Rutgers, The State University of New Jersey
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This report is for September 2000 to August 2001.

1. PERSONNEL

The members of the astrophysics group were:

Faculty: P. Côté, L. Ferrarese, J. P. Hughes, R. Jimenez, A. Kosowsky, T. A. Matilsky, D. Merritt, C. Pryor, J. A. Sellwood, T. B. Williams, and H. S. Zapolsky. C. L. Joseph and K.-I. Nishikawa are research faculty members.

Postdoctoral Fellows: Fidel Cruz, Parviz Ghavamian, Marc Hemsendorf, and Licia Verde. Rob Olling left for a position at the Naval Research Lab and Percy Gómez moved to the University of Pittsburgh.

Graduate students: Monica Hasegan, Vincent Jacobs, Andrés Jordán, Jackie Kelly, Meng Li, Andrew Mack, Libarid Maljian, Milos Milosavljevic, Mingyan Poon, Cara Rakowski, Jessica Sawyer, Juntai Shen, Arend Sluis, Jianxiang Wang, and Bingrong Xie.

Longer term visitors: Dr. Tinatin Kakhniashvili from the Abastumani Astrophysical Observatory and Dr. Slawomir Piatek, from NJIT.

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 a 10-meter class optical telescope optimized for spectroscopic work that will closely resemble the Hobby-Eberly Telescope at McDonald Observatory. Construction is now underway and is scheduled to be completed by the end of 2004. Major consortium partners are South Africa and Poland, the Board of the HET, and a number of universities, including Rutgers and Wisconsin.

Williams is constructing a new Imaging Fabry-Perot Spectrophotometer for use on the telescopes at CTIO in 2002. It will be made available to the entire US astronomical community through an agreement between Rutgers and CTIO.

Two group members are individually involved in major space missions. Joseph is a member of the STIS instrument team for the Hubble Space Telescope, for which he receives GTO time to observe the nuclei of galaxies. Hughes was involved in the development of the new Chandra X-ray Observatory (formerly AXAF) and has access to GTO observations of supernova remnants and galaxy clusters.

Joseph has a well-equipped laboratory for characterizing optical and ultraviolet astronomical detectors.

A computer controlled 20-inch instructional telescope on the roof of our building is equipped with a CCD camera and fiber-fed CCD spectrograph. It is used for undergraduate and graduate training.

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 (Jimenez, Kosowsky, Sellwood), galaxy clusters (Hughes, Kosowsky), the extragalactic distance scale (Ferrarese, Hughes), supermassive black holes (Ferrarese, Joseph, Merritt), dwarf galaxies (Côté, Pryor), globular clusters (Côté, Jimenez, Pryor, Williams), CMB and early universe theory (Kosowsky), supernovae (Hughes, Kosowsky), the interstellar medium (Joseph), damped Lyman alpha systems (Jimenez), high velocity clouds (Williams), X-ray astronomy (Hughes, Matilsky), stellar evolution theory (Jimenez), chemical and stellar evolution of galaxies (Côté, Jimenez, Pryor), gravitational lensing (Hughes, Jimenez, Kosowsky), magnetospheres of the Earth and Sun (Nishikawa), and chaos theory and non-linear dynamics (Matilsky, Merritt, Zapolsky). Major areas of expertise include optical and ultraviolet instrumentation (Joseph, Williams) and *N*-body and 3-D magnetohydrodynamic simulations (Merritt, Nishikawa, 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 publications by members of the group is miantained 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 undergraduate major offered by the Department now includes an option of Astrophysics. This degree is suitable preparation for graduate study in astronomy; it has a strong physics and math content, but includes several courses and labs in astronomy and an (optional) senior-year research project.

6. FURTHER INFORMATION

Further details relating to the 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

The following papers appeared in refereed journals between September 2000 and August 2001.

