

**Sonoma State University**  
**Department of Physics and Astronomy**  
*Rohnert Park, California 94928*

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This report, the Department's twenty-fourth, covers the period September 1999 through August 2000. See <http://www.phys-astro.sonoma.edu> for more information.

### 1. PERSONNEL

The faculty consisted of professors Lynn R. Cominsky, John R. Dunning, Samuel L. Greene, Duncan E. Poland (Chair), Saeid Rahimi, Gordon G. Spear (Observatory Director), and Joseph S. Tenn. Greene continued his partial retirement, teaching only in the fall semester. Dr. Laura Whitlock joined the department, working full-time on NASA-sponsored Education and Public Outreach with Cominsky. Tenn was on sabbatical during the fall semester.

### 2. INSTRUCTION

A total of 482 students took Descriptive Astronomy, Introductory Observational Astronomy, Extraterrestrial Intelligence and Interstellar Travel, Frontiers in Astronomy, Cosmology, Astronomical Imaging and Special Studies.

Cominsky developed a new version of the Cosmology course, which was offered during the Spring 2000 semester. All lectures were posted on the Internet, and are becoming part of NASA's Cosmic Journeys web site or the interdisciplinary Connections: Quarks to the Cosmos web site. See course web pages at <http://perry.sonoma.edu/lynnc/courses/a350/>. Work on the Cosmic Journeys outreach site is being done by SSU students Michelle Curtis and Mark Fertig.

The Department awarded 3 B.A. degrees and 3 B.S. degrees in Physics. There were 43 physics majors in Spring 2000.

### 3. EQUIPMENT

Optical telescopes are mounted in a sliding-roof observatory on campus. Auxiliary instrumentation for the 0.36-m Schmidt-Cassegrain telescope includes an ST-4 CCD camera, wide field cameras, a slitless prism spectrograph, and a 0.5 Å H $\alpha$  filter.

The Epoch Instruments 0.25-m *f*/5 Newtonian telescope is computer-controlled. The system points reliably to within 1-2 arcminutes on the sky. When used with the current CCD camera, the resulting images have a 20 arcminute field of view and a 2 arcsecond/pixel image scale. Reliable photometry is feasible for objects as faint as 16th magnitude.

The Observatory has recently been substantially upgraded because of a series of important contributions. These contributions include two Pentium class computers, a Power Macintosh, and an ST-7 CCD camera with a rotating filter wheel. The new CCD system is now installed on the Epoch Instruments computer controlled telescope and was used for classes and research projects in the spring. The new CCD system provides observers with substantial improvements in sensitivity, resolution, and dynamic range over the previous

system. It seems capable of recording objects as faint as 19th magnitude. Students complain that the faintest objects recorded are now too faint to conveniently compare with many of the standard astronomical catalogs. Any Messier object can be recorded with exposure times of a few seconds, and it is believed that any galaxy or nebula in the NGC or IC catalogs could be recorded with exposure times of a few minutes. The filter wheel will enable students to produce tri-color images and to obtain standard BVRI photometry of stars, galaxies, and nebulae.

### 4. RESEARCH

Cominsky continued collaborating with the Particle Astrophysics Group at the Stanford Linear Accelerator Center on the Unconventional Stellar Aspect (USA) X-ray astronomy experiment and the Gamma-ray Large Area Space Telescope (GLAST), for which she was appointed lead of the Education and Public Outreach (E/PO) program. Whitlock assists in developing materials for GLAST's E/PO program. GLAST is in the formulation phase, and is scheduled for launch in 2005.

Whitlock is leading the E/PO program for the Swift MI-DIX mission, which was selected by NASA for a 2003 launch. Cominsky assists with this effort, and also serves as Swift's Press Officer. Students Timothy Graves, Sarah Silva and Julia Maisen are all involved in working on GLAST and/or Swift.

Spear has initiated a program to observe and analyze interacting binary systems that exhibit apsidal motion. Systems will be selected for study which can provide improved information about internal stellar structure and relativistic apsidal motion. Student Chris Trechter assisted with obtaining CCD photometry of the primary eclipse of the interacting binary star Z Draconis. This system has well documented period changes and a possible eccentric orbit. Student Shawna Moyer is assisting with the analysis of unpublished photoelectric photometry of Z Dra from the 1960s. Moyer is also assisting with a campaign to obtain intensive coverage for the system IU Aur.

