#### 

## Stellar activity with CARMENES The Chromatic Index

#### David Baroch López

Institut de Ciències de l'Espai (IEEC-CSIC)

February 20th 2019, Granada Present and future science with CARMENES







• The spot breaks the symmetry of the stellar surface, <u>creating spurious RV changes</u>.

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 The induced radial velocity <u>amplitudes depend on the</u> <u>wavelength</u> in which we are observing the star.

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- The induced radial velocity <u>amplitudes depend on the</u> <u>wavelength</u> in which we are observing the star.
- The <u>amplitude decreases</u> toward <u>longer wavelength</u>, due to the lower contrast between spot and phhotosphere.

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This effect can be seen in some active stars with CARMENES, thanks to its wide wavelength range.

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The <u>Chromatic index</u> is defined as the <u>slope</u> of the radial velocity as a function of the logarithm of the wavelength (Zechmeister et al. 2018)

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0.5

Rotation phase

0.6

0.7

0.8

0.9

0.4





0.2

0.3

0.1

400

200

0

-200

-400 400

200

-200

-400

CRX (m/s/order)

RV (m/s)

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## RV vs Chromatic Index



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## RV vs Chromatic Index



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Using StarSim (Herrero et al. 2016) we can model a spotted rotating star to simulate this "8-shapes".



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Amp<sub>top</sub>-Amp<sub>bot</sub>



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#### Fit to observations



#### <u>YZ CMi</u>

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Slope=-3.0 Length= 900 ΔA=-60

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#### Fit to observations



#### <u>YZ CMi</u>

∆T=-150 K Spot Size= 15 deg CB=-500 m/s

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# Thank you for your attention

**Questions?**