

Search for rotational periods of weakly magnetic candidate O Stars

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Mercator telescope, La Palma 7 – 17 October

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Aimed time coverage: **September - October - November 2019** but spectra taken earlier (archival) or later are equally welcome.

Target list

	Spectral Type	V	rotation period	Priority
alpha Cam	O9 Ia	4.3	2 - 13 d, unknown, main goal	1
zeta Ori	O9.7Ib	1.8	~ 6.8 d, to be improved	2
xi Per	O7.5III	4.0	2.04058 d, check star to confirm period	3

Instrumental requirements:

Spectral coverage: Most important lines are **Halpha** and **He II 4686**, but also **Hbeta** will help.

Resolution: about ~20 km/s or better is needed, i.e. around 0.4 - 0.5 Å per 2 pixels.

S/N: We aim at S/N >100 per pixel. The more the better.

Exposure time: not really limited, given the relatively long rotation period.

Wavelength calibration: essential.

Format:

The ideal format is a FITS file with wavelengths against flux (or counts), not normalized, preferably corrected for the barycentric velocity of the Earth's motion.

Specify: telescope, instrument, grating, camera properties, exposure time and UT start.

Telluric line removal for Halpha spectra would be helpful.

Normalization and correction for the radial velocity of the star will be done afterwards.

Analysis:

We will bundle all collected spectra and perform a period search at specific parts of the lines, which probe the inner wind just above the star.

Summary of scientific background:

Magnetism in O stars must be very wide spread, but so far only 7% of them have been found to be magnetic. This must be a lower limit due to sensitivity limits of current spectropolarimeters, even on 4m class telescopes. If a period for alpha Cam can be detected by this campaign with small telescopes, it will prove that alpha Cam is a weakly magnetic star. This would be then for the first time that a strong indirect method would reveal magnetic O stars. This will form the basis for follow-up spectropolarimetry to measure the field.

Publication: a paper with all contributing authors to be submitted to Astronomy and Astrophysics

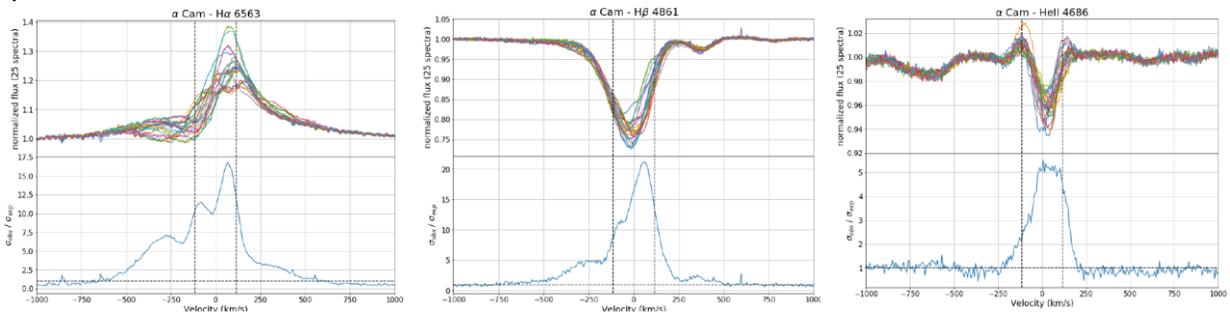
What to expect?

Halpha, Hbeta, He II 4686 spectra collected in past years: hourly variations, but no period determination was possible due to lack of data coverage.

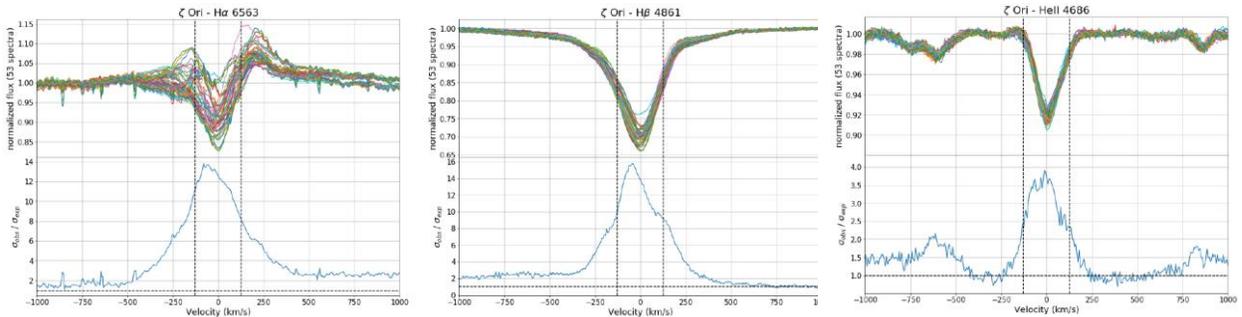
Upper panel: overplot of normalized line profiles in velocity space, with vertical dashed lines indicating the rotational parameter $v \sin i$ in km/s.

Lower panel: significance of the variability, expressed as the ratio of the measured standard deviation to the expected standard deviation as in the neighboring continuum.

alpha Cam:



zeta Ori:



xi Per:

