per cent reported by the ESO staff at 8500 Å using the 3.6 m telescope. Fig. 1 shows the near-infrared spectra of two gaseous nebulae: IC 418, a galactic PN, and N 81, a H II region in the Small Magellanic Cloud. Exposure times are 10 and 30 min. respectively.

The Y-axis represents analog to digital converter units (ADC). The system is set such that 1 ADC corresponds to the rms noise, which is about 1,000 counts. Saturation of an individual diode occurs at about 4×10^6 counts or about 4,000 ADC units. Therefore, a signal of 600 ADC (Hα line of N 81) corresponds to about 15 per cent of the saturation level of the detector.

The [S III] λλ 9060, 9532 Å lines were detected in N 8, N 54, N 81, N 153, P 40 (nebulae in the MC) and in 15 galactic southern PN, while in N 2, P 8 (PN in the MC) and 108–76°1, K 648 (galactic halo PN) the [S III] doublet was detected below a 3σ level or not at all.

TABLE 1: Total Sulfur Abundances

	Log (S/H +12
41 PN	6.80 ± 0.28
22 PN with $O^{++}/O^{+} > 10$	6.82 ± 0.23
11 PN with $2 < O^{++}/O^{+} \leqslant 10$	6.78 ± 0.33
8 PN with $O^{++}/O^{+} \leqslant 2$	6.77 ± 0.39
H II Regions	6.85 ± 0.21
Sun	7.22 ± 0.13
Orion	7.34

Reference: Natta et al. 1980.

Table 1 (after Natta et al. 1980) shows our present knowledge of the total sulfur abundances in nebulae. These figures indicate that the average sulfur abundance for galactic PN is lower than the one in the Sun and the Orion Nebula. Consequently, one of the first concerns has been to compare the Reticon sulfur abundance with the ones reported by Natta et al. (1980). So far, and for galactic PN only, my values for log (S/H)+ 12 range from 6.35 ± 0.20 to 6.75 ± 0.33, depending on the object and ICF method used. In any case, my results seem to confirm a total sulfur abundance in PN lower than the one in the Sun and in the Orion Nebula. A large number of questions remain to be answered. For example, (1) Is the value of log (S/H) + 12 for galactic PN and PN in the MC lower than the equivalent value for H II regions? (2) To what extent do the sulfur abundances in the MC match the ones in the Galaxy?, and (3) Since sulfur is a nucleosynthesis product, to what extent do the answers to the two previous questions influence models of galactic evolution?

As in previous runs, the La Silla staff was very friendly and cooperative, and excepting the search for uninvited vinchucas to my bedroom (I found two), the days were quiet for sleeping.

This work was done while the author was with the Max-Planck Institute for Astronomy in Heidelberg.

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Asteroid Rotation – Hunting for a Record: 1689 Floris-Jan

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Introduction

Last year, in June 1981 – *ESO Messenger* No. 24, p. 22–23 – H. J. Schober published a report on "Spinning Asteroids and Photometry". There he mainly gave a general introduction about what can be done using UBV photometry in order to derive physical properties of asteroids such as geometric forms, diameters, reflectance on the surface, bimodality of asteroids with respect to typology.

A special effort was made to report about the activities to deal with asteroids as "variable objects" like variable stars – showing lightcurves with defined rotation rates to be derived. Among asteroids it was stated that the longest rotation periods found before 1975 were not larger than 20 hours – followed by 654 Zelinda 31ʰ.9 (1975), 393 Lampetia 38ʰ.7, 128 Nemesis 39ʰ.0 (1979), 709 Fringilla 52ʰ.4 (1979) and 182 Elsa 80ʰ.00 (1980), the latter corresponding to 3ᵈ.33.

The Asteroid 1689 Floris-Jan

Combined observations were undertaken in 1980, when measurements were carried out for the asteroid 1689 Floris-Jan between Oct. 7 and Nov. 6, 1980. H. J. Schober observed this object at Cerro Tololo, CTIO, Chile (0.6 and 0.9 m telescopes), J. Surdej at ESO, Chile (0.5 m telescope), and a few points were delivered additionally by A. W. Harris and J. W. Young from JPL, Pasadena, at Table Mountain Observatory (0.6 m telescope). The brightness of the asteroid was only between 13.50 to 14.00 in V. During a few nights even simultaneous measurements were made at ESO and CTIO, using different comparison stars; they do overlap perfectly – proving the high quality of our measurements – the results will be published in detail in *Astronomy and Astrophysics*.

The surprising result is that 1689 Floris-Jan shows a double-wave lightcurve with primary and secondary extrema as many asteroids, with an amplitude of 0.40 magnitude, but with a resulting rotation period of

$$P = 145^{h}.0 \pm 0^{h}.5 \ (\triangleq 6^{d}.042 \pm 0^{d}.021)!$$

beating the record of 182 Elsa. Due to the colours derived for 1689 Floris-Jan it should not be a S-type asteroid and, depending on the albedo assumption, its diameter is found to be rather small, in the range 9 to 27 km.

