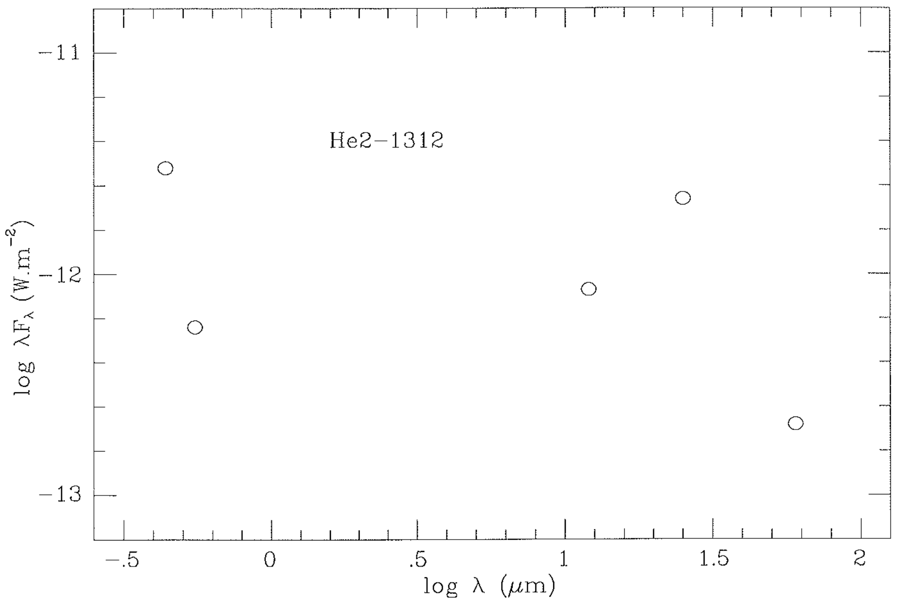

Figure 3: *The energy distribution of He2-1312. Note the strong far IR excess.*

about 0.″75 FWHM. Figure 2 is a recently discovered PN (19+5♀1) which was described as having a FWHM of 3.″5 with 2.″2 field stars (3)! In the NTT image, with a seeing of 0.″8, the object shows intricate structure consisting of two ansae connected by faint emission to a cross shaped central structure. The overall size is about 10″.

Spectroscopy of both sources, again using the NTT/EFOSC2, indicates a complicated velocity structure with velocity differences of up to 560 km s^{-1}. Emission lines typical of PN are present, with strong [O III], Hβ, [N II] lines and Hα. In He2-1312, [O III] is absent in the outer ansae.

The sources are both in the IRAS PSC and the partial energy distribution of He2-1312 is shown in Figure 3, and is typical of this kind of object.

More data are clearly needed, kinematic mapping, near IR photometry, optical photometry and CO measurements are all useful to characterize these sources. On the basis of the evidence collected so far, I will stick my neck out and say that 19+5♀1 and He2-1312 are transition objects.

Considering the preliminary state of the NTT/EFOSC2 at the time of observing (no instrument rotator, no active optics operative, no spectral calibration lamps), the high quality of the obtained data points to a very rosy future for what without a doubt now is the best telescope in the world.

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Narrow-Band Imaging of M87 with the NTT

B. JARVIS, ESO

Already during the current installation phase (August 1989), ESO's New Technology Telescope (NTT) presents an opportunity for useful science due to its large aperture and good tracking (no autoguider yet) on a site of excellent seeing. The greatest limitation is the lack of a field rotator which severely limits the maximum exposure times possible without obtaining unacceptably trailed images. Over most of the observable sky, this maximum exposure time is less than 5 minutes if one is to avoid more than 1 arcsecond of trailing one arcminute from the field centre.

