

## US astronomy

## Big ideas, short pockets abound

Washington

LARGE optical telescopes that are also usable in the infrared are all the rage these days, but paying for them is another matter. With the exception of the Keck Telescope, a joint project of the California Institute of Technology and the University of California, large telescopes are being planned, not built. But now hope flickers for an ambitious project called the Binocular Telescope.

What has happened is that the first sponsors of this project, the University of Arizona and Ohio State University, have found a third partner, the University of Chicago, to join them in building a twin 8-m telescope. And now there is also a chance that a fourth partner, a consortium of Italian institutions, will join in. But even with four partners, the binocular telescope will exist only on paper until the estimated \$60 million needed to build it can be raised.

The instrument will consist of two 8-m mirrors side by side on the same mount. The twin mirror design will give the light-gathering capacity of a 11.3-m telescope and the resolution of a 22-m telescope. Peter Strittmatter, director of the Steward Observatory at the University of Arizona, says the new telescope will have an angular resolution of 5 milli-arc seconds in the visible spectrum.

A site selected for the telescope on Mount Graham in southeast Arizona was given preliminary approval by the US Forest Service last week. The mirrors will be made using a new spin-casting technique being developed by Roger Angel at the University of Arizona. A 3.5-m mirror blank will be cast early next year to test this new technique. The plan is for the telescope to be operating by 1992, but that may be optimistic.

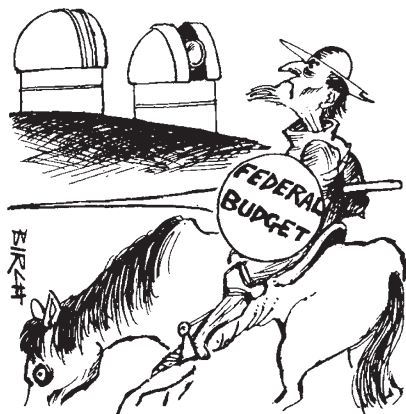
The University of Chicago's decision to become a partner was not unexpected. Astronomy department chairman Roger Hildebrand says Chicago has had an historical interest in large telescope projects. In the 1890s, Chicago built the Yerkes Observatory and, in the 1930s, the McDonald Observatory in Texas. The astronomy department is now especially anxious to work with optical interferometry techniques, for which the binocular telescope offers many opportunities. Chicago has also recently joined a consortium to build a remotely operated 3.5-m telescope in New Mexico, a project that will also use a spin-cast mirror from the University of Arizona (see *Nature* 322, 493; 1986).

Several US telescope projects are now being canvassed. The Carnegie Institution of Washington has begun discussions with the University of Arizona and Johns Hopkins University on a Southern Hemis-

phere telescope. Located at Las Campanas in Chile, that would have a single 8-m mirror. The University of Texas also has plans for a single-mirror 8-m telescope to be built in Texas.

Interest in new large telescopes is not confined to the United States. Japan is planning an 8-m telescope, similar to that being considered by Texas, which would be located at Mauna Kea in Hawaii, while the European Southern Observatory (ESO) has plans for a telescope consisting of four 8-m mirrors, to be located in Chile.

The ESO project is very similar to that for the National New Technology Telescope (NNTT) being considered by the US federal agencies. That would also con-



sist of four 8-m mirrors to be cast and polished using Angel's techniques. The selection of a site for NNTT is still under way, but it will definitely be in the Northern Hemisphere. As a national project, NNTT does not have the luxury of seeking private funds, and it is thought to be "far down in the queue" for new starts by federal agencies. Ironically, many of the large telescopes under consideration are likely to use mirrors of the type being developed at Arizona for NNTT.

Although paper and pencil (and computer) are still the primary tools for building most new large telescopes, project managers of the Keck Telescope have switched to bulldozers and glass furnaces. Construction of the telescope housing and mount has begun at Mauna Kea.

Forty-two mirrors are being made for the Keck Telescope, which will be a composite parabolic surface based on 36 separate mirror surfaces. There will be one spare for each of the 6 partial parabolas used in the segmented mirror design. Earlier this year, project directors successfully tested the intricate pointing and stabilizing system the Keck Telescope will use to control its multiple mirrors. First light is expected in 1990, although the project still needs to raise an additional \$17 million to meet the final expected production cost of \$87 million.

Joseph Palca

## French research

## Optimists and pessimists

M. ALAIN Devaquet, French minister for research and higher education, "appeared to be a happy man" when presenting his research policy in Paris last week, in the wake of the recent 1987 budget announcement, according to a reporter from *Le Monde*. Less happy, however, was the panel of "wise men", the Conseil Supérieur de la Recherche et de la Technologie, which saw fit the same day to publish its warnings on the future of French science, the panel's advice to the minister first delivered in secret on 3 July.

That the Conseil Supérieur, consisting of scientists, trade unionists and industrialists, should believe its warnings of three months ago to be still appropriate suggests that despite his smiles, Devaquet has not yet set the fears of the French scientific and technological community at rest. There have been improvements since July, but they came mostly in the form of a dramatically increased defence budget. The consequent extra FF5,000 million (£500 million) for research and development will be spent mainly in industry, where it will do something to offset cuts in industrial research subsidies elsewhere in the budget; but the spending will be only in a few big industries, the Conseil complains. Moreover, the ministry of defence has still not announced the areas of military research on which its bonanza will be spent, so it is still difficult to assess the overall impact. Research in small companies and related long-term market share and exports, are still threatened, the Conseil says.

In its earlier advice now published, the Conseil complained that:

- The loss of 373 research posts was the first reduction in French research personnel "since the Second World War".
- Basic research in 1987 would be supported only with the same real budgets as in 1985, despite increases in research costs. The re-equipment of French laboratories, previously planned for 1986, remains far from complete.
- The balance between the French "big programmes" (space, nuclear power and aviation), industrial research and strategic and basic research has gone too far in favour of the big programmes.
- Research support removed from small companies would prove "irreplaceable".

For Devaquet there must be one consolation, however. The present government has placed almost all its ministries under tight financial constraint, and yet the research minister has achieved an increase in his budget. Although this merely restores spending to 1985 levels, the political achievement is real. **Robert Walgate**