with the InSb detector. For many programmes on extended sources the larger diaphragms (≤ 30″) and chopping amplitudes (≤ 4′) will compensate to some extent for the smaller telescope aperture compared with the 3.6-m and in some cases may even make this telescope more attractive.

IRSPEC (Infrared Spectrometer)

This is a cooled array spectrometer which is being developed for the 3.6-m telescope where it should provide for observations in the 1–5 μm region at a resolving power of ≃ 3000 through an input slot of up to 3 × 7″. The mechanical construction is now in progress and most of the critical assemblies should be delivered within the next 2–3 months. Final completion will depend largely on when we actually receive the 52-element InSb array being produced specially for this instrument and on the difficulties encountered in developing its associated electronics. A more detailed account of this instrument therefore will be reserved for a future *Messenger*.

Acknowledgements

Without wishing to offend the many other ESO staff involved with the projects described here, I feel that special mention should be made of P. Salinari who was responsible for most of the IR photometer design before escaping to Florence, A. van Dijsseldonk who alternately builds and repairs detector units with great enthusiasm in Garching and, on La Silla, D. Hofstadt, F. Gutierrez, J. Roucher plus J. Koornneef and C. Perrier who face the unenviable task of demonstrating to visiting astronomers what has been written here.

ANNOUNCEMENT OF AN ESO WORKSHOP ON

"GROUND-BASED OBSERVATIONS OF HALLEY'S COMET"

to be held in PARIS, 29–30 APRIL 1982

With the aim of stimulating and planning ground-based observations of Halley's comet during its next apparition in 1985–1986, ESO is organizing a workshop entitled "Ground-based Observations of Halley's Comet".

This workshop will take place at the Institut d'Astrophysique de Paris on 29–30 April 1982. It will include both review papers and short contributions with ample time for discussion.

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Mass Determination of Massive X-ray Binaries

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Introduction

Massive X-ray binaries consist of a normal component of spectral type O or B which is transferring matter to a compact companion, generally a neutron star, with possibly one exception, Cyg X-1, where the compact component could be a black hole. These compact stars have enormous magnetic fields (of the order of 10^{12} gauss), and extremely large gravities; accreted matter will be accelerated to velocities of half the light velocity, and guided by the field lines to restricted areas near the magnetic poles, the hot spots. These regions acquire in this way temperatures of the order of 10^7 K, and X-rays are generated. The X-rays are transported outwards as beams, and since the compact objects rotate rapidly, X-rays are observed as pulse-shaped beams.

In order to enable a good physical description of compact objects and to derive an equation of state, their masses have to be determined as accurately as possible.

Mass ratios for binary systems can be derived from the radial velocity curves of the two components. In the case of a double-lined spectroscopic binary this is possible from measurements of the amplitude of these variations. For X-ray binaries the optical spectrum of the non compact component leads to the radial velocity curve of this component; from the Doppler delay of the arrival time of the X-ray pulse the radial velocity curve of the compact companion can be derived. Hence when the compact star is a pulsar the system can be treated exactly as a double-lined spectroscopic binary.

Massive X-ray Binaries

A list of massive X-ray binaries with their characteristics is given in Table 1. The table shows the names, spectral types, magnitudes, orbital periods in days, eventual pulse periods in seconds, the optical luminosity and the distance in kpc. As can be seen from the table the best suited candidates for the determination of physical parameters are Vela X-1 (4U 0900-40), 4U 1700-37, SMC X-1, LMC X-4, Cen X-3, Wra 977, 1538-52 and Cyg X-1, since they have short periods and are not too faint. Vela X-1, SMC X-1, Cen X-3, Wra 977 and 1538-52 are pulsars so that in principle the two radial velocity curves can be derived.

The best suited one is Vela X-1, since its magnitude of $6^{m}.9$ offers the possibility to acquire high-resolution coudé spectrograms, and moreover it is a pulsar (already discussed by Mauder in *The Messenger* No. 24).

The Case of Vela X-1

Some hundred blue plates were taken by the Amsterdam-Brussels group (Astrophysical Institute, Brussels; Royal Belgian Observatory; Astronomical Institute, Amsterdam) with the 152-cm spectrographic telescope of ESO with reciprocal dispersions of 12 and 20 Å/mm in the wavelength range 3700-4900 Å. The plates were collected between April 1973 and May 1976. From the line positions, heliocentric radial velocities were derived (Van Paradijs et al. 1976, *Nature,* **259,** 547). In