With these points in mind, in August 1989, EFOSC 2, equipped with an RCA CCD (0.″259 pixel^{-1}) was used to image the peculiar galaxy M87 (Virgo A, NGC 4486, and whose nuclear spectrum has similarities to a Seyfert galaxy's nucleus) through narrow-band filters centred at the galaxy's redshifted wavelengths of [O III] (5007 Å), [N I] (5200 Å), H_α (6563 Å), and [S II] (6716 + 6731 Å). Spectra of the core region of M87 taken earlier by the author with EFOSC 1 at the 3.6-m also showed the presence of strong [N II] (6584 Å) lines. Since the FWHM of the H_α filter was about 70 Å, centred at redshifted H_α, the light of [N II] was also passed, making it difficult to separate the relative contributions from these two lines (see note 1).

Figure 1 shows the average of two 5-minute exposures of M87 (lightly smoothed) in the light of H_α + [N II]. The background galaxy has been removed by the subtraction of a near continuum image taken at 6480 Å. Note that due to the late time of the year at which these observations were made, the altitude of M87 was never more than 25°. However, even at this extreme airmass, the seeing was still better than 1″!

The interesting feature in Figure 1 is the extensive fine filamentary structure of H_α + [N II], which, although concentrated towards the centre of M87, extends more than 1′ to the southeast of the nucleus terminating in a bright three knot structure. There is also a bright "jet-like" feature pointing in a NW direction from the core and inclined about 20° to the N of the well-known radio and optical jet.

The [O III] emission, shown in Figure 2, is also very interesting. This figure is the same as Figure 1 except that the [O III] emission is shown as an insert as observed relative to the H_α + [N II] features. The [O III] is extended symmetrically about the broadband photometric centre of M87 and very closely aligned with the H_α + [N II] feature and not the radio structure. This is very curious in view of recent work by Haniff, Wilson and Ward (1988) and also by Wilson and Baldwin (1989). Haniff et al. found that in a sample of 10 galaxies with "linear" radio sources, *all* showed alignment (within measurement errors) of the [O III] emission line region and the radio structures. Wilson and Baldwin's observations of another Seyfert galaxy, 0714-2914 showed the same effect, i.e. alignment of [O III] emission with the radio. Moreover, Whittle et al. showed in a sample of 11 Seyferts that several showed clear evidence for double-lobe

Note 1: Meisenheimer and Hippelein (*Sterne und Weltraum*, May, 1989, p. 292) report that I ([N II])/I (H_α) ≃ 2.

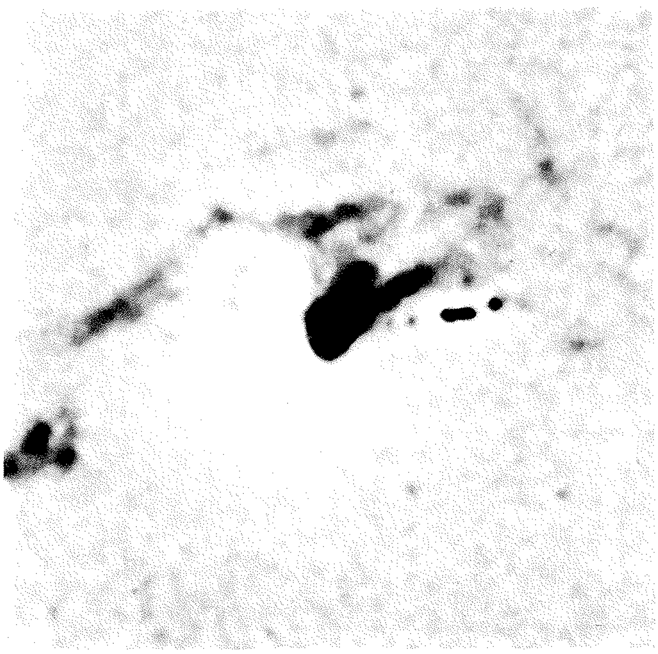

Figure 1.

