

PHYSICS COMMUNITY

Graduate Physics in Wyoming Hinges on Boosting Undergrad Enrollment and Funding Observatory

The University of Wyoming is suspending admissions to its graduate physics and astronomy programs, and in two years may scrap them completely; if that happens, Wyoming will be the only US state that doesn't offer any graduate-level physics. Part of a five-year plan to be submitted to the university's trustees in July, the move is something of a reprieve compared with an earlier proposal, which would have immediately terminated the graduate programs, as well as possibly discontinued the undergraduate majors and sold or leased the physics and astronomy department's Wyoming Infrared Observatory (WIRO). Even so, physicists and astronomers say that the threats to their department have already "contributed to faculty and students leaving, poor morale, and a climate of distrust," as department chair Paul Johnson puts it.

The aim of the five-year plan, says university president Philip Dubois, is to shift limited resources to "focus on areas that can be first-class." Physics is the only core field scheduled to be cut back, though the plan calls for terminating a total of 11 majors. In two years, the administration may decide to rebuild the physics and astronomy graduate programs, but only if the department ups the number of majors and finds a way to make WIRO self-sustaining, explains Dubois, who admits that these goals are vague.

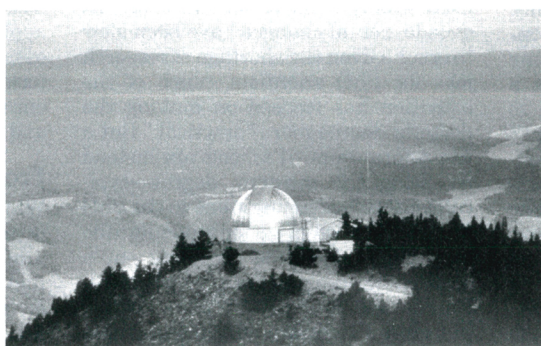
A weak department

Judith Powell, a former associate provost for academic affairs, who coordinated a university review last year that rated the physics and astronomy department "unacceptable," says problems in the department had been growing over the past decade: "They didn't appear to be reversing some of the trends that were occurring, such as escalating costs for salaries and lab equipment, and declining enrollments. And then they had all this bad luck—they needed to do expensive work on the [WIRO] telescope at a time when money was drying up. Another piece of bad luck was that their planetarium flooded. The university is now calling

▶ Do financially motivated sanctions signal the death of Wyoming's only university physics and astronomy program?

attention to the problems, and saying, 'This is serious.'" The review, however, recommended that the department be strengthened, not slimmed, so this spring's announcement came as a shock, Johnson says.

Johnson admits his department is weak in some areas. The number of physics and astronomy majors fell from 42 in 1993 to 25 last year (a slightly steeper drop than the nationwide downward trend); graduate enrollment has also decreased in the past few



THE WYOMING INFRARED OBSERVATORY sits atop 9656-foot-high Jelm Mountain, about 25 miles southwest of Laramie, where the University of Wyoming is located, and 125 miles north of Denver.

years; and the number of tenured and tenure-track faculty has plunged, from 17 in 1997 to, at most, 6 for the next academic year. Says Johnson, "The university has let the department shrink by retirements and promotion denials. I've been arguing with the administration that they've let our department hemorrhage long enough."

Infighting among the faculty has also been "more extreme than usual for an academic department," says Johnson. But he and others on the physics and astronomy faculty refuse to elaborate on their problems, except to say that the department and the university administration share the blame. When he became department chair two years ago, Johnson says, "it was with a mandate to turn things around."

Among the changes the department

has begun implementing is a new "physics plus" major, which will combine physics with course work in, say, business or atmospheric science. The threats to the department, Johnson says, "have forced us to accelerate the programs that we were thinking of trying. We are going to have to be more creative in how we market our program. We'll have to pull out all the stops."

An underused telescope

The department also had WIRO reviewed externally. The reviewers said the 2.3-meter telescope—the largest infrared dish owned by a single university—is underused, but that it could do world-class science, and that it alone "sets this department and this university apart from numerous similar state and private universities." Acting on the reviewers' recommendations, the department has applied for money to hook up the telescope for remote operation and data access, and observing time is now allocated competitively, instead of being divvied up among in-house astronomers. But, says WIRO director Earl Spillar, "We can't afford instrumentation on our annual budget." For the past few years, he adds, Wyoming astronomers have had to rely too much on visitors bringing "some unique instrument, like a far-infrared spectrometer. We piggyback on that."

WIRO has two strong points, says Harley Thronson, who was on the Wyoming faculty for 15 years before joining NASA in 1996: "It's an extremely good training ground for astronomers, and it's good for shaking down instruments." Recently, for example, scientists used WIRO to test instruments for Subaru, Japan's new 8.3-meter telescope on Mauna Kea in Hawaii. "It's a sad commentary if the University of Wyoming is retreating from premier research and teaching at a time when we are well into a golden age of astronomy," says Thronson.

To remove WIRO's dependence on university funding, there is talk of forming a consortium to run it, probably with Denver University, the University of Colorado at Boulder, and the non-profit Pikes Peak Observatory. Details,

including whether the telescope would stay on Jelm Mountain, in Wyoming, or be moved to Colorado, were still being ironed out at press time.

