maxima and their mean amplitude is 4.8 magnitude, i.e. about 1 magnitude greater than that of the normal maxima. A naïve expectation would predict that no hump should be observed during supermaxima as it is not observed during the normal maxima. But in spite of this naïve expectation—and it is the most curious thing—not only a hump but even a *superhump* is observed during the supermaxima of VW Hyi. It is called the superhump because its amplitude in intensity units is much greater than what is observed at minimum light. Moreover, what makes the phenomenon still more curious is that the mean period of the superhump of VW Hyi is 110 min (0ᵈ07676), i.e. it is by about 3 per cent larger than the orbital period observed at minimum light, and even more, the superhump period is decreasing during the supermaxima. The same behaviour was observed with WX Hyi, another southern star of SU UMa type. In its case the mean period of superhump is also greater by about 4 per cent than the orbital period of the system as obtained from humps at minimum light.

Interpretation?

What is the real nature of such behaviour of SU UMa-type stars? Are the superhumps connected with appearance of a "superspot" on the disc surrounding the white dwarfs? Is the observed superhump period change related to the period change observed in Nova V 1500 Cyg? Is it indeed so that with all SU UMa stars no hump is observed during the normal maxima, but only during the supermaxima? Are the physical processes responsible for the two types of outbursts completely different?

Observations on La Silla

All these questions motivated the author to place some SU UMa stars in her observational programme for La Silla. Most of these stars at minimum light are below the threshold of visibility of the 60 cm Bochum telescope which was available. But every night the author started her observations by checking whether or not any of the stars had exploded. The chance was rather small during the author's short stay at La Silla. Thus she was very pleasantly surprised when on the night of May 7, while making her nightly survey, she perceived a star in one of the previously empty fields. It was V 436 Cen which had just exploded and was by then about 3 magnitudes brighter than the limiting magnitude of the Bochum telescope. The author's excitement was so great that she could not believe that this was the correct star. Only after measuring colours of the star she was sure there was no misidentification. The star showed a great ultraviolet excess as is usually observed with dwarf novae. The star was then monitored in blue light almost until the moment it was on the horizon.

It was not obvious after the observations of the first night whether or not the star was in a normal maximum or in one of the rare supermaxima. According to the New Zealand observers it was known that the normal maxima of V 436 Cen last only about 2 days. On the following night the star increased again in brightness and as it kept this high brightness during the next two nights it became clear that it was a *supermaximum!* In the course of the observations a hump which only started to develop on the first night increased its amplitude to the value of 0.3 magnitude so that it was clearly seen from the counts displayed on the monitor screen.

Unfortunately cirrus clouds which often cover the sky above La Silla at this time of the year interrupted these exciting observations. But when after an 8-day break, the author again began the observations (due to the kindness of N. Vogt and J. Breysacher who offered her their nights), the star was only about 1 magnitude fainter, and the hump was still visible although its amplitude had decreased. On the following night the hump merged into a rapid flickering. But the star was visible in the telescope even 16 days after the beginning of the outburst, giving strong evidence that it was indeed a long-lasting supermaximum. The reader may see some of the observations of the star in the figure. The observations are not yet fully reduced. Perhaps their further careful analysis will make some contribution to the better understanding of the most interesting dwarf novae.

Observation of the M87 Jet with the International Ultraviolet Explorer

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During the past months, astronomers have been busy at the IUE ground station near Madrid. Dr. Massimo Tarenghi was the first ESO astronomer to use this unique ultraviolet satellite to observe extragalactic objects. This is the first, brief report about his exciting observations, together with Dr. Perola from Milan. We expect to bring further news about the IUE in the next issue of the Messenger.

The International Ultraviolet Explorer (IUE), a joint project of NASA, the United Kingdom, and the European Space Agency, is the first satellite designed for use by the general astronomical community which does not require a special knowledge of space techniques on the part of the observer. IUE is a geosynchronous satellite equipped with a 45 cm Cassegrain telescope for spectroscopic studies in the wavelength range 1000–3000 Å. It is kept under control at two operation centres, one located at the Goddard Space Flight Center in Greenbelt, Maryland, USA, the other at the ESA Tracking Station in Villafranca del Castillo near Madrid, Spain.

The telescope field of view is seen by a television camera in the satellite and can be displayed on a TV screen at the ground station to allow the observer to identify his target. The situation is like with a normal ground telescope: just imagine to observe with the ESO 3.6 m telescope, where the astronomer sits in the control room. With IUE the control room for the European astronomers is at the Villafranca station, the telescope is only a bit further than the other side of the window . . . !

The telescope is a Ritchey Chrétien of 45 cm aperture, with focal ratio f/15, an image quality of 1 arcsec and an acquisition field of 10 arcmin in diameter. At the focal plane there is an echelle spectrograph with two SEC vidicon cameras, one for the range 1150–2000 Å, the other for the range 1800–3200 Å. One can choose between a high-dispersion mode (resolving power $\sim 10^4$) and a low-dispersion mode (resolution ~ 6 Å).

The scientific aims of the IUE mission can be summarized as follows:

- to obtain high-resolution spectra of stars of all spectral types,
- to study gas streams within binary star systems,
- to observe at low resolution faint stars, galaxies and quasars,
- to obtain spectra of planets and comets,
- to improve the knowledge of the physical conditions in the interstellar matter by measuring its effect on the stellar spectra.

