17, 1981. The data points represent the mean value of the heliocentric velocity of the He 4143, 4388 and 4471 lines, and the solid line is the least squares sine curve fitted to the individual points. The mean error on each point is estimated to be of the order of 5–6 km s^{-1}. The range of radial velocity variation is about 20 km s^{-1}, and a probable period of .19 day (approximately 5 hours) is obtained from the fit. uvbyβ photometry of α Pyx yields a β-index β = 2.606 and a reddening corrected temperature index Co = .034, values very representative for a β Cephei star. The quasi-sinusoidal radial velocity variation found on JD 2444680 seems to support the suggestion that α Pyx is a reliable β Cephei candidate. The final evaluation of all available plates will probably give more indications concerning its nature. A detailed study of the star will be undertaken using the 1.5 m telescope at La Silla in 1983.

It is clear that the frequent use of an instrument like the Mills telescope may contribute enormously to increase the efficiency of searches and surveys and it may give important hints for planning observational research at larger telescopes. In addition, it offers the possibility of extended spectroscopic runs, allowing to follow the same star for several weeks or months. This kind of programme can never be executed at La Silla or similar observatories with a tight visitors schedule. Finally, simultaneous photoelectric (La Silla) and spectroscopic (San Cristobal) observations of brighter stars over relatively large time intervals would also be of great scientific interest, as shown above by means of the β Cephei candidates.

There is some hope that the actual one-prism spectrograph may be replaced by a modern fast instrument in the future. Such a development would surely encourage European observers to apply for observing time.

A New and Interesting Seyfert 2 Galaxy: NGC 5728

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NGC 5728 is an SBb galaxy; its galactocentric radial velocity is 2,710 km s^{-1} with H_0 = 50 km s^{-1} Mpc^{-1}, its distance is 54 Mpc and 1″ = 262 pc. The central structure of NGC 5728 is curiously asymmetric; a high luminosity nucleus sits within a high-surface brightness ring (dimensions 7″.5 × 10″.0 or 2.0 × 2.6 kpc); but the nucleus is displaced from the centre towards the east (Sandage and Brucato 1979, *Astronomical Journal* **84,** 472; Rubin 1980, *Astrophysical Journal* **238,** 808).

Within 2 arcsec of the nucleus, strong lines of Hα, [N II], [S II] and [O III] are observed, with [N II]λ6584 marginally stronger than Hα; weaker lines are also present ([O I]λλ6300, 6364 and [Ar III]λ7136); in the nuclear region, the Hα and [N II] emission lines are split into multiple components; the emissions continue beyond the nucleus through the region of the nuclear ring. Nuclear emission is intense; emission from the ring is weak. (Rubin 1980; Sandage 1978, *Astron. J.* **83,** 904).

According to Rubin, the velocity distribution in the ring can be fitted with a model with rotation plus axisymmetric expansion; this model implies a constant rotational velocity near V = 300 km s^{-1} and an expansion velocity decreasing from 275 to 150 km s^{-1} from r = 0.65 to r = 1.3 kpc and to zero at r = 2 kpc (r is the distance from the centre). Simple energetic considerations show that velocities radial from the nucleus with V ~ 250 km s^{-1}, decreasing to zero near 2 kpc imply a nuclear mass (r < 2 kpc) ~ 1 × 10^{10} $M_\odot$; this value agrees well with the mass deduced from the rotational velocities.

A spectrum exposed for 20 minutes, obtained on 12 August 1980, with the Image Dissector Scanner (IDS) and the Boller and Chivens spectrograph attached to the 1.5 m ESO telescope at La Silla, with a dispersion of 171 Å mm^{-1} (resolution ~ 10 Å FWHM) and a 4 × 4 arcsec aperture shows that the nucleus has the Seyfert 2 characteristics: [N II] λ 6584 ~ Hα and [O III] λ 5007 ≫ Hβ (Fig. 1).

