STELLA & Amadeus

The case of XX Trianguli

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with the help of

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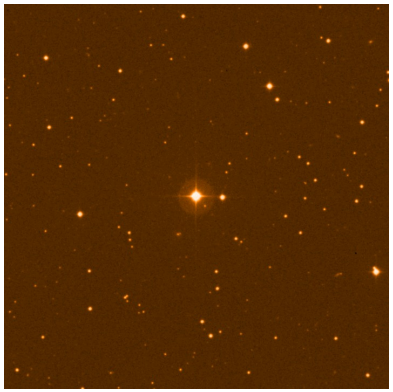
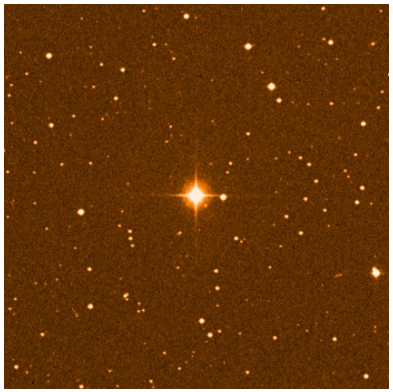
Krisztián Vida

Thomas Granzer Klaus Strassmeier Michael Weber

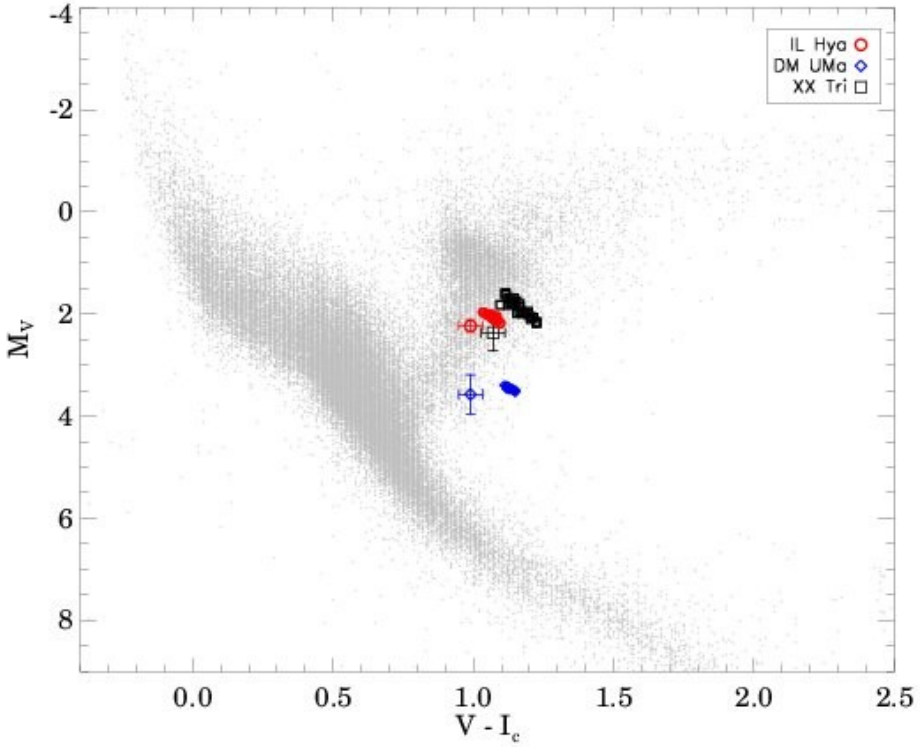
XX Trianguli

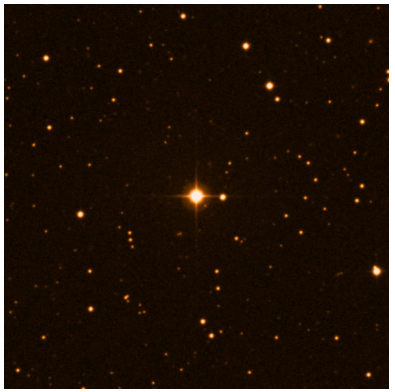


DSS blue

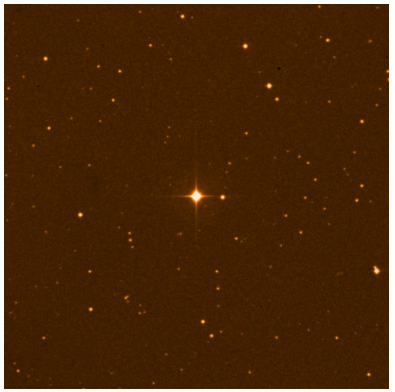


DSS vis.





