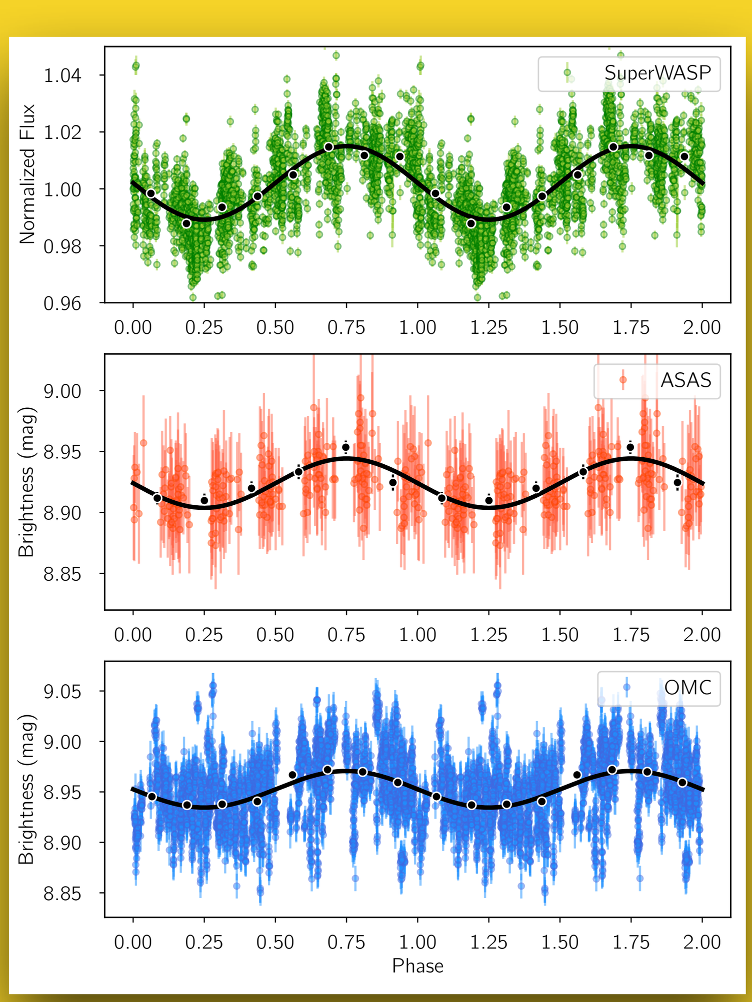
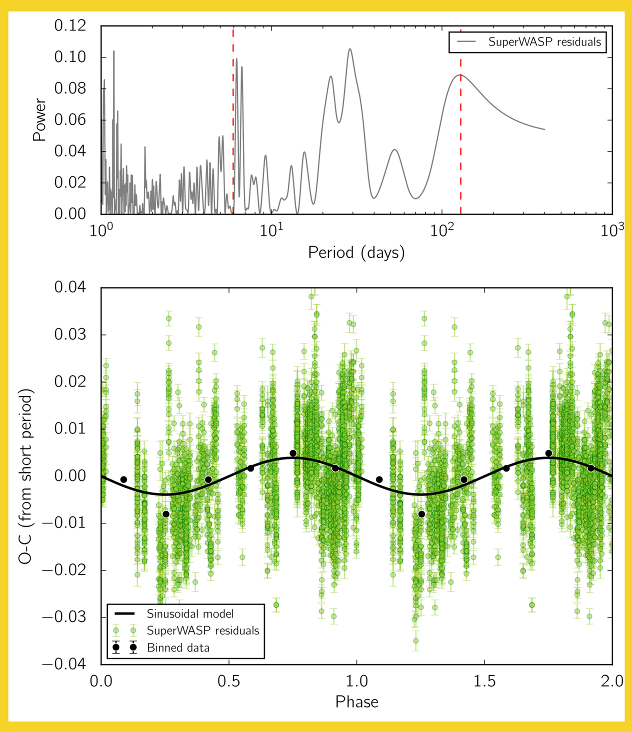
- WHAT LIGHT CURVES SAY -