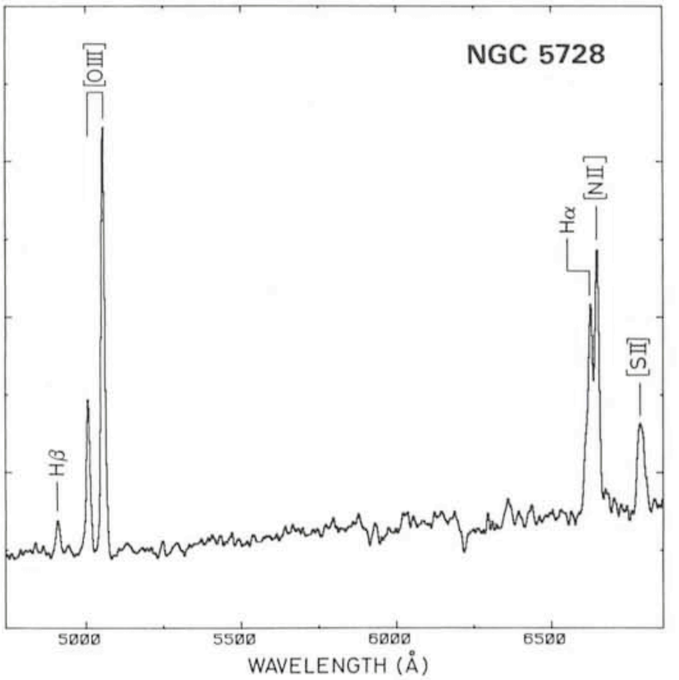

Fig. 1: *Spectrum of the nucleus of NGC 5728 obtained with the Image Dissector Scanner and the Boller and Chivens spectrograph attached to the 1.5 m ESO telescope. The resolution is about 10 Å. This spectrum shows that NGC 5728 has a Seyfert 2 nucleus.*

The heliocentric radial velocity of the emission lines as measured on this spectrum is V = 2,760 km s^{-1}, close to the systemic velocity measured by Rubin, V_0 = 2,800 km s^{-1}.

Two spectra have been obtained with the IDS and the Boller and Chivens spectrograph at the ESO 3.6 m telescope, on 10 February and 5 August 1980, with a dispersion of 29 Å mm^{-1} (giving an instrumental profile of 1.6 Å FWHM), with a 2 × 4 arcsec aperture (with the large dimension in the EW direction), in the spectral range 4600–5100 Å. The emission lines (Hβ and [O III] λλ 4959, 5007) have a simple profile, with broad wings; their FWHM is 350 km s^{-1}. The radial velocity of the peak of these lines is V ~ 3,000 km s^{-1} (Véron 1981, *Astronomy and Astrophysics* **100,** 12).

More recently, on 23 March 1982, we observed again this nucleus with the 3.6 m telescope, in the red. The dispersion was 60 Å mm^{-1}, the aperture 4 × 4 arcsec. On this spectrum, all lines are double with a separation of about 10 Å; the radial velocity of these two components is 2,520 and 3,000 km s^{-1} respectively (Fig. 2).

This seems to indicate that the gas in the nucleus has a radial velocity of 3,000 km s^{-1}, larger by 200 km s^{-1} than the systemic

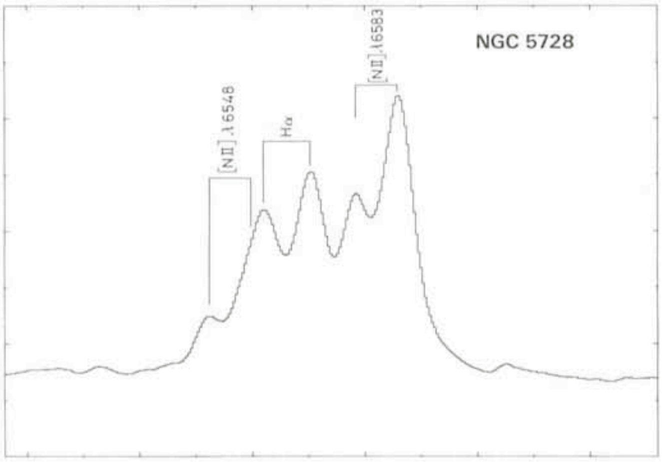

Fig. 2: *Spectrum of the nucleus of NGC 5728 obtained with the Image Dissector Scanner and the Boller and Chivens spectrograph attached to the 3.6 m ESO telescope. The aperture was 4 × 4 arcsec, the resolution about 4 Å. The double structure of the emission lines is clearly seen.*

velocity. The second, low velocity component, which is seen with a 4 × 4 arcsec aperture, but not with a 24 arcsec aperture, probably originates in the part of the ring which is close to the nucleus. A remarkable fact is that, in both components, [N II] λ 6584 > Hα, indicating that the material in the ring has the ionization characteristics of Seyfert nuclei rather than being ionized by hot stars.

