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A NEW INSIGHT TO THE GALACTIC O VZ STARS

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Based on a large sample of spectra from the Galactic O-Star Spectroscopic Survey (GOSSS, Maíz Apellániz et al. 2011) a systematic study of the Galactic O dwarfs belonging to the luminosity subclass Vz is being performed. Preliminary results suggest a redefinition of the quantitative criterion to assign the "z" qualifier to the spectra.

As a high-mass star probably begins to burn H while still accreting material, the Zero-Age Main-Sequence (ZAMS) phase of the O-type star is very difficult to observe in the UV-optical range. However numerous O stars appear to be very young. The luminosity class Vz was introduced to describe those O-dwarf spectra that show the He II 4686 absorption stronger than any other He line (e.g. Walborn & Blades 1997). This characteristic is hypothesized to represent an "inverse" behaviour of the Of effect, which is due to the emission filling of the line and correlates with luminosity. Thus, O Vz objects are expected to be less luminous and less evolved, i.e., nearer to the ZAMS. Quantitative studies place some objects on and others apart from the ZAMS. Based on the VFTS data (Evans et al. 2011), Sabín-Sanjulián et al. (SS13) analyzed a sample of O Vz stars in 30 Doradus, finding that, as a class, they are closer to the ZAMS, although there is a considerable number of cases with ages of 2-4 Myr. They also proposed that the large number of O Vz stars in 30 Dor is related to the low metallicity of the LMC.

Our sample of study consists of 131 O dwarfs selected from the GOSSS database. SB2 and peculiar spectra have been discarded. 59 of these objects ($\sim$ 45%) are classified as Vz. They show a peculiar spectral-type distribution, with an "excess" of objects at intermediate types, very different from that shown by the "normal" dwarfs (see Fig. 1, top). Both distributions are however very similar to those found in 30 Dor by SS13. As rotational broadening and other effects influence the He I and He II lines differently, they may also affect the standard spectral classification based on line-intensity ratios. For this reason, we investigate the behaviour of the equivalent widths (EW) of the lines relevant to the Vz phenomenon, through two parallel developments: using FASTWIND model (Santolaya-Rey et al. 1997; Puls et al. 2005) predictions generated with the IACOB-GBAT tool (Simón-Díaz et al. 2011); and measuring these EWs in the GOSSS sample. As a first result, we propose to redefine the quantitative criterion to assign the "z" qualifier to an O V spectrum. In particular, if we adopt EW(He II 4686)/EW(He II 4542) $>$ 1.1, for types earlier than or equal to O7, and EW(He II 4686)/EW(He II 4471) $>$ 1.1, for types later than O7, previously marginal cases are avoided, and the number of O Vz objects is reduced to 38 ($\sim$ 29%). Moreover, astrophysically more meaningful distributions are obtained (see Fig. 1, bottom).

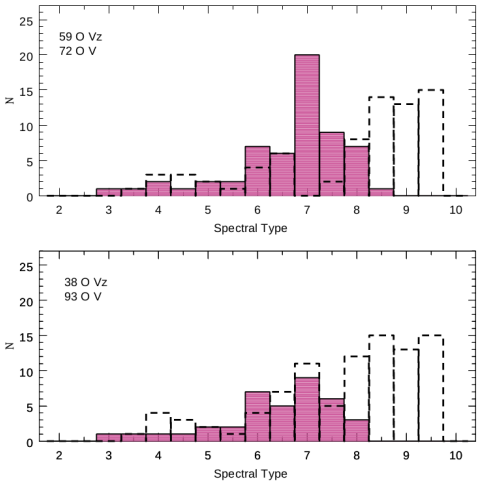

Fig. 1. Top: Spectral-type distribution for the O Vz (filled) and O V (open) in GOSSS. Bottom: the same, considering classification based on the EW ratios.

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