by 2005.

PHYSICS