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VFTS 682: a surprisingly isolated twin of R136′s WN5h core stars

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Abstract

Context. The existence and quantification of an upper stellar mass cutoff of massive stars ($\sim$150 $M_\odot$; Figer 2005, Nature, 434, 192) have been questioned by recent investigations based on optical and near infrared (NIR) spectra of the most massive members of R136a within 30 Dor in the LMC (Crowther et al. 2010, MNRAS, 408, 731). Crowther et al. concluded that the four WN5h stars in the core of R136 were consistent with having initial masses in the range of $165 - 300$ $M_\odot$. Being placed at the dense cores of young clusters, deep analyses of the most massive members can be severely affected by crowding problems. *Aim.* Interestingly, a new, very massive ($\sim$150 $M_\odot$) and isolated WN5h star (VFTS682) has been detected within the VLT-Flames Tarantula Survey (Evans et al. 2011, A&A, 530,108). The star is located within an active star forming region (Johansson et al. 1998, A&A, 331, 857) 30 pc NE from R136 and is moderately obscured by interstellar dust. Being in isolation, the above mentioned crowding problems basically disappear. Further, since the distance to the LMC is well known, VFTS 682 may thus be a key object to confirm the existence of super-massive stars with initial masses above 150 $M_\odot$. Here, we present the preliminary results derived from the analysis of the UVB, VIS and NIR XSHOOTER spectra of VFTS 682 to address the nature and stellar properties of the object, its origin, and birthplace. *Results.* VFTS 682 is basically twin, in terms of stellar parameters, to one of the most massive members of the nearly cluster R136 (R136a3).The resemblance between both objects is striking as inferred from their optical and NIR normalized spectra as well as from their de-redded spectral energy distributions .Thus, we may wonder whether VFTS682 formed "in situ"or was dynamically ejected from the core of R136. The discovery of this massive isolated star represents a unique oportunity to study the dynamical ejection scenario and/or massive star formation theory and to adress the existence upper stellar mass cutoff.