DSS red

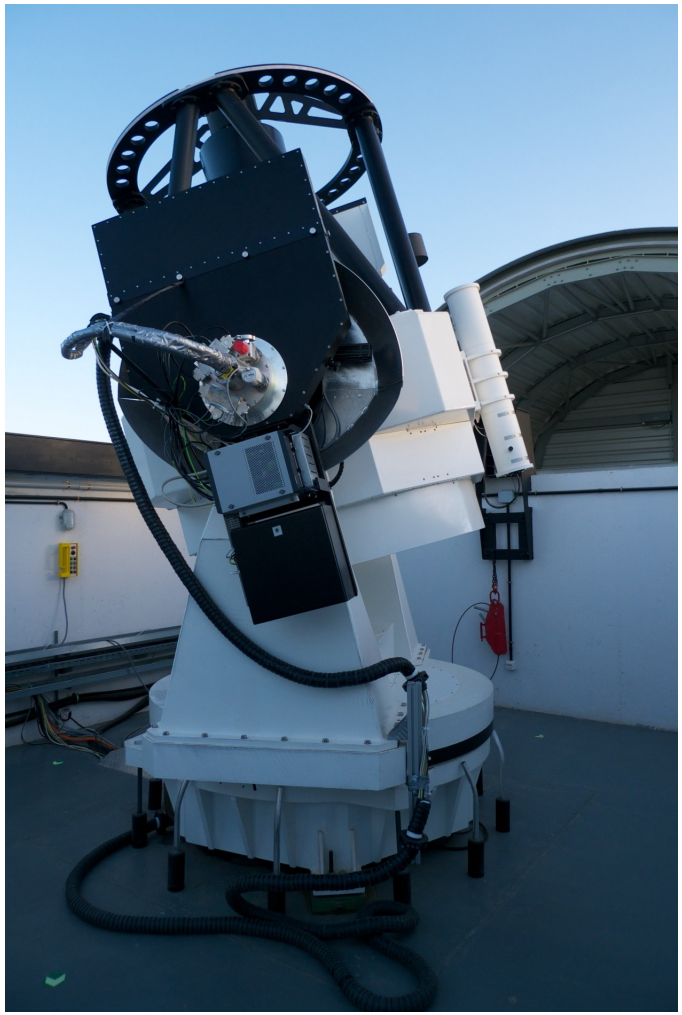


DSS ir.

Place on the HRD among stars within 200 pc
with two other K giant stars, primaries
of close binary systems

