

LSS4005 AND NaSt1, TWO GALACTIC Ofpe/WN or B[e] OBJECTS*

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Optical and IR spectroscopy of two galactic objects previously considered to be extreme late WN stars (van der Hucht et al., 1984), LSS4005 (formerly tentatively listed as WR85a) and NaSt1 (WR122), show both objects not to be WR stars, but Ofpe/WN- or B[e]-like objects.

A CASPEC spectrum of LSS4005 obtained in Spring 1985 displays numerous narrow ($\Delta\lambda \approx 20 \text{ km.s}^{-1}$) emission lines of NII, [NII], NIII, FeII, [FeII], FeIII, [FeIII] and strong emission of HeI and HeII. Except for SiIV λ 4089, no absorption lines are present in the 3800–6500Å wavelength range and, in particular, no P Cygni absorption components. This indicates that LSS4005 does not have the dense stellar wind characteristics of WR stars. A medium-resolution CCD spectrum of NaSt1 shows strong similarities with LSS4005. IR spectra of NaSt1 in the J, H and K bands show HeI, HeII and NII emission lines.

Walraven photometry of both stars shows Balmer jumps indicative of effective temperatures of the order of 12000 K. Such temperatures are rather low for objects showing HeII emission lines.

Walraven and ground-based IR photometry betray both objects to be light variables ($\Delta m \approx 0.2 \text{ mag}$ for LSS4005, $\Delta m \approx 0.6 \text{ mag}$ for NaSt1), and to have heated ($T \approx 900 \text{ K}$) circumstellar dust envelopes, showing wider ranges of temperature than those associated with WR stars (Williams et al., 1987).

The low-ionization emission lines and the circumstellar dust shells point to a B[e] classification, but the HeII emission is indicative of an O[e] class, while the NIII emission lines argue for a Ofpe/WN status. The composite appearance of both LSS4005 and NaSt1 could mean a double shell structure or binarity.

In the literature the objects have no equals in the Galaxy nor in the LMC. More observations are needed to understand these enigmatic objects.

References:

van der Hucht, K.A., Williams, P.M., Thé, P.S.: 1984, in: A. Maeder & A. Renzini (eds.), *Observational Tests of the Stellar Evolution Theory*, Proc. IAU Symp. 105 (Dordrecht: Reidel), p. 273

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*) Based on observations collected at the European Southern Observatory (La Silla, Chile), the United Kingdom Infrared Telescope (Mauna Kea, Hawaii, USA) and the Anglo-Australian Observatory (Epping, NSW, Australia)



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