# LINE OBSERVATIONS OF THE 30-DOR COMPLEX AND N159A5 WITH THE MPE IMAGING NIR SPECTROMETER FAST

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ABSTRACT. Images with subarcsec spatial resolution in the light of near-infrared atomic (Brγ) and molecular hydrogen $H_2$ (S(1) v=1-0) emission lines were obtained for some extended, pointlike objects in the Large Magellanic Cloud (LMC) for the first time. We used the Max-Planck-Institut für extraterrestrische Physik (MPE) near-infrared array spectrometer FAST (image scale 0.8"/pix, spectral resolving power 950) at the ESO/MPI 2.2m telescope, La Silla. We present some results on the 30-Dor complex and N159A5.

## 1. 30 Doradus

The 30-Dor complex around R136 was mosaiced in the light of the Brγ line (2.17μm) from 27 single images spaced by about 30" covering an area of about 3'x3'. The Brγ emission follows roughly the Hα emission, but differences are obvious and can be interpreted in terms of a spatial variation in extinction. Extended emission of molecular hydrogen $H_2$ was discovered for the first time in the LMC about 70" north of R136 with a peak flux of $5 \cdot 10^{-18}$ W/m$^2$arcsec$^2$.

Strong emission of molecular H (lower flux limit $1 \cdot 10^{-16}$W/m$^2$) was detected at the position of a star-like object 45" NE of R136 which is so far classified as an M supergiant. The continuum image taken close to 2.17 μm shows a circular source of ~ 4" diameter (seeing was below 1"). The Brγ emission (lower flux limit $1.7 \cdot 10^{-16}$ W/m$^2$) is also somewhat circular with a diameter in the same range, but indicates high velocity in or out bipolar flow. Pending conclusive interpretation of this object the data that an extended surrounding structure exists.

## 2. N159A5

N159A5 was investigated *in detail* for the first time by Heydar-Malayeri & Testor (1982). On their Hα, Hβ, [OIII] plates they discovered a 4" diameter double-peaked nonstellar condensation elongated ~ 80°E of N. Israel & Koorneef (1988) reported strong Brγ and weak $H_2$(S(1) v=1-0) emission in a 7.5" - 10" aperture. Our near-IR continuum image N159A5 (Fig. 1a) reveals a more complex nucleus and an extended halo of fuzzy structure with ~ 6" diameter. The nucleus, (at least double), elongates (NE-SW), its P.A. corresponding to that of the low-level elongated structure with 50" diameter in a K-band image (Jones *et al.* 1986). The non-circular shape of the source in their image can be reproduced by convolving our image (note the star to the SE) to their 10" spatial



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resolution. The Brγ emission line image (Fig. 1b) with a diameter of ~ 8" looks almost circular and is centred on the SW continuum peak. The $H_2$ emission (Fig. 1c) looks very different and reveals a ring-like structure centred about 2" east of Brγ. This distance and direction is similar to the double peak found by Heydari-Malayeri & Testor (1982). The deconvolution of Fig. 1a using the nearby star as a point spread reference function suggests the existence of a multiple component nucleus, a picture also supported by the different geometrical centres of the Brγ and $H_2$ images.

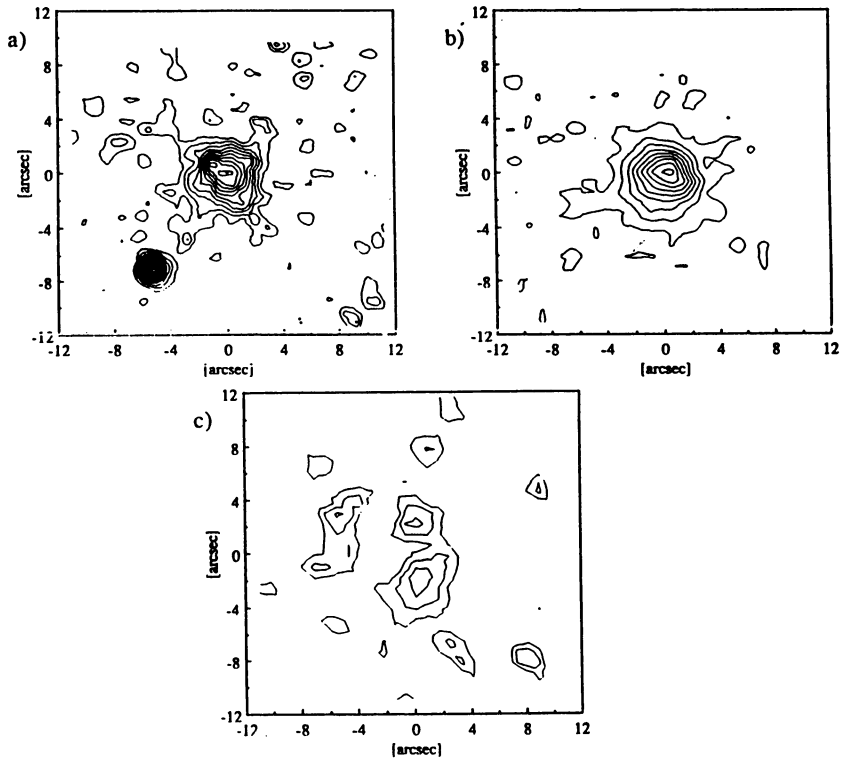


**Figure 1.** N159A5. a) Continuum image taken with the circular variable filter (R=50) close to 2.12μm at 400 sec total integration time. The contour levels are spaced by $6.7 \cdot 10^{-17}$W/m$^2$arcsec$^2$μm with the lowest contour at this level. The total flux at 2.1 μm is $1.4 \cdot 10^{-14}$W/m$^2$μm. b) Brγ emission at a total integration time of 1200 sec at the position of the line. The contour levels are spaced by $2.5 \cdot 10^{-18}$ W/m$^2$arcsec$^2$, the lowest contour is $1 \cdot 10^{-18}$W/m$^2$ arcsec$^2$. The total Brγ flux yields $3.3 \cdot 10^{-16}$ W/m$^2$. c) The $H_2$(S(1) ν=1-0) emission at a total integration time of 2200 sec on the line position. The contour levels correspond to 9, 13, $18 \cdot 10^{-19}$W/m$^2$arcsec$^2$. The total $H_2$ emission is $5.2 \cdot 10^{-17}$W/m$^2$ in a circular aperture of 13 arcsec diameter. The total fluxes in all three images agree well with Israel & Koornneef (1988).

## References

Heydari-Malayeri, M., Testor, G. (1982), *Astron. Astrophys.* **111**, 116.
Israel, F.P., Koornneef, J. (1988), *Astron. Astrophys.* **190**, 21.
Jones, T.J., Hyland, A.R., Straw, S. *et al.* (1986), *Mon. Not. R. astr. Soc.* **219**, 603.