Arnaud, M., Neumann, D. M., Aghanim, N., Gastaud, R., Majerowicz, S., & **Hughes, J. P.**, 2001, ''Measuring cluster temperature profiles with XMM/EPIC,'' A&A, 365, L80

Blakeslee, J. P., Metzger, M. R., Kuntschner, H., & **Côté, P.** 2001, ''Lensing in the Hercules Supercluster,'' AJ, 121, 1

Bowen, D. V., **Jimenez, R.**, Jenkins, E. B., & Pettini, M. 2001, ''Where Are the Absorbers toward Q2302+029?,'' ApJ, 547, 39

Bower, G. A.,Green, R. F., Bender, R., Gebhardt, K., Lauer, T. R., Magorrian, J., Richstone, D. O., Danks, A., Gull, T., Hutchings, J., **Joseph, C.**, Kaiser, M. E., Weistrop, D., Woodgate, B., Nelson, C., & Malumuth, E. M. 2001, ''Evidence of a Supermassive Black Hole in the Galaxy NGC 1023 from the Nuclear Stellar Dynamics,'' ApJ, 550, 75

Buchalter, A., **Jimenez, R.**, & Kamionkowski, M. 2001, ''Galactosynthesis: halo histories, star formation and discs,'' MNRAS, 322, 43

Debattista, V. P. & **Sellwood, J. A.** 2000, ''Constraints from Dynamical Friction on the Dark Matter Content of Barred Galaxies,'' ApJ, 543, 704

Ferrarese, L., Pogge, R. W., Peterson, B. M., **Merritt, D.**, Wandel, A., & **Joseph, C. L.** 2001, ''Supermassive Black Holes in Active Galactic Nuclei. I. The Consistency of Black Hole Masses in Quiescent and Active Galaxies,'' ApJL, 555, L79

Freedman, W. L., Madore, B. F., Gibson, B. K., **Ferrarese, L.**, Kelson, D. D., Sakai, S., Mould, J. R., Kennicutt, R. C., Ford, H.C., Graham, J. A., Huchra, J.P., Hughes, S. M. G., Illingworth, G. D., Macri, L. M., & Stetson, P. B. 2001, ''Final Results from the Hubble Space Telescope Key Project to Measure the Hubble Constant,'' ApJ, 553, 47

Gómez, P. L., **Hughes, J. P.**, & Birkinshaw, M. 2000, ''A Merger Scenario for the Dynamics of Abell 66,'' ApJ, 540, 726

Ghavamian, P., Raymond, J., Smith, R. C., & Hartigan, P. 2001, ''Balmer-dominated Spectra of Nonradiative Shocks in the Cygnus Loop, RCW 86, and Tycho Supernova Remnants,'' ApJ, 547, 995

Harrus, I. M., Slane, P. O., Smith, R. K., & **Hughes, J. P.** 2001, ''A New ASCA and ROSAT Study of the Supernova Remnant G272.2-3.2,'' ApJ, 552, 614

Heavens, A. F., **Jimenez, R.**, & Lahav, O. 2000, ''Massive lossless data compression and multiple parameter estimation from galaxy spectra,'' MNRAS, 317, 965

Hughes, J. P. 2000, ''The Expansion of the X-ray Remnant of Tycho's Supernova (SN 1572),'' ApJL, 545, L53

Hughes, J. P., **Rakowski, C. E.**, & Decourchelle, A. 2000, ''Electron Heating and Cosmic Rays at a Supernova Shock from Chandra X-Ray Observations of 1E 0102.2-7219,'' ApJL, 543, L61

Hughes, J. P., Slane, P. O., & Plucinsky, P. P. 2000, ''Discovery of X-Ray Emission from G328.4+0.2, a Crab-like Supernova Remnant,'' ApJ, 542, 386

Jacobs, V. & **Sellwood, J. A.** 2001, ''Long-lived Lopsided Modes of Annular Disks Orbiting a Central Mass,'' ApJL, 555, L25

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Matarrese, S., Verde, L., & **Jimenez, R.** 2000, ''The Abundance of High-Redshift Objects as a Probe of Non-Gaussian Initial Conditions,'' ApJ, 541, 10

Merritt, D. & **Cruz, F.** 2001, ''Cusp Disruption in Minor Mergers,'' ApJL, 551, L41

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