First observations of XX Tri

July 18, 2006
10 yr + 82 d



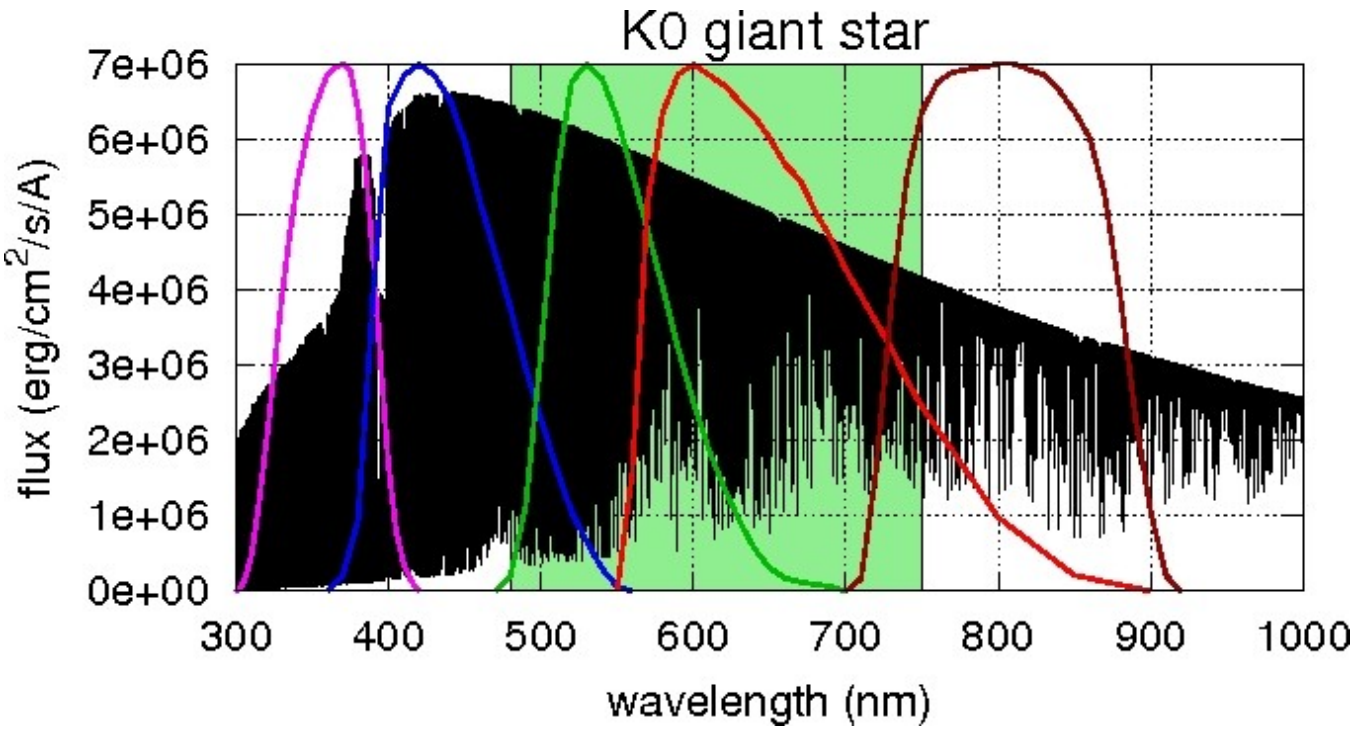
STELLA

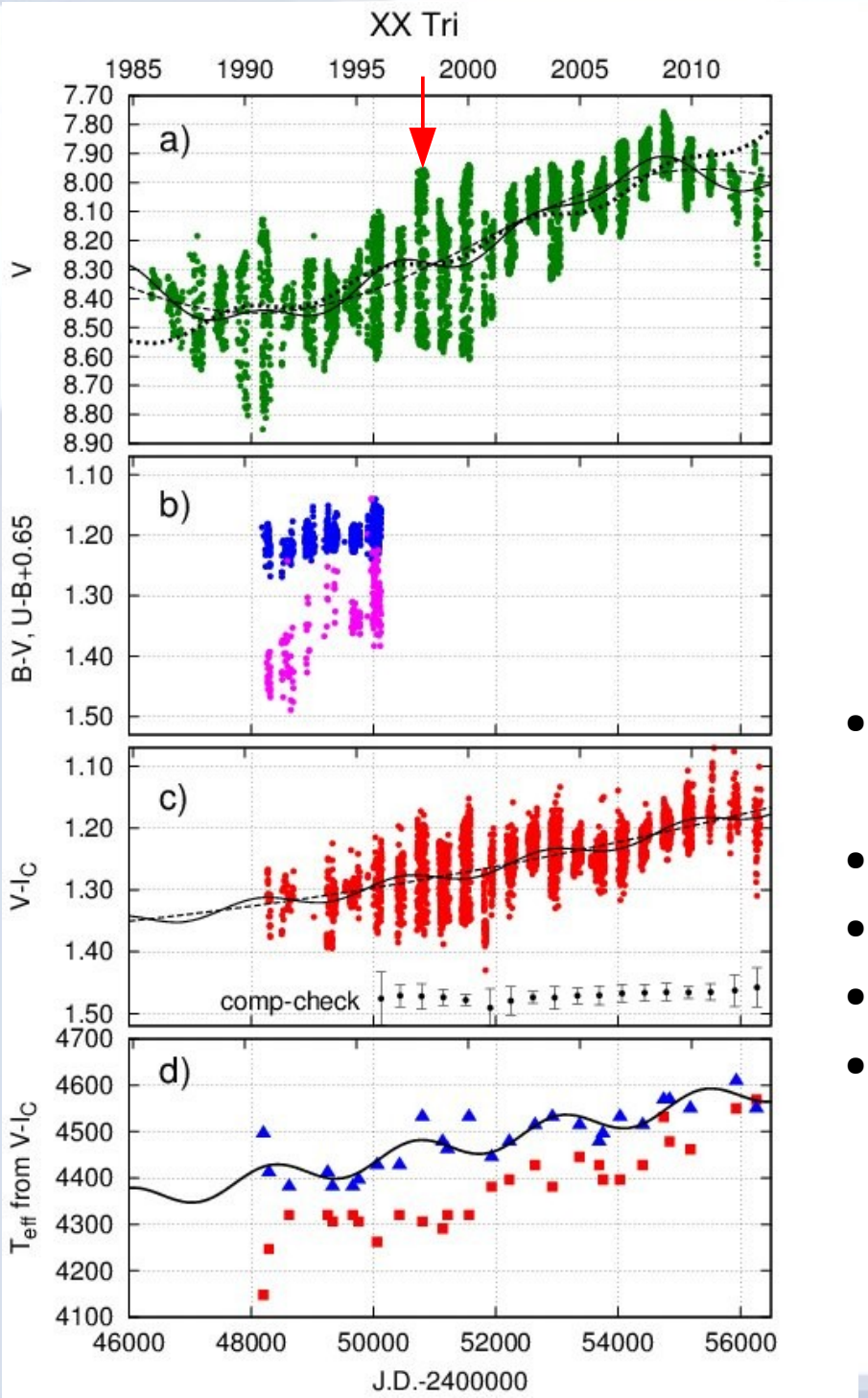
November 7, 1996
February 3, 1996
(at Fairborn): 20 yr + 2 d