On the left figure we show the phased light curves from SuperWASP (green), ASAS (red) and OMC (blue) datasets folded with a ~5.9 days period. This period is clearly identified in the SuperWASP and ASAS periodograms, and is assumed to be the rotational period of the G-type star. The analysis of the three light curves provides consistent results, as shown in the table below:

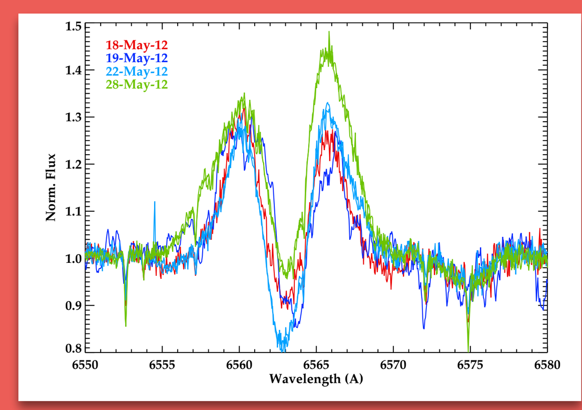
Parameter	SuperWASP	ASAS	OMC
Period (days)	5.9508±0.0006	5.9670±0.0014	5.9702±0.0002
ϕ_0 (days)	2452652.01±0.16	2452652.30±0.21	2452651.95±0.04
Amp. (mmag)	12.93±0.52	20.2±2.9	18.12±0.41

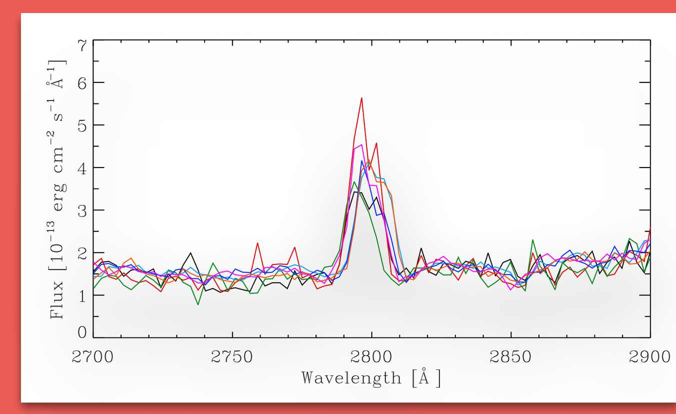
If we remove the 5.9d signal from the SuperWASP dataset (the most precise one), we find in the periodogram of these residuals other (non-significant) peaks (right hand figure). We want to highlight the peak at ~129 days, since it also appears in the RV analysis (see **blue** section). The phase-folded light curve with the 129 days period is shown on the right.



- PUZZLING Hα VARIATIONS -

The G-type star of LoTr5 shows rapid variations of the Hα double-peaked profile as seen by CAFE in the bottom left panel (also previously reported by Jasniewicz et al. 1994). Several mechanisms could explain the origin of this complex profile: the chromospheric activity of the G-star, an accretion disk and/or the existence of stellar winds.





It is clear that the G-type component has a high chromospheric activity, as confirmed by other active-chromosphere indicators, like the MgII h&k lines, in emission in the IUE spectra (right panel). However, the FWHM of the Hα line is too large (~450 km/s) to be due only to chromospheric activity and we did not find correlation of the Hα profile with the rotation period of the G-type star. On the other hand, based on the calculation of the Roche lobe radius, we discard the presence of an accretion disk formed via Roche lobe overflow. Finally, stellar winds seem not to be relevant due to the absence of P-cygni profiles in the spectra.