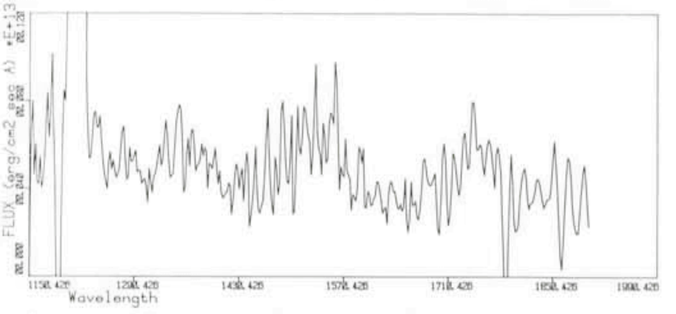
After the first few months of observations an exciting body of data has already accumulated on a large number of objects, from planets to QSOs. At the end of September, a full issue of *Nature* will be devoted to the data obtained in the very first period of observations.

Here we would like to present the preliminary results of an observation of the jet in M87, which represents a case of this instrument used at the limits of its technical possibilities. The radio galaxy Virgo A (NGC 4486, M87) is a bright elliptical in the Virgo cluster. It is known since 1918 to contain a very peculiar feature near its centre, which looks like a jet emerging from the nucleus. The total magnitude of this feature is $m_B = 15.8$, but it consists of several bright spots, among which the brightest has $m_B = 16.77$. The optical spectrum is a featureless continuum which follows a power law with a spectral index $n = 1.7$ ($F(\nu) \alpha \nu^{-n}$) and is highly polarized.

The soviet astrophysicist L. Shklovski suggested in 1956 that the optical radiation is produced via the synchrotron process by relativistic electrons and positrons in a magnetic field. It was the first extragalactic source with spectral and polarization properties similar to those of the Crab nebula continuum. One of the main problems it poses is how the electrons get continuously accelerated to catch up with the synchrotron losses, which become more and more severe as the emission frequency increases. The first aim of our measurement with IUE was therefore to measure how the continuum extends into the far UV.

On July 24, 1978, we pointed the IUE telescope in the direction of M87, whose nucleus is bright enough to appear as a diffuse spot on the TV screen. The jet itself is too faint to be seen in the picture, so, in order to position the entrance slot of the spectrograph on it, we made use of the possibility offered by IUE to guide an observation in the "blind" offset mode. We therefore moved the telescope off by 12" from the centre of the galaxy in the appropriate direction and then selected a bright star in the field of view for the automatic guide. After 6^h30^m of exposure time with the short-wavelength camera we saw on the screen the spectrum of the brightest knot of the M87 jet. Unfortunately, some fairly wide sections of the spectrogram were disturbed by a comparatively strong microphonic noise produced during the read-out of the camera. (This happens rather rarely.)

A preliminary version (there are still problems with the calibration of the IUE camera) of the spectrum after the subtraction of the background is presented in the figure. It



tells us two important things: the first is that the optical continuum appears to extend into the far UV without changing the slope of the power law. The second is that, despite of the noise, there is one emission feature in the spectrum which looks undoubtedly real (we have carefully inspected the raw image of the spectrogram to make sure that it is not a fake). This feature sits at 1556 Å, which corrected for the redshift of M87 corresponds to the line CIV λ1549, the most prominent line after Lyα found in this range of wavelengths in high redshift QSOs and also in the spectra of 3C 273, NGC 4151 and NGC 1068 obtained with IUE. (Because of the large aperture of the slot, the strong Lyα line at 1216 Å is due to geocoronal light.)

This result is particularly important, because it immediately implies that the brightest knot at least cannot be moving at a large speed (say greater than a few hundred km sec^{-1}) relative to the galactic nucleus. This represents a strong constraint for dynamical models of the jet involving ejection of matter from the nucleus of the galaxy.

Optical Pulsations from 4U 1626–67 Discovered with the ESO 3.6 m Telescope

S.A. Ilovaisky, C. Motch and C. Chevalier

A little over a year ago, Drs. Claude Chevalier and Sergio Ilovaisky reported the optical identification of the X-ray source LMC X-4 (cf. Messenger *No. 9, p. 4). Now, together with Dr. Christian Motch, also from Observatoire de Meudon, France, they have succeeded in measuring optical pulses in a 19^m star with the same period as the southern X-ray source 4U 1626-67, and therefore identical with this source. To obtain a high time-resolution, $0^s.8$, it was necessary to use the 3.6 m telescope. Contrary to other X-ray sources, no Doppler shift has yet been detected in 4U 1626-67.*

Much excitement has been generated in the astronomical community by the publication of more than 50 accurate positions (± 20" to 30") of galactic X-ray sources obtained with the Rotation Modulation Collimator (RMC) experiment on the SAS-3 satellite. Even more numerous and accurate X-ray positions are expected as a result of the sky survey being carried out at this moment by the giant HEAO-1 satellite. With this improved positional information, *optical identifications* can now be attempted with a high degree of confidence inside the small X-ray error circles.

Preliminary photometric detective work carried out by Jeffrey McClintock and colleagues at Cerro Tololo last year singled out two sources for further study: the X-ray burster MXB 1735-44 and the X-ray pulsar 4U 1626-67. In both error circles faint blue stars with unusual colours (V = 17.5, B-V = +0.2, U-B = –0.8 and V = 18.6, B-V = +0.1, U-B = –1.2, respectively) were found. These two suggested optical counterparts have been scrutinized in detail