The rotation period of six days for 1689 Floris-Jan is the longest one ever published for an asteroid. The histogram in Fig. 1 shows the exceptional position of 1689 Floris-Jan among the more than 300 published asteroid rotation

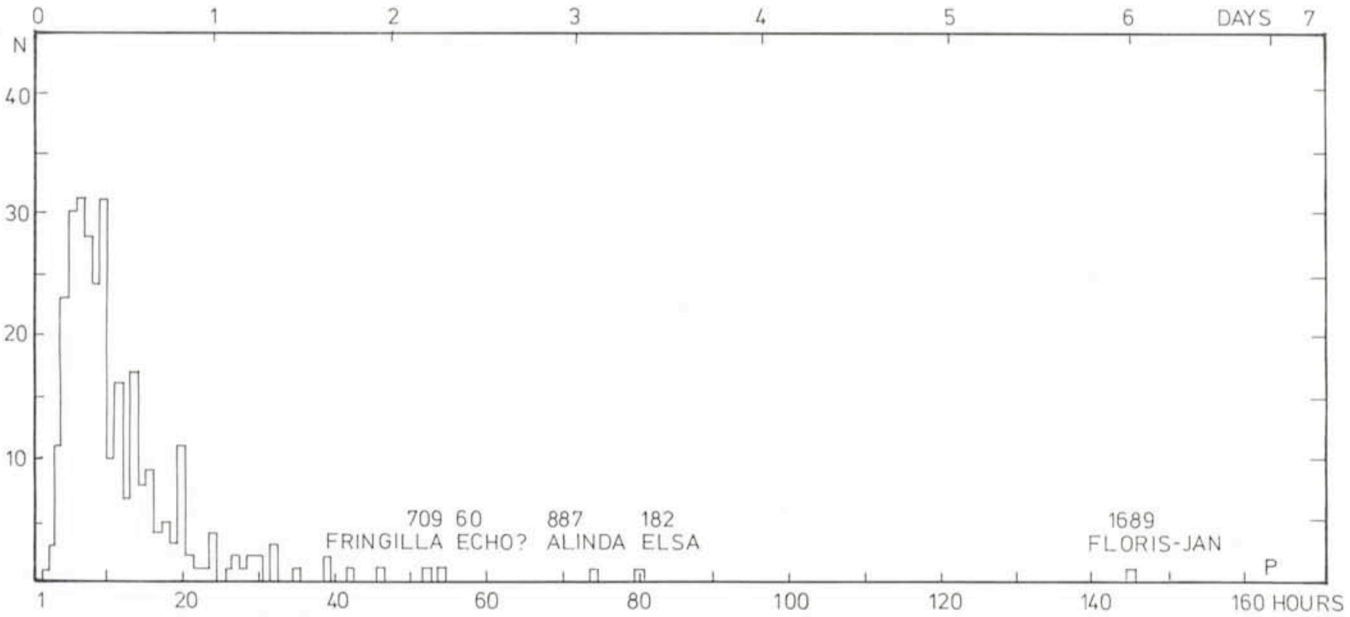

Fig. 1: *Histogram of asteroid rotation periods as published until 1982; numbers and names for slowly spinning asteroids with periods longer than 50 hours are given. The long rotation period P = 145.0 hours for 1689 Floris-Jan is clearly exceptional.*

rates. In addition, it must be stated that – in opposition to what should be expected – there are indications that small asteroids are not necessarily fast rotators. Among all asteroids with rotation periods longer than 50 hours there appear to be no objects larger than 100 km. It is still premature for a final conclusion, but it seems that small asteroids prefer also slow rotation rates, whereas larger objects with diameters larger than 200 km (roughly 30 asteroids) prefer to rotate faster with periods of the order of only 8–29 hours!

We are waiting even for other surprises: 1981 QA, also a small asteroid with a 0.8–2 km size is reported to rotate also in only six days approximately – and new exciting results are to be expected for 288 Glauke, a 30 km sized S-type asteroid.

Good luck for all hunters!

The Atmospheric Transmission at La Silla at 230 GHz

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Introduction

From April to November 1981, ESO La Silla was host to a team of observers from the Netherlands, forming the "CO group". During this time they applied themselves to detecting radiation of the CO molecule at 230 GHz, using the CAT and their own heterodyne (sub-)millimetre wave receiver.

In general the importance of CO observations lies in the fact that CO is, after molecular hydrogen, the most abundant molecule in interstellar space while its (dipole) rotational transitions can be much more easily detected than the very weak (quadrupole) rotational transitions of H_2; the rotational levels of CO are believed to be excited by collisions with other particles, mostly H_2, and therefore, by studying the distribution and kinematics of CO one gets indirect information on those properties of H_2.

So far, most information on the distribution of molecular clouds in the Galaxy is based on observations of the ^{12}CO $J = 1 \rightarrow 0$ rotational transition at 115 GHz. Such observations have been carried out mainly from northern hemisphere observatories and were therefore limited to $\delta > -40°$. Incidental observations from the southern hemisphere have been made using optical telescopes, due to the lack of mm telescopes. As the CAT, being just installed, was not yet scheduled for general use, ESO agreed to allocate us all day time and about half of the night time in the above-mentioned period. We have used this telescope to survey the galactic plane in the fourth quadrant, to observe molecular clouds associated with HII regions and to make maps of a few dark clouds. Since this was the first time the CAT was used so extensively, we encountered several telescope problems. Pointing, for instance, was off by a few degrees in some directions. Extensive star pointing sessions showed the offset to be systematic and a correction programme was developed bringing the absolute pointing accuracy 1′ to 2′. This problem is less serious for observers using the spectrograph since the stars can be seen on the TV screen and thus centered (the correction programme is also implemented for these observers, however); the tracking capability of the CAT is good.

Other problems arose from the fact that the CAT was not designed for this type of operation. The most persistent of these typically frequency-related problems is the reflection of local oscillator signal from the receiver on dome and telescope surfaces, causing variable standing waves in the spectra. We were able to suppress these