Planetary nebula LoTr5: hints of a possible third companion in a long-period binary central star

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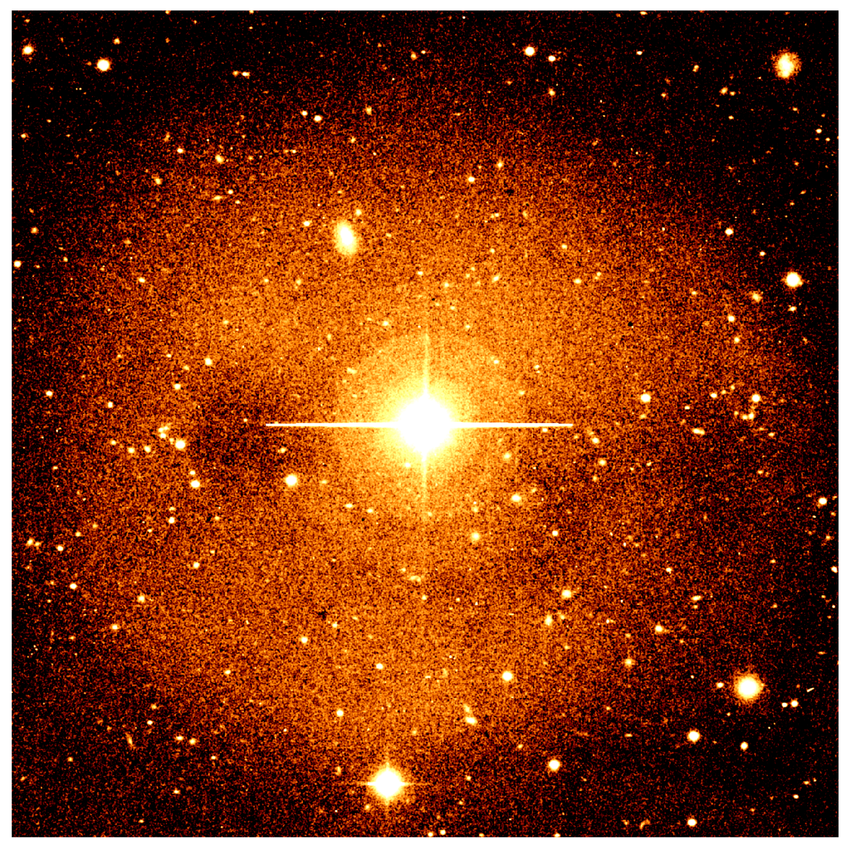
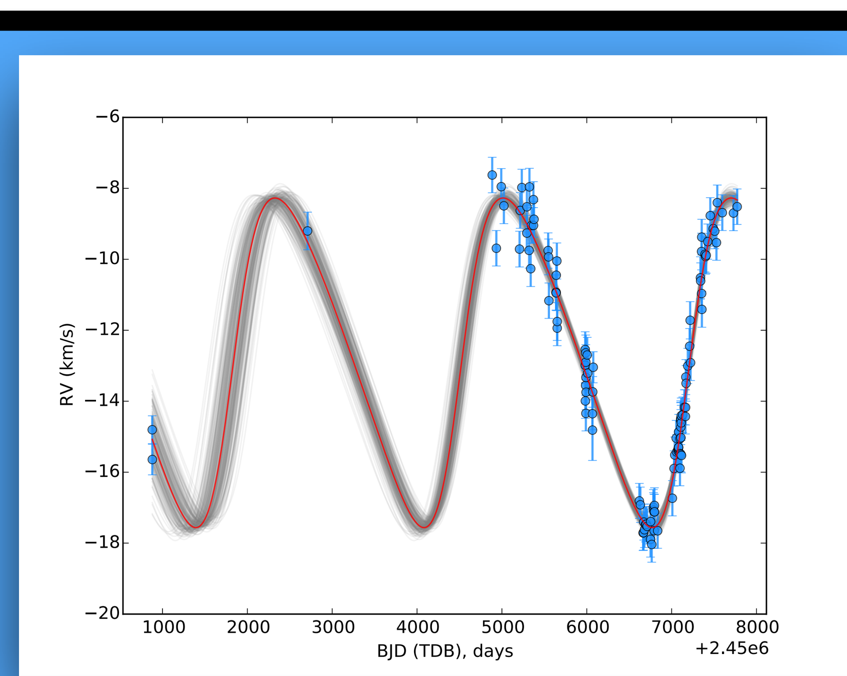


The central star of planetary nebula LoTr5 has recently become one of the longest orbital period binary central stars with the discovery of a companion at about 2700 days. The system, consisting on a rapidly rotating G-type star and a hot star, which is responsible for the ionization of the nebula. We present new radial velocity observations of the central star which show hints of a possible third component in the system at 129 days to the G star. This is also complemented with the analysis of archival light curves from SuperWASP, ASAS and OMC. We also present a detailed analysis of the complex Hα double-peaked profile, which varies with very short time scales, and whose origin is still unknown. We do not find a correlation with the rotation period and that the presence of an accretion disk via Roche lobe overflow is unlikely.

