

spread the astronomical bug through field trips, leading campers into the woods to spot Halley's comet or popping up with pinhole cameras for solar eclipses. And at the Harvard-Smithsonian Center for Astrophysics in Cambridge, hundreds of the field's brightest lights crowd the halls.

At Penn State, in contrast, the entire department can fit around a good-size dinner table—yet each of its 10 faculty members is pursuing a distinct path. Feigelson scans the skies for objects that emit X-rays or radio waves. Next door sits Associate Prof. Lawrence Ramsey, an optical astronomer—he works with visible light—who quit a higher-paying but unfulfilling engineering job to study the stars. Prof. Gordon Garmire, respected internationally for his work with X-ray observation, won part of a coveted space X-ray telescope project for Penn State. Down the hall, Hungarian-born Associate Prof. Peter Mészáros, a theorist, wrestles with the inner workings of quasars—distant galaxies with massive black holes in their centers that emit many types of radiation—and plans experiments to test his ideas. All of the approaches are necessary since, as Feigelson says, "You can't grab a star and poke it."

Quarter peeks: Stargazers also find employment in the outside world; one-third of America's astronomers work for the government, most of them within the system of federally funded national observatories. Others serve with the space program, either with NASA or aerospace firms, or with computer consulting firms. "The skills you learn as an astronomer are remarkably portable," says James Wertz, a former astronomer who heads a small aerospace consulting firm. These posts often provide higher pay than schools, but can pose conflicts for scientists who must abandon pure research for narrow tasks or who deplore military uses of space such as Star Wars.

There are even opportunities for an untrained but enthusiastic avocationist. Several nights each month, for instance, Tony Hoffman sets up his \$400 Japanese-made scope in Greenwich Village and invites passersby to gaze at Jupiter, Saturn and the moon—at 25 cents per squint. Hoffman took astronomy courses at the University of Michigan but didn't major in it. By day, he works in magazine production. After two years of free-lancing, he says he has amassed enough quarters from his 50 or so nightly clients to pay for his instrument.

Full-time astronomers, on the other hand, are highly trained at the 67 degree-granting programs in the United States, most often taking an undergraduate degree in physics topped off by an astronomy doctorate. Often academic astronomers must also master physics, computer science and engineering. Because female and black students have not gravitated to these disciplines in huge numbers, astronomy



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Sky guide: *Free-lancer Hoffman and young clients*

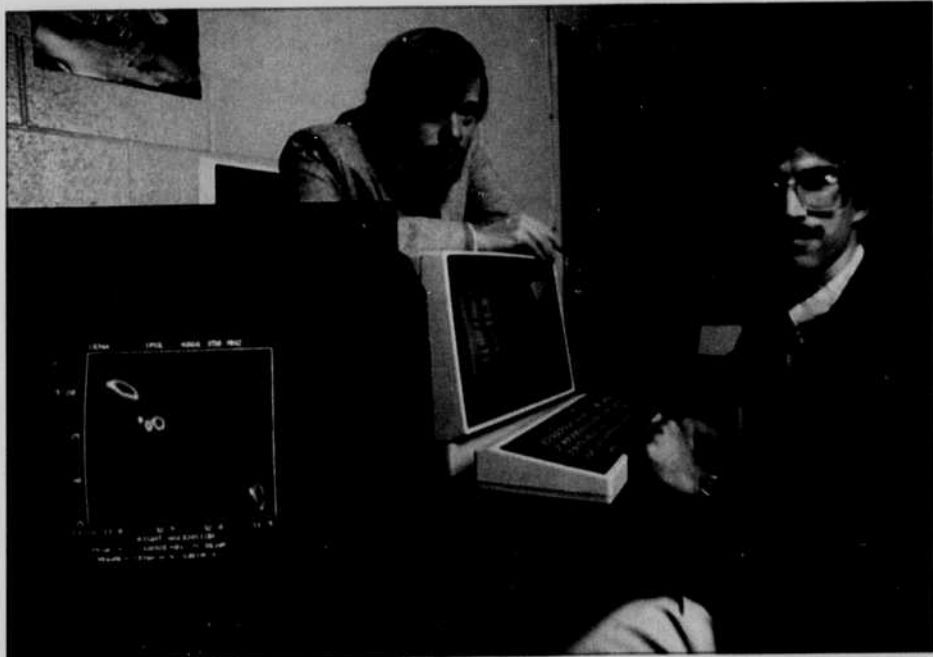
remains largely a fraternity of white males; there are fewer than 10 black astronomers among the 3,500 in the United States, and only about 12 percent of the total are women.

As a career, astronomy has its share of, well, nebulous prospects. Long-term projects can suffer costly and time-consuming setbacks. The Challenger tragedy and subsequent shuttle delays have stymied those astronomers who depend on manned flights to carry their experimental equipment.

And there is the case of the Advanced X-ray Astrophysics Facility (AXAF), a space telescope planned for the 1990s. A major part of the multimillion-dollar project, in which Penn State participates, was lost last August when an off-course rocket had to be destroyed; the culprit, a resistor like those sold for less than a dollar at Radio Shack, had been installed through a design error. The loss and delays mean harder times for space-based projects already squeezed by a cost-conscious Congress.

No fame: Despite setbacks, astronomers are generally patient—a quality that's helpful when you're sitting all night on mountaintops and dealing with infinite scales of time and space. They persevere, though surely not for fame; the last astronomer to become a household name, Edmund Halley, died 244 years ago. They even stay on despite the fact that very few outside the field seem to understand what they do: Andrew Young, a lecturer at San Diego State University recalls that soon after completing his dissertation, a woman at a party asked what he did for a living. Proudly he declared, "I am an astronomer." At which the woman wrinkled her nose and said, "Yeah, I had an aunt who believed in that stuff once." Even when you earn your living reaching for the stars, there's always someone to bring you down to earth.

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Catch the wave: *Penn State's Feigelson (right) and Ramsey with imaging computer*