We have obtained two 10-minute exposures of the nucleus of NGC 5728 with the ESO CCD attached to the Cassegrain focus of the Danish 1.5 m telescope at La Silla; one was through a r filter (λ_o = 6580 Å, FWHM ~ 900 Å) containing the strong emission lines of Hα, [N II] and [S II]; the second through an i filter (λ_o = 8190 Å, FWHM ~ 1880 Å) filter which avoids all emission lines of any significant strength. Fig. 3 is a subtraction of these two pictures (r – i) showing the emission nebulosity; this picture is similar two those of Rubin and Sandage and Brucato, although it shows more details. This nebulosity has sharp outer edges, but material is seen everywhere inside it, suggesting that it is an envelope rather than a ring.

Making use of the measurement of the velocity field by Rubin, we may conclude that it is an expanding asymmetrical envelope. It may even be that there is no gas in the nucleus and that the gas seen in the direction of the nucleus in fact comes from the far side of the shell.

A detailed study of the dynamics of this envelope of gas would certainly be of interest and could shed some light on the ill understood complex profiles of the emission lines in the nucleus of active galaxies (Heckman et al. 1981, *Astrophys. J.* **247,** 403). TAURUS, the Fabry-Perot imaging device of the Imperial College, London (Atherton et al., this issue) seems to be well suited for such a study.

The nuclear nebulosity of NGC 5728 is in some ways qualitatively similar to the Crab Nebula. The Crab Nebula is a somewhat ellipsoidal volume, about 4 pc in diameter (if its distance is 2 kpc), partially filled with emission filaments; this volume is expanding with a velocity at its outer surface of about 1,500 km s^{-1} with respect to the centre. The emission line spectrum has the same main characteristics as the Seyfert 2 galaxies, including NGC 5728; the filaments are most probably radiatively ionized by the non thermal continuum filling the volume of the nebula. The loss of rotational energy by the central pulsar is an adequate supply for the energy requirements of the nebula (~ 2 × 10^{38} erg s^{-1}) (see for instance IAU Symposium No. 46, 1971, "The Crab Nebula"). The NGC 5728

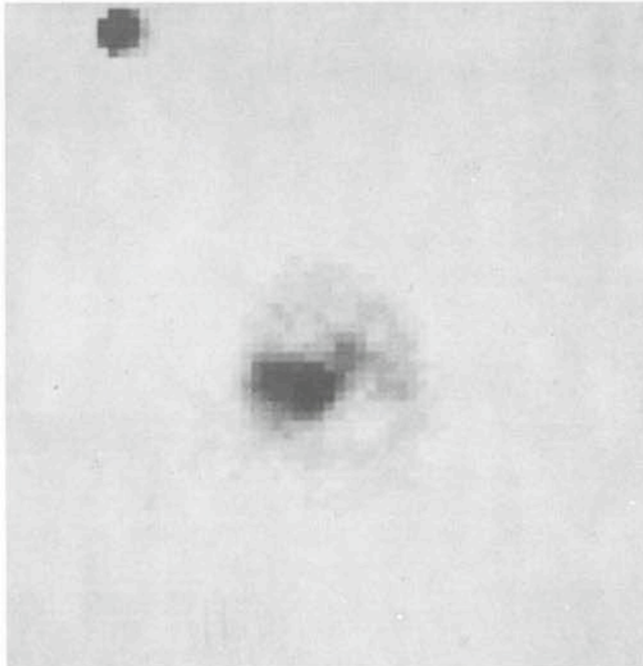

Fig. 3: *Difference of a red and an infrared CCD picture of the nuclear region of NGC 5728, showing the emission nebulosity. Its total NS extent is about 10 arcsec.*

nebulosity is almost 3 orders of magnitude larger than the Crab's one; its expansion velocity is much smaller but it has been decelerated in the gravitational field of the nucleus; the energy is several orders of magnitude larger. The origin of the ultraviolet ionizing continuum and the source of energy are still unknown.

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