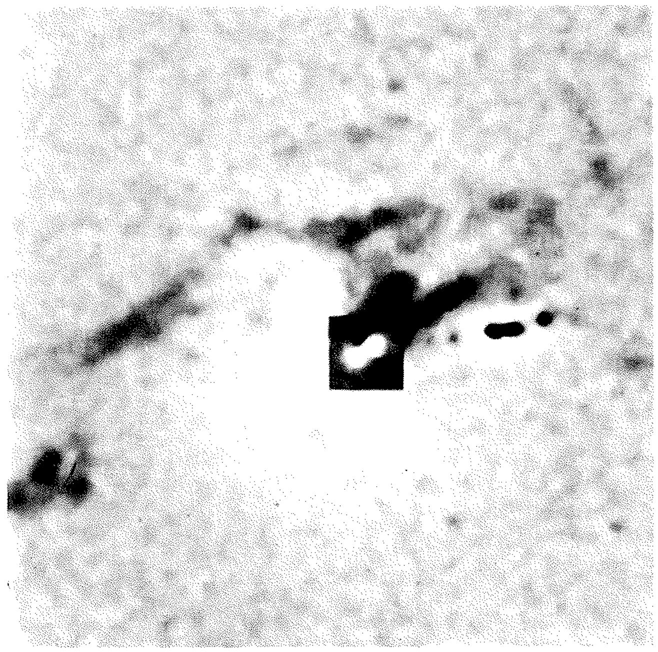

Figure 2.

substructure in the [O III] emission. This is also clearly seen in the case of M87 (see Fig. 2) except that the circumnuclear [O III] is aligned with the H_α + [N II] jet and not the well-known radio jet! How and if these features are related is currently unclear but may be associated with shock excitation and acceleration of the emission line region clouds by the radio jets, or, some mechanism for particle beaming of ionizing radiation along the radio ejection axis (see e.g. Wilson et al., 1988).

During the next observing season for M87 by which time the field rotator should be fully functional, it is planned to extend these observations, under much more favourable conditions as well as imaging in the other known emission lines, notably [O I] and H_β. These better signal-to-noise images from longer exposures will hopefully lead to a better understanding of what is really happening at the centre of M87.

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NTT Images of SN 1987A

G. GOUIFFES, E.J. WAMPLER, D. BAADE and L.-F. WANG, ESO

The fine optical quality of the NTT telescope, together with the good dome design and excellent La Silla site permit routine observing in conditions of sub-arcsec seeing. We have used the NTT and an RCA CCD on August 27, 1989 UT to obtain new direct images of SN 1987A. These images have a sampling of 0.26 arcsec per 30 μm CCD pixel and are described below.

Figure 1a–b reproduces two images taken through narrow band interference filters, one centred on [O III] and the other in the neighbouring continuum at λ 5118 Å. Gaussian fits to the star images in the CCD frames showed that the seeing disks are slightly less than 0.5 arsec full width at half maximum (FWHM).

With such good imaging it is possible to explore the circum-supernova environment in detail. It has been known for some time that the supernova is surrounded by a small nebula that was initially excited by a UV flash which accompanied the supernova explosion. Evidence for the nebula was first seen in IUE spectra taken several months after the explosion (Wamsteker et al., 1987; Fransson et al., 1989). Later, narrow optical lines from the nebula appeared in spectra obtained in Dec. 1987 (Wampler and Richichi, 1989). Crotts et al. (1989) have given results of images taken in late 1988 and early 1989 with seeing of 0.68–0.84 arcsec FWHM. On April 1 of this year, an ESO image of the nebula around SN 1987A was obtained in seeing conditions of 0.85 arcsec. That ESO data were published in an earlier *Messenger* article (D'Odorico and Baade, 1989).

Despite the fact that the airmass for our observations was nearly two, the seeing conditions for the narrow-band images shown here are better than any reported to date for SN 1987A. In addition to the better seeing, the continuing decline in the brightness of the supernova reduces the contamination of faint, nearby features by scattered supernova light. Thus, these data show the nebulosity near the supernova with unprecedented clarity. Ghost reflections in the equipment are not a problem since field star images are sharp, with no evidence of halos or extraneous images.

It is clear from Figure 1 that there is extended nebulosity in a "C" shaped arc running from 2 arcsec north of the supernova, through the east to about 2 arcsec south of the Supernova. The nebula is well marked in [O III] light and is also faintly seen in the λ 5118 Å continuum exposure. The knotty structure of this nebula was noticed in April 1989 by D'Odorico and Baade (1989) although they could not rule out its being an artefact of the extensive deconvolu-