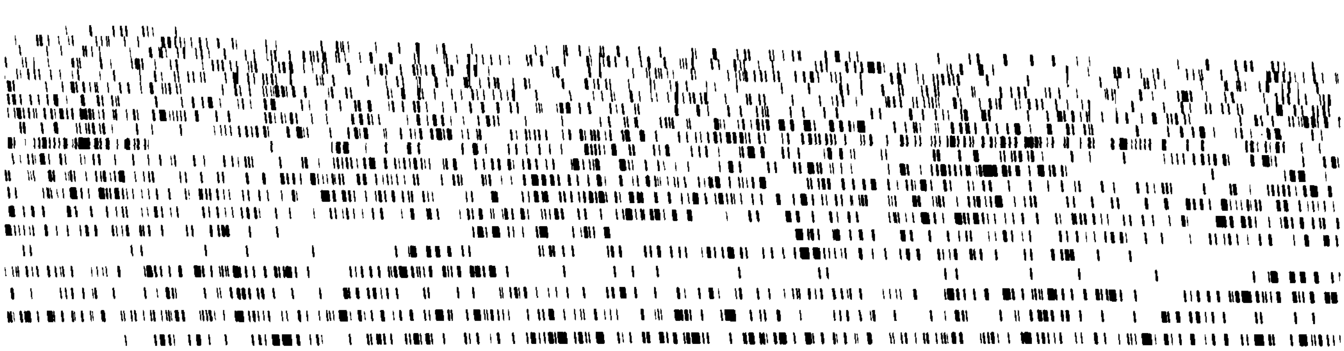

A part of the mask for the CORAVEL instrument, here shown in negative. Each line corresponds to a line in the spectrum of a late-type (cold) star. More than 3,000 lines were drawn by a computer programme operating the ESO S-3000 measuring machine in Geneva in a play-back mode. The mask is enlarged several times in this figure.

The CORAVEL

The measurement of radial velocities, i.e. the velocity in the direction of the line of sight, is of fundamental importance in stellar as well as in galaxy astronomy. Until the 1960s the only possible method was to obtain a spectrum on a photographic plate and then measure the displacement of the spectral lines. These observations were extremely time-consuming for faint objects. With the advent of image-intensifying devices, the observing time was drastically reduced, but so was—unfortunately—the accuracy of the measurement, due to geometric distortions in the image tubes. Now, however, the situation has improved very much indeed, as explains Dr. M. Mayor *of the Geneva Observatory, who, together with several European colleagues, is building a spectrometer to determine stellar* radial velocities *by a* correlation *method.*

The Marseille and Geneva observatories (A. Baranne, M. Mayor and J. L. Poncet) are working together to build two spectrophotometers for stellar radial velocities. Testing of the first machine has been completed. But before giving the results of these tests it could be useful to review the principles of operation of these "spectrovelocimeters".

In the last ten years, the field of stellar radial velocities has been enriched by a new method whose efficacity and precision for late spectral type stars is exceptional. The development of this method and the proof of its reliability are due to R. Griffin at Cambridge. He has been able to measure the radial velocity of a 14th B-magnitude star to within 1 km/s in only 4 minutes at Palomar!

The Doppler shift measurement is done by means of an optical cross-correlation between the stellar spectrum and a mask located in the focal plane of the spectrograph. This mask is designed to stop photons coming from the stellar continuum and is transparent in the regions of the absorption lines. The spectrum is scanned across the mask and the point of minimum light transmission is located. CORAVEL, which is designed to work at the Cassegrain focus, is a fairly compact apparatus with a collimator focal length of only 60 cm. Nevertheless, its echelle grating which is used between the 43rd and 62nd orders gives a mean dispersion of about 2 Å/mm over the 1500 Å spectral range. The total light transmitted by the mask is measured by a photomultiplier. Rapid scanning at about 4 Hz is used to eliminate atmospheric scintillation effects and the correlation function is built up on-line by integration in the memory of the HP 2100 computer. The zero point of the radial velocities is determined by means of a hollow cathode iron lamp which illuminates the entry slit at the beginning and end of each measurement. The reduction of the Earth's motion is immediately done at the end of the measurement.

The mask used in CORAVEL is derived from the spectrum of Arcturus and consists of about 3,000 holes distributed over the 20 orders of the echelle grating. The useful zone of the mask is approximatively 13 x 70 mm. The calibration of the focal surface and the drawing of the work was done using the OPTRONICS two-coordinate microphotometer of the ESO Sky Atlas Laboratory. A small modification of the microphotometer allows it to be used in play-back mode to make a negative on a high-resolution photographic plate. A negative copy of this plate gives us the mask which in fact is a glass plate coated with chrome.

Measurements of the sky light from the laboratory permit a partial test of the mask. The correlation dip for the Sun is characterized by a 15 km/s width at half depth. The daily variation of the solar radial velocity (0.3 km/s at Geneva) is easily measured with a scatter of ± 0.1 km/s for the individual measurements. Tests on stars other than the Sun are planned during the next few weeks and will be the subject of another report.

An observation period at La Silla is planned after some months of observing in the northern hemisphere.

Of Apollos and Trojans

It is often seen in science that more is learned from abnormal ("pathological") cases than from the normal ones. This is certainly true in astronomy too.

The title of this note should not confuse the reader. We do not attempt to discuss the mentality or health of ancient Greek gods and warriors, but rather to summarize some new information pertaining to these two "families" of minor planets which has recently become available from observations with ESO telescopes. They represent extremes in the asteroid world: the Apollo planets are those which come closest to the Earth; the Trojans are more distant than any other known minor planets.

1976 WA

Comparatively few Apollo asteroids are known to date. The most famous, (1566) Icarus, comes within 28 million kilometres from the Sun, in a very elongated orbit that also carries it across the Earth's orbit. The interest in these rare ob-