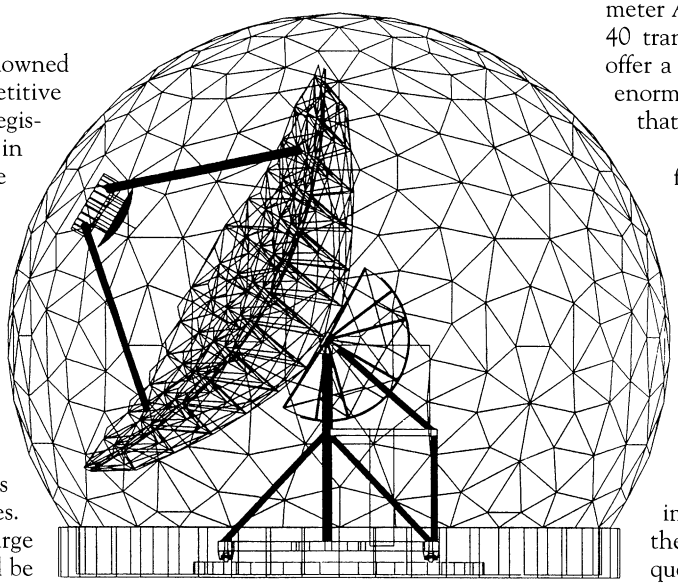
Astronomy Funding Goes South of the Border

Massachusetts congressmen are renowned for their ability to deliver noncompetitive earmarked federal funds—"pork" in legislative vernacular—to researchers in their districts. But their latest set-aside of $3 million for a radiotelescope, buried in a defense appropriations bill, is bringing cheer not only to radioastronomers in this northern New England state, but to scientists south of the border as well.

The earmark, in a bill signed last week by the president, goes toward a final design study for a joint U.S.-Mexican project to build in Mexico what would rank among the world's largest high-precision radiotelescopes. The instrument, known as the Large Millimeter Telescope (LMT), should be able to detect electromagnetic radiation down to wavelengths of around 1 millimeter. Its still undecided site, taking advantage of Mexico's dry air and excellent view of the relatively unexplored Southern sky and center of the Milky Way galaxy, would bring that country its first world-class facility in astronomy. The Mexican government is so eager for this prize that it has already agreed to pay nearly $23 million of the instrument's projected $43 million cost. "The Mexicans are anxious to put up half the money. This is a big deal to Mexico. It would be the biggest project they've ever done in the physical sciences," says William Irvine, who now directs the Five College Radio Astronomy Observatory located at the University of Massachusetts, Amherst, and has been involved with the LMT proposal from its inception.

Some U.S. astronomers are not so enthusiastic, however. Their chief concern is where the rest of the money will come from. The project is envisaged primarily as a partnership between the University of Massachusetts (UMass) and Mexico. UMass is committed to spending $1.5 million, and the state of Massachusetts has pledged another $5 million (most of which would go to a Massachusetts firm contracted to provide the project's electronics). Even with the $3 million congressional earmark and the $23 million from Mexico, that leaves the project more than $10 million short. And while they praise the telescope's scientific merits, a number of astronomers are concerned that those funds may come from the National Science Foundation's radioastronomy program, leaving other projects—including those deemed more important to the community—scrambling for money.



UMASS

Domes across the border. An artist's rendition of the proposed Large Millimeter Array radiotelescope to be built in Mexico. The instrument has a 50-meter dish housed in a radome.

The project does have a lot going for it. As envisioned, the LMT would imitate the "intelligent surface" design used by Hawaii's Keck optical telescope. Covered by a radome, a permanent structure made of material transparent to millimeter waves, the 50-meter dish would consist of 126 hexagonal segments that are continually adjusted by computer to achieve precise control of the antenna's shape. The telescope would be controlled remotely from centers at Amherst and in Puebla, Mexico.

The only telescopes comparable to the proposed LMT, a 45-meter dish in Japan and a 30-meter dish in Spain, are operated by other countries. That has left U.S. astronomers frustrated in their attempts to take a leadership role in studying the interstellar medium, a strong emitter of millimeter radiation. "Millimeter astronomy is the new frontier in radioastronomy. The LMT would fill a gap in our arsenal," says Kenneth Kellerman of the National Radio Astronomy Observatory (NRAO). With this wavelength window into interstellar media, the telescope is particularly well-suited to study the origin and evolution of planetary systems as well as probe the evolution of galaxies and stars.

The problem is that the LMT, despite these advantages, isn't the highest priority radioastronomy facility in the United States. The telescope didn't get top ranking in the influential 1991 report on astronomy research priorities produced by Princeton astronomer John Bahcall's Astronomy and Astrophysics Survey Committee. The subcommittee on radioastronomy, chaired by NRAO's Kellerman, put the LMT a close second to the proposed $115 million Millimeter Array (MMA). The Array, a series of 40 transportable 8-meter antennas, would offer a national facility to complement the enormously successful Very Large Array that focuses on centimeter research.

If the final chunk of money needed for the LMT does ultimately come from NSF funds, the worry is that the Millimeter Array will be shortchanged. And that may force astronomers to re-address questions they thought the Bahcall report had resolved. For example, "Is it worthwhile postponing the Millimeter Array for at least 1 year to get the LMT?" asks Irwin Shapiro, director of the Harvard-Smithsonian Center for Astrophysics. Shapiro, impressed by the scientific potential of the Mexican telescope, thinks it's a question worth considering.

The buck, however, doesn't stop with the building. "The real problem then becomes the continued funding for operating it" says Kellerman. Indeed, NSF is privately concerned that even if it does not have to fund construction of the LMT, it will become responsible for providing approximately $4 million a year in operating expenses over the next 20 years. That "represents a potential distortion of the [radioastronomy] program," one official (who preferred to remain anonymous) told *Science*, since NSF allocates only $8 million a year for university-based radioastronomy research.

Supporters of the LMT, however, argue that the U.S. cannot turn its back on such a scientific bargain. "For committing around $15 million, we're getting $43 million of astronomy investment," contends Paul Goldsmith, who recently left UMass to become director of National Astronomy and Ionosphere Center, which runs Arecibo Observatory. Advocates also note that the government must move quickly or Mexico might back out. That's one reason why UMass turned to its congressmen, particularly House Democrats J. Joseph Moakley and John Olver, who helped push through the earmark. "We're hoping these funds will lock in their commitment. We were getting a lot of pressure from the Mexicans to do something," Irvine says. In fact, UMass officials won't rule out avoiding NSF altogether for the project and asking Congress for another earmark for the U.S. side of the telescope funding package. And that means next year Massachusetts congressmen may once again be flexing their political muscle.

–John Travis