

Three years after the Field Report, how is astronomy faring?

Prospects for research in astronomy and astrophysics are exciting. New discoveries, including new black-hole candidates, giant voids in the universe, gravitational lenses composed of matter not yet observed, and twisted jets emerging from radio galaxies, challenge our understanding of physics and cry out for the observations of greater sensitivity and wavelength coverage that only new instruments can provide. The application of particle physics to the early universe results in predictions for the distribution of matter in the universe, which can be tested by new instruments. The merging of particle physics, astrophysics, and cosmology now in progress could be the beginning of a powerful new scientific synthesis with implications we can't yet grasp. What, then, are the prospects for new astronomical instrumentation that can attack frontier problems?

Nearly three years have elapsed since the publication of the Report of the National Academy's Astronomy Survey Committee, which I headed. The Report recommended priorities for astronomy programs to be carried out in the 1980's, arranged in three categories: major, moderate, and small. In addition, it discussed a number of approved and continuing programs. Here is how the recommendations of the Report are faring in Washington.

OSTP, NASA, NSF and Congress have all responded positively to the Report. OSTP requested a briefing on astronomical research needs in 1982, and the panel formed for this purpose responded by highlighting the actions that should be taken in fiscal 1984 to implement the Committee recommendations with regard to several key initiatives, including the Space Infrared Telescope Facility (SIRTF), the Advanced X-Ray Astrophysics Facility (AXAF), the Very Long Baseline Array of radio telescopes (VLBA), the National New Technology Telescope (NNTT), the Explorer program, and a variety of activities that are prerequisites for undertaking new initiatives. In fiscal 1984 NASA increased the Explorer budget and NSF funded a number of prerequisites as recommended. In the fall of 1983, Congress enacted House Concurrent Resolution 218 in support of the Committee recommendations.

In fiscal 1985, NASA initiated a phase B study of AXAF, the highest priority among major new programs in the Report; it plans to propose a new start for AXAF in fiscal 1987. During fiscal 1985, NASA also chose an instrument complement for SIRTF and began the development of the Solar Optical Telescope (SOT). Both SIRTF and SOT had originally been planned as shuttle-based facilities under the Spacelab Program; these were discussed in the Report under Approved and Continuing Programs. NASA subsequently determined that SIRTF is to be carried out as a free-flying observatory, and NASA plans to start a phase B study of SIRTF in fiscal 1987.

The highest-priority ground-based facility, VLBA,

was proposed as a new start in the President's fiscal 1985 budget, and \$15 million was requested for this purpose. Just behind VLBA in the priorities, NNTT is now undergoing intensive study with NSF support.

From this brief review it is clear that there has been progress on a broad front in implementing the Committee's recommendations. However, as we get into the core of the program, obstacles are sure to arise. Already a problem has arisen that appears to be unrelated to the merits of the recommended facilities. In Congress, VLBA has become embroiled in a dispute over the funding of science education. As explained elsewhere in this issue (see page 59), last year Congressman Edward Boland prevented VLBA from going ahead as planned, telling NSF it could spend only \$9 million in fiscal 1985, and only after 1 April 1985. In the recent hearings before his subcommittee on the President's proposal to spend \$11.5 million on VLBA in fiscal 1986, he has indicated that VLBA may be delayed by two or three years. For those familiar with the Washington scene, that could result in the death of the project. As it is essential to pursue both scientific research and education if America is to remain competitive, it seems unwise to resolve the science education issue by preventing the construction of an instrument that is necessary for frontier research. I hope that the Senate will agree with this and support VLBA.

While NASA's plans for implementing SIRTF and AXAF seem reasonable, there is considerable doubt whether they can stick to their schedule, given the resources made available so far. Funding for AXAF phase B is barely adequate, as is the pre-phase-B activity for SIRTF. We become quite concerned when we read that AXAF is on a list with three other missions for a new start in fiscal 1987, and has an uncertain priority at best.

Cost overruns in the Hubble Space Telescope program have forced delays in other elements of the NASA space science program. To be sure, the Space Telescope presented an unusually difficult technical and management challenge, but the message is clear: If the instruments called for in the Astronomy Survey Report are to be built, it is essential that astronomers and NASA work together to assure that such overruns do not recur.

It is important that astronomers and physicists planning to use the new facilities convey their significance to the responsible government officials. Decision makers, both in the Administration and in Congress, need to know the consequences of actions that they may take. Most of them will take the time to talk if we take the initiative. Grand opportunities await science if we continue to move forward with our program for the 1980s. Physics and astronomy alike will benefit.

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