

UCAC2 46706450: A rapidly rotating K-type subgiant with an extremely hot white dwarf companion



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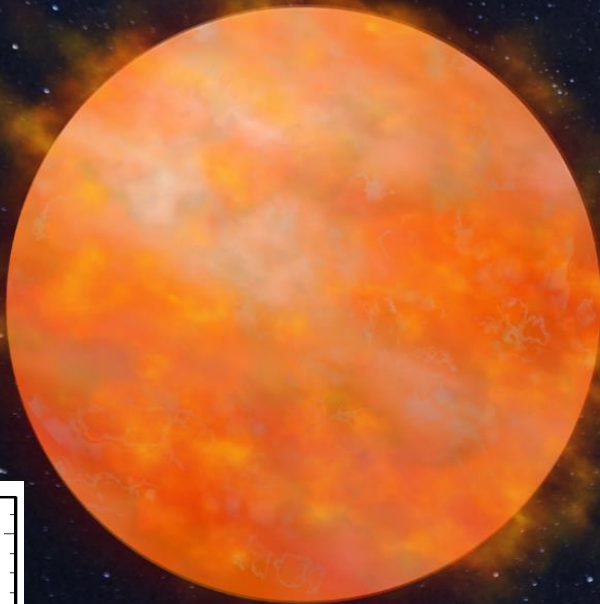
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K-type sub-giant

- Observed within LAMOST, APOGEE, Gaia
 - $T_{\text{eff}} = 4950 \pm 250 \text{ K}$
 - $\log g = 3.04 \pm 0.25$
 - $M/M_{\odot} = 0.8 - 2.4$
- Chromospherically active
- **Rapidly rotating**
- $v \sin i = 81 \text{ km/s}$
- $P = 1.98 \text{ d} \Rightarrow v_{\text{rot}} = 151 \text{ km/s}$

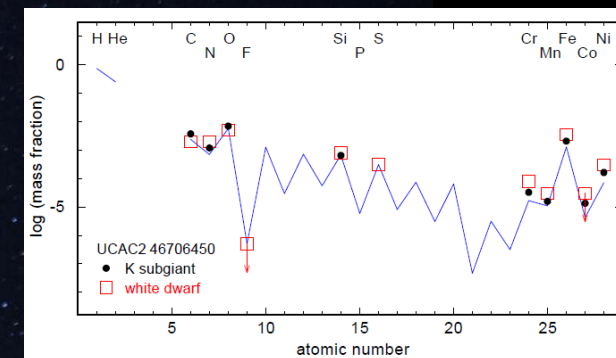
⇒ **One of the most rapidly rotating (sub-) giants known!**

From equal and constant radial velocities of the white dwarf and the K subgiant as well as from a fit to the spectral energy distribution, we infer that they form a physical, wide (though unresolved) binary system.

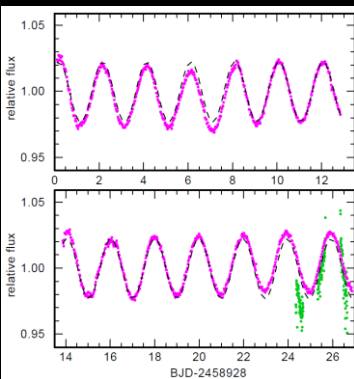


Non-LTE spectral analysis of the HST spectrum reveals the UV source is one of the hottest white dwarfs known with:

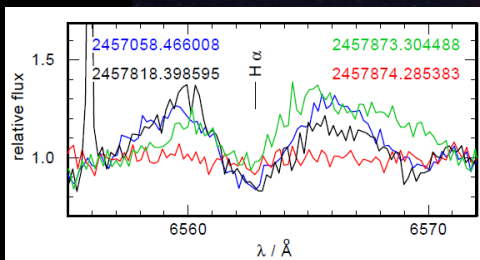
- $T_{\text{eff}} = 105,000 \pm 5000 \text{ K}$
- $\log g = 7.4 \pm 0.5$
- Likely H-rich
- $M/M_{\odot} = 0.54^{+0.02}_{-0.02}$



Element abundances measured in the white dwarf (red squares) and in the K subgiant (black dots) are similar and show iron-group elements with slightly oversolar (up to 0.6 dex) abundance, meaning that atomic diffusion in the white dwarf atmosphere is not yet active due to a residual, weak radiation-driven wind. The blue line indicates solar abundances.



TESS (magenta) and Tübingen 80 cm telescope V-band (green) light curves indicating a rotational period of 1.98d.



Time-variable H α emission observed in TNT spectra indicate that UCAC2 46706450-A is chromospherically active. The HJD of the observations is provided.

Want to find out more?

- **Read our article** published in A&A: <https://ui.adsabs.harvard.edu/abs/2020A%26A...642A.228W/>
- **Watch a talk** about this system held at the German astronomical society meeting: http://www.astro.physik.uni-potsdam.de/~nreindl/video/NReindl_UCAC2_46706450.mp4
- **Contact me:** nreindl885@gmail.com