- RADIAL VELOCITY ANALYSIS -

On the right hand panel we show the radial velocity (RV) data covering 20 years of observations done with ELODIE, HERMES and CAFE instruments. Our data covering two cycles of the binary orbit confirm the orbital solution of Jones et al. (2017), an eccentric orbit with a period of ~7.4 years.



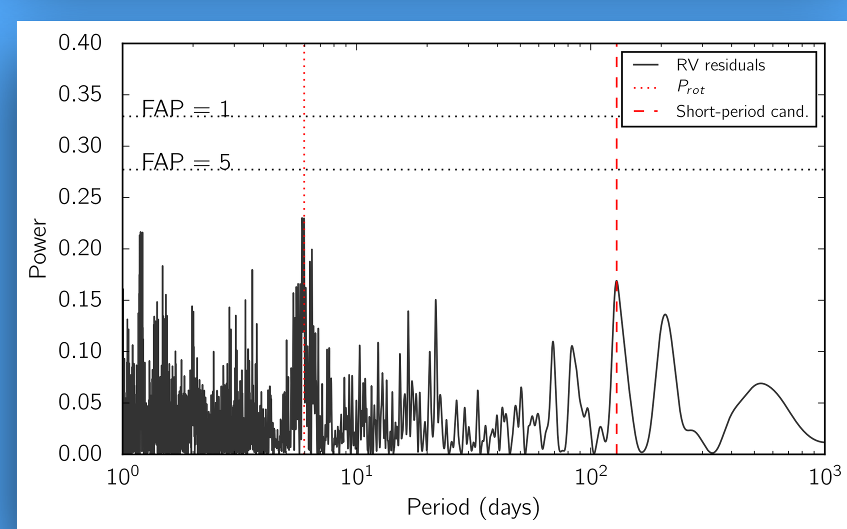
A third guest in the system?

1. The 5.9 days period

We show on the right the Lomb-Scargle periodogram of the RV residuals, where we removed the long period companion. For this analysis, we have only used the data from Jones et al. (2017) with JD ≥ 2456700, since they have the lower dispersion. The strongest peak corresponds to P~5.95 days, also identified in the light curves. This periodicity could be either explained as stellar rotation-induced activity signal or could be due to a third low-mass guest in the system. However, the light curve modulations are too large to be due to such an object, allowing us to discard this configuration.

2. The 129 days period

Interestingly, we find another peak at ~129 days, i.e., at the same periodicity as seen in the photometric data (see **yellow** section). We explored circular and eccentric orbits possibilities (see Table on the right). Despite being a marginal detection, the data variations could be explained by a low-mass object (in the planetary or brown dwarf domain) with a high eccentric orbit. The third guest would be as close to the primary giant star as 0.12AU during the periastron passage and this could thus be the source of the variability seen in the SuperWASP light curve with the same periodicity.



Parameter	Long period	5.95 d	~129d (circ)	~129d (ecc)
V_{sys} (km/s)	-8.53 ± 0.37	-	-0.009 ± 0.090	-0.020 ± 0.080
P (days)	2689 ± 52	5.9667 ± 0.0005	128.9 ± 6.0	129.8 ± 1.6
T_0 (days)	2455944 ± 25	-	-	2454976 ± 8
K (km/s)	4.630 ± 0.084	0.609 ± 0.028	0.089 ± 0.100	0.279 ± 0.080
e	0.249 ± 0.018	-	0.0	0.6 ± 0.2
w (º)	259.9 ± 4.8	-	-	-26 ± 40

References: **[1]**. *Jones et al. (2017), A&A, 600, 9;* **[2]**. *Jasniewicz et al. (1994), A&A, 286, 211*

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