

**Rutgers, The State University of New Jersey**  
**Department of Physics and Astronomy**  
*136 Frelinghuysen Road, Piscataway, New Jersey 08854*

This report is for September 2002 to August 2003.

## 1. PERSONNEL

The members of the astrophysics group were:

Faculty: P. Côté, L. Ferrarese, J. P. Hughes, A. Kosowsky, T. A. Matilsky, D. Merritt, C. Pryor, J. A. Sellwood, T. B. Williams, and H. S. Zepolsky. R. Jimenez left the group for a position at the University of Pennsylvania. Matilsky took sabbatical leave for the entire year to work on material related to the Chandra X-ray satellite for the CfA. Sellwood took sabbatical leave for the spring semester at the Institute for Advanced Study in Princeton.

Research faculty: C. L. Joseph.

Research associate and adjunct lecturer: S. Piatek.

Postdoctoral fellows: Parviz Ghavamian, Eric Barnes, Sandor Molnar, Eric Peng and Dalia Chakrabarty. Licia Verde left to take up a faculty position at the University of Pennsylvania. Marc Hemsendorf moved to a private sector position in his native Germany.

Current graduate students: Arthur Congdon, Matthew Francis, Monica Hasegan, Jens Hube, Vincent Jacobs, Andrés Jordán, Basil Mchunu, Miguel Preto, Naseem Rangwala, Ricardo Sanchez, Neelima Sehgal, Juntai Shen, Arend Sluis, Jianxiang Wang, Jessica Warren, and Bingrong Xie. Cara Rakowski graduated and took up a PD fellowship at the CfA.

## 2. FACILITIES

Rutgers University is a partner in the SALT (Southern African Large Telescope) consortium, a group of countries and universities which are jointly constructing an 11-meter optical telescope optimized for spectroscopic work with a design that closely resembles the Hobby-Eberly Telescope at McDonald Observatory. Construction at Sutherland Observatory is on schedule for operation by the end of 2004. Rutgers is helping to build the prime focus spectrograph. Major consortium partners are South Africa and Poland, the Board of the HET, and a number of universities, including Rutgers and Wisconsin.

Williams is assembling a new Imaging Fabry-Perot Spectrophotometer for use on the telescopes at CTIO. It will be made available to the entire US astronomical community through an agreement between Rutgers and CTIO.

Hughes was involved in the development of the Chandra X-ray Observatory and is a member of the Astro-E2 International Science Working Group and the Constellation-X Facility Science Team.

Joseph is a member of the STIS instrument team for the Hubble Space Telescope and is involved in the development of optical and ultraviolet astronomical detectors mostly for use in space.

Group members have substantial computing resources at their disposal. Sellwood has a Beowulf cluster of high-performance PCs, Merritt a GRAPE-6A/8 special purpose computer, and both the Department and the University maintain powerful facilities for numerical computation.

A computer controlled 20-inch optical telescope on the roof of the Physics and Astronomy building is equipped with a CCD camera and fiber-fed CCD spectrograph. It is used for undergraduate and graduate training. A small radio telescope is also used for teaching purposes.

## 3. RESEARCH PROGRAMS

Research currently underway at Rutgers encompasses both observational and theoretical programs in areas ranging from cosmology to the solar system. Major activities are: galactic dynamics (Côté, Joseph, Merritt, Pryor, Sellwood), galaxy formation and dark matter (Kosowsky, Merritt, Sellwood), galaxy clusters (Hughes, Kosowsky, Merritt), the extragalactic distance scale (Ferrarese, Hughes), super-massive black holes (Ferrarese, Joseph, Merritt), dwarf galaxies (Côté, Pryor), globular clusters (Côté, Pryor, Williams), CMB and early universe theory (Kosowsky), supernovae (Hughes, Kosowsky), the interstellar medium (Joseph), high velocity clouds (Williams), X-ray astronomy (Hughes, Matilsky), chemical and stellar evolution of galaxies (Côté, Pryor), gravitation (Kosowsky, Zepolsky), gravitational lensing (Hughes, Kosowsky), and chaos theory and non-linear dynamics (Matilsky, Merritt, Zepolsky). Major areas of expertise include optical and ultraviolet instrumentation (Joseph, Williams) and  $N$ -body simulations (Merritt, Sellwood).

Observational work is both ground based, principally at the National Observatories, and space based, using mainly the Hubble Space Telescope and X-ray satellites.

A continuously-updated list of preprints by members of the group is maintained at the group website.

## 4. GRADUATE PROGRAM

The Graduate Program has separate Physics and Astronomy options with differing course and examination requirements. The graduate curriculum in astronomy offers an introductory course plus separate advanced courses covering the major areas of astronomy. See our Department web site for further information: <http://www.physics.rutgers.edu/>

Students taking the astronomy option are expected to do research with one of the above-listed faculty members, but research opportunities relating to the interests of other members of the Department, e.g. the early universe, also exist within the physics option.

**5. UNDERGRADUATE PROGRAM**

The Department now offers two undergraduate majors. The BS in Astrophysics is suitable preparation for graduate study in astronomy; it has a strong physics and math content, but includes several courses in astronomy, observing lab courses, and an (optional) senior-year research project. The Physics Major has a number of separate options.

**6. FURTHER INFORMATION**

Further details relating to academics, facilities and full descriptions of specific research activities at Rutgers can be found on the group's web page: <http://www.physics.rutgers.edu/ast/group-ast.html>

J. A. Sellwood