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LATE HELIUM FLASH IN V605 AQL: PNE EVOLUTION AND SHELL FORMATION IN QUICK MOTION

S. Kimeswenger[1]

I present recent observations of the born-again core V605 Aql of the old planetary nebula Abell 58.

The "born-again" PNe V605 Aql (A 58) and V4344 Sgr (Sakurai) give us the rare chance to follow shell formation and the building of winds in "real time". The high carbon abundance, and thus the high dust formation rate, enhances the mechanisms. Thus, the timescales are shortened. My data presented here give an overview of the results of new observations of V605 Aql and its old planetary nebula (PN) A 58 obtained at the ESO NTT (2002 August).

Remarkable changes of the spectrum relative to that obtained by Guerrero & Manchado (1996) in 1994 June were found. The [S II] $\lambda\lambda\,6716 + 6731$ and [O I] $\lambda\lambda\,6300 + 6364$ lines increased compared to the [N II] lines. He I $\lambda\,5875$ increased by 50% relative to N II $\lambda\,5754$. In general, all lines got stronger.

The finding of Guerrero & Manchado (1996) of an Hα line as strong as 30% of [N II] $\lambda\,6548$ is not supported by my observations. It may originate from an inaccurate subtraction of the line from the old nebula. The absence of Hα was found also by Pollacco et al. (1992). I also obtained Hβ images and the corresponding offband, obtained to remove stellar components and continuum radiation. Those images show the same flux of V605 AQL in the hydrogen line and of the adjacent continuum. The flux thus stems from the continuum. I conclude that this object is much more hydrogen under-abundant than given in Guerrero & Manchado (1996). The obtained continuum flux also does not match the prediction in Koller & Kimeswenger (2001).

As Hinkle et al. (2001) (using [O III] and [N II] *HST* images) pointed out already, V605 Aql seems to consist of a dense inner core and a second clump separated from this region by about $0''.5$. This is much smaller than the values given by Guerrero & Manchado (1996), deconvolving ground based images. Thus, a completely closed special geometry can give only first estimates. The absence of strong blue continuum straylight from clumps illuminated by a central source hidden from the line of sight excludes the possibility of an open geometry. On the other hand, the strong [O III] $\lambda\,4636$ and [Ne III] $\lambda\,3869$ emission lines cannot originate from the inner edge of an optically thick dust shell. Those strong lines were not detected in the 1994 spectra of Guerrero & Manchado (1996). This is again an indication of rapid changes in the shell.

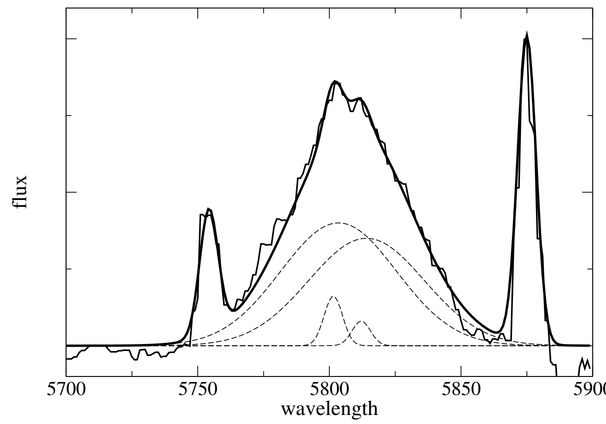

Fig. 1. The carbon line C IV $\lambda\lambda\,5801.5 + 5812.1$ (excitation 39eV) is best fitted by two components. The vast majority of the radiation originates from a wide component with a FWHM of 2600 km s^{-1} (FWZI of 6100 km s^{-1}). Both lines also have a narrow component, best fitted by the same width as the neighboring lines of He I and N II. While the wide main component of each line fits to the systemic velocity of the old PN A 58, the narrow component is blueshifted in the same way as the other lines of V605 Aql. This difference in blueshift implies a model with an optically thick dusty shell covering only a very small outer section (Koller & Kimeswenger 2001) and a wide optically thin hot bubble. The complete absence of other wind lines like O IV $\lambda\,5291$ as seen in the older twin A 30 leads to the conclusion that the core of V605 Aql has been eroded down to the pure carbon core of the star during the 1919 event.

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[1] Institut für Astrophysik der Leopold-Franzens-Universität Innsbruck, Technikerstr. 25, A-6020 Innsbruck, Austria (Stefan.Kimeswenger@uibk.ac.at).