### 5. MISCELLANEOUS

One of the highlights of this past year was the conference hosted by Sonoma State University entitled *Cosmic Genesis and Fundamental Physics*. Over 150 astronomers and physicists attended this conference, which was the first in a series of workshops designed to help generate a programmatic vision for the long-term future of the meeting ground of particle, nuclear, gravitational, and astro-physics. Cominsky chaired the local organizing committee, as well as being a member of the scientific organizing committee and organizing press coverage of the conference. More information about this conference and some of the talks can be found at <http://www.quarkstothecosmos.org/history.html>

SSU's optical observatory was used 30 times for public viewing nights, classes, and research. There were over 200 visitors.

The Department presented its *What Physicists Do* public lecture series, under the direction of Cominsky and Tenn, for the 58th and 59th semesters. Visiting speakers on astronomical topics were Dr. David Lamb ('94, University of Alabama, Huntsville), Dr. Peter Sturrock (Stanford University), Dr. Kenneth Ganezer (CSU Dominguez Hills), Dr. Adrienne Cool (San Francisco State University), Drs. Derek Busazi and Garrett Jernigan (UC Berkeley), Dr. Rosaly Lopes-Gautier (JPL), Tom McMahon ('85, University of Arizona) and Dr. J. Anthony Tyson (Lucent).

In her capacity as AAS Deputy Press Officer, Cominsky also participated in many press activities at the January, 2000 AAS meeting in Atlanta, GA. Another astronomical public outreach effort was Cominsky's participation in a one-hour live webcast on the Discovery Channel's *Science Live!* program. She was part of a panel that included Mario Livio (STScI) and Phil Plait (GSFC), and that discussed the "Future of Astronomy." See the webcast at <http://www.discovery.com/news/sciencelive/morespace.html>. Cominsky also provided expert commentary during a NASA Space Science Update televised press briefing in March, 2000, during which the discovery of a new class of unidentified gamma-ray sources was announced by Neil Gehrels (GSFC) and Isabelle Grenier (CEA Saclay).

Cominsky gave an invited lecture to the Women's Interchange at SLAC in September, 1999 entitled "Gamma-ray Visions of the Universe." She also gave the Physics Colloquium at Sacramento State University entitled "Using X-ray Emission from Compact Objects to Test General Relativity" in November, 1999.

In November, 1999, Whitlock gave a lecture in SSU's What Physicists Do series entitled "You Say Science, Math, Language Arts, And History, I Say Astronomy!" In April, 2000, she gave an invited lecture on "Gamma-ray Astronomy" to the Sonoma County Astronomical Society. She also presented a workshop at the National Science Teachers Association convention entitled "A Universe of NASA Data: High energy Bursts of Math and Science!" along with

Padi Boyd, Alan Smale, Karen Smale (all from GSFC) and high school teacher Kara Granger (Maria Carillo HS, Santa Rosa, CA). Another workshop entitled "Algebra of Astronomy: High Energy Bursts of Math and Science" was later presented at the National Council for Teachers of Mathematics convention by Whitlock and Granger.

In July, 2000, Whitlock taught astronomy to 26 local teachers at the North Bay Science Project's summer institutes. The teachers were taken on a field trip to the nearby Robert Ferguson Observatory in Sugarloaf State Park, where they observed the Sun and (later) the night sky. The workshop curriculum included an introduction to gamma-ray astronomy, gamma-ray bursts, and the Gamma-Ray Burst Activity Books from the StarChild and Imagine the Universe projects. These booklets are available at <http://imagine.gsfc.nasa.gov/docs/teachers/gammaraybursts/gammaraybursts.html>

Tenn has been expanding his historical website <http://phys-astro.sonoma.edu/BruceMedalists/> on the astronomers awarded the Catherine Wolfe Bruce gold medal of the Astronomical Society of the Pacific. The site now includes photos, biographies, and bibliographies on ~35 of the 93 medalists from 1898-2000, as well as links to their original papers and articles about them.

## PUBLICATIONS

- Feigelson, E. D., Cominsky, L. R. & Whitlock, L. A. 1999 "The Swift MIDEX Education and Public Outreach Program," *BAAS*, 32, 1526
- Hertz, P. L., Wood, K. S., Fritz, G., Kowalski, M. P., Johnson, W. N., Lovellette, M. N., Ray, P. S., Wolff, M. T., Yentis, D., Bandyopadhyay, R., Bloom, E. D., Giebels, B., Godfrey, G., Reilly, K., Saz Parkinson, P., Shabad, G., Michelson, P., Roberts, M., Beall, J., Chakrabarty, D., Cominsky, L., Kim, Y., Leahy, D., & Scargle, J. 1999, "Early Results from the USA Experiment," *BAAS*, 32, 1425
- Tenn, Joseph S. 2000, "A History of Astronomy from 1890 to the Present," *Journal for the History of Astronomy*, 31, 2, 179 [Book Review]

Lynn R. Cominsky