ASTRONOMY

Green Light for Infrared

from our Astronomy Correspondent

THE new branch of astronomy based on the observation of celestial objects in infrared light has received a significant boost from the Science Research Council in the form of a grant to the infrared astronomy group at Imperial College. Although the grant of just over £27,000 is modest by today's standards, it will be enough to construct a 60-inch flux collector—an infrared telescope—and to prepare the way for a more elaborate instrument. At a mirror diameter of 60 inches, the telescope will be as large as any infrared instrument now operating. This is a measure of the return which infrared astronomy yields for a comparatively small investment. Professor J. Ring, who heads the Imperial College team, says that a 120-inch infrared telescope—the logical next step—would cost about £60,000, with perhaps another £90,000 for the building, instruments and so on. By comparison, the 150-inch optical telescope now being built in Australia is costing around £5 million. The reason for the difference is that the optical criteria of an infrared telescope are less stringent.

Naturally enough, astronomers are delighted that a real start is at last being made, and there is every confidence that, in a year or so, the Science Research Council will be able to give the go-ahead for a 120-inch instrument. The committee of the SRC which deals with astronomy has made no secret of its faith in the future of infrared astronomy, and it seems likely enough that the SRC would have been happy enough to approve the more ambitious programme at the same time as it announced the grant to Imperial College. Treasury dissatisfaction with a scheme which is still ill-defined—there is still no suitable site for an observatory—is probably the reason why Professor Ring and his colleagues will be in suspense for some time to come.

The rule that the opening up of unexplored regions of the electromagnetic spectrum leads to exciting and unsuspected discoveries is the chief motivation behind the interest in this new branch of astronomy. Infrared emissions from cool stars, and from regions which may be the birthplaces of stars, are regarded as merely hints of what is waiting to be discovered. Astronomers in France have also argued that infrared spectroscopy may be important in a more parochial sense, in the study of the planets.

In the first instance, however, the 60-inch telescope which Professor Ring and his team are to build will be used to test possible locations for a permanent infrared observatory. As well as the usual criteria of ease of access and good seeing conditions, the site will have to be in an area where absorption of the infrared signals by water vapour in the atmosphere is likely to be low. The site in the European Alps near the Matterhorn which Professor Ring has been using has not turned out to be ideal. Oddly enough, considering the water vapour problem, the current favourite is the island of Tenerife in the Canaries, 200 miles off the African coast in the Atlantic Ocean, where during the past twenty years 90 per cent of summer nights have been clear. Above an inversion layer which seems to be a more or less permanent feature over the island, the air is dried by circulation into the stratosphere. This also

seems to be why Hawaii is used by American infrared astronomers from the United States. Second favourite is in the Sierra Nevada Mountains near Granada in southern Spain. The present Testa Grigia site in the Alps is a poor third. The aim is to have the 60-inch instrument built within twelve months or so. Designed to be robust and transportable, it will be used for perhaps a year on the urgent business of testing possible sites. When a site is settled, the telescope will have a useful life of several years.

Although larger instruments are likely to have a primary mirror made up of a mosaic of hexagonal components, the 60-inch telescope will have a simple paraboloidal mirror. An equatorial mounting has been chosen, as much as anything to test its feasibility for future large instruments. The design for the 120-inch telescope which will come out of experience with the instrument now being built is likely to be quite different. For one thing, the primary will be built up of six separate hexagonal components, each with spherical curvature, fitted together so that there is a gap in the place which would be occupied by the seventh component. Spherical aberration will be corrected at the secondary. Several out of the way schemes are being considered to mount the instrument. One design involves an altazimuth mounting—a familiar example is the Mark I telescope at Jodrell Bank—which has advantages in dealing with deformations of the primary due to bending. Steering is then by computer. Difficulties which the Russians are said to be having with the altazimuth mounting of their 240-inch optical telescope are not a propitious omen, however. Another possibility, suggested by Professor P. B. Fellgett of Reading University, who has had much to do with the instrumentation of infrared astronomy, has the dish sitting on six hydraulic legs which control the direction of pointing. A mirror with a spherical support of fluid bearings is also under consideration.

Besides Imperial College, groups at Queen Mary College and University College in London and the Royal Observatory in Edinburgh are involved, and will share the facilities. Professor Ring is to be chairman of a committee which will manage the instrument, and a scientific committee on infrared astronomy is being set up by Sir Harrie Massey.

Britain is also to have a stake in American infrared astronomy through a Science Research Council contribution to the Universities of Minnesota and California. This will pay for British students to visit the United States for training and, perhaps more important, will give British theoretical astronomers first crack at American results to cover the hiatus before an infrared observatory is built on the east of the Atlantic. In effect, the sum of £40,000 over four years which will be the British contribution will pay for a fair proportion of the facilities being developed by the cooperative team from Minnesota and California, who have a 30-inch telescope and are building a 60-inch telescope at a cost of £50,000. Compared with the £27,000 being spent on the new British telescope, the Science Research Council would seem to be getting good value from Professor Ring's team.