Unintended consequences

Even as the department struggles to make improvements, however, the feeling among faculty and students is that the administration is undermining their efforts. The five-year plan, Johnson says, "gives us less leverage to hire the highest quality research faculty." Adds astronomer Robert Howell, "Raising undergraduate enrollment is reasonable. Having a consortium run WIRO is reasonable." But the hard-nosed approach, Howell says, "is exacerbating problems. The administration has destroyed the minimal level of trust that has to exist between faculty and administration. All of us are looking around at other options. Unless [the administration is] willing to make a long-term commitment to the department, how can they expect one from us?"

The academic planning process is taking a toll on students, too. "It hits us all really hard," says Jennifer Cash, who is working on a PhD in astronomy. "It's had several effects on me personally. First and most unfortunately, my research adviser decided to accept a position at another university due to the uncertainty of the department's future and the lack of respect for scientific research shown by the administration." Cash also expects that she and other graduate students will have to take on heavier teaching loads, "and this will probably increase the time it will take for me to finish my PhD." That's unlikely, says Johnson, although advanced graduate students are being asked to teach two classes for double pay. And, he adds, "Prospective undergraduates have been scared away. Physics has been the centerpiece in the media. High school students know what's going on here."

Stephen Bieber, a statistics professor who sits on the faculty academic planning committee, agrees that the moratorium on admitting new physics and astronomy graduate students will make it more difficult and costly to rebuild the programs later. The university should either say outright that the programs are being closed, or delay any action and consider physics along with the rest of the graduate programs, he says. "This middle ground is unacceptable. I think the physics graduate programs are being scheduled for elimination." But Dubois insists this isn't so: "If we wanted to do that, we would have left the first draft [of the five-year plan] unchanged."

The university would do better to keep its physics graduate programs,

says Brian Schwartz, a physicist at City University of New York, who has offered to mediate, which he's done for other universities in similar situations. (Most notably, as part of a team from the American Physical Society, he helped James Madison University save its physics department in 1995; see *PHYSICS TODAY*, March 1995, page 81, and October 1995, page 57.) "Right now, almost all state universities are involved in regional economic development. If graduate physics is eliminated, high-technology development will be weakened," says Schwartz. And since the other sciences at Wyoming currently offer the PhD, he adds, "if physics doesn't, it will be a second-class citizen within its own university. Theoretically, it's possible to have only an undergraduate physics program. But

psychologically, it's difficult. It's the intangibles. . . . And there are always unintended consequences."

But on 3 May, the faculty senate endorsed the university's plan, and also defeated a bill to "put a moratorium on moratoria," reports Johnson. "My hope now is that we can put together a committee that has credibility with both sides, perhaps with members from the department, the administration, industry, and APS," and lay out a clear plan of what the administration and the department will each do to bolster the physics and astronomy department. "We need realistic criteria, instead of just saying, 'It will be evaluated'—the faculty worry that could mean anything. To rebuild the department, we will have to build trust."

TONI FEDER

Professional Master's Degrees Promise Quicker Entry into Industry Jobs

Although the need to reform graduate education in the sciences has been widely debated for much of this decade, actual changes have been slow to occur. Given the shortage of research jobs for PhD scientists, much of the attention has focused on making the doctoral degree more "practical." But a few reform-minded schools are instead recasting the master's degree—typically either a stepping stone to the PhD or a consolation prize for students who drop out of doctorate programs—as a respectable diploma in its own right. Comparable to an MBA or a law degree, but with a technical component, these new professional master's degrees are intended to prepare students for careers outside of academia—managing industrial research projects, for example, or dealing with intellectual property rights, or working as a liaison between a company's R&D and business operations.

There are now about 50 professional master's degree programs in science and mathematics in the US, according to Sheila Tobias, a longtime advocate of science education reform and currently an adviser to the Alfred P. Sloan Foundation, which is funding the startup of such programs at five universities. This new breed of master's tends to be in an emerging or interdisciplinary field, such as biotechnology, says Tobias, or it may apply scientific training to some nontechnical application, such as financial mathematics.

Four of the Sloan-funded schools will offer degrees in physics or physics-related disciplines: the University of Southern California's physics for business applications program; the

University of Arizona's applied and industrial physics program; Michigan State University's program in physics applications; and the University of Wisconsin—Madison's environmental monitoring program. USC and Wisconsin will enroll their first students this fall, MSU and Arizona the following year.

From school to work

While few would argue that the PhD is still the degree of choice for the professoriat, there is growing recognition that it is not the most appropriate or the most efficient path to many nonacademic jobs. That's the message being sent by both employers and students. University of Arizona physicist Michael Shupe says the impetus to revise the master's program in his department came from alumni. "In some years, close to half of our graduates go directly into industry," says Shupe. "They know what it's like to work there, and they've encouraged us to go in this direction."

Boosters of the professional master's degree say the two-year programs will groom students to become research managers in industry, as well as at national labs and government agencies. "What we've been hearing is that there's a tremendous demand for people who not only are technically proficient, but can plan and manage a project, particularly with a commercial orientation," says Tim Olsen, who is coordinating the Wisconsin program.

Indeed, a common complaint from business employers is that PhDs fresh out of school have trouble adapting to a corporate environment, says Hans Bozler, a physicist at USC. "It just