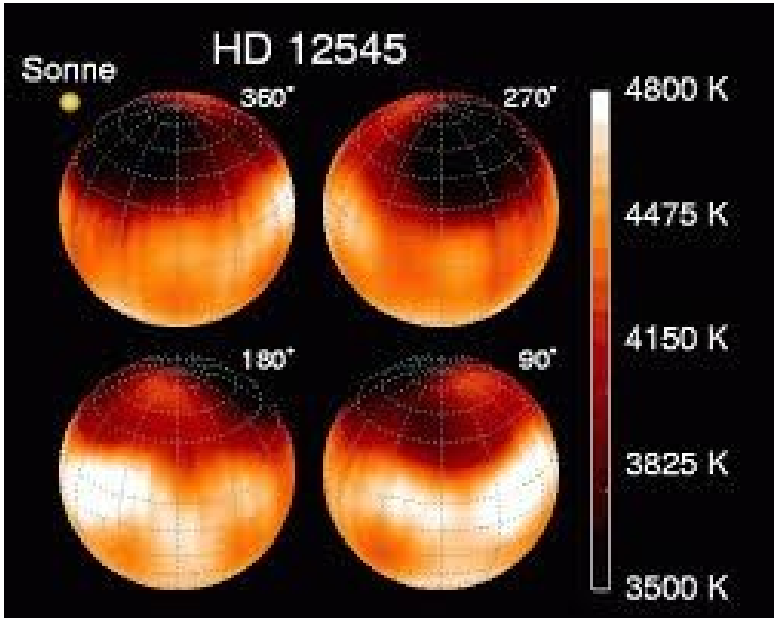
Amadeus

Green background: echelle wavelength range used for temperature determination with PARSES

UBV(*RI*)$_C$ passbands: *V* and I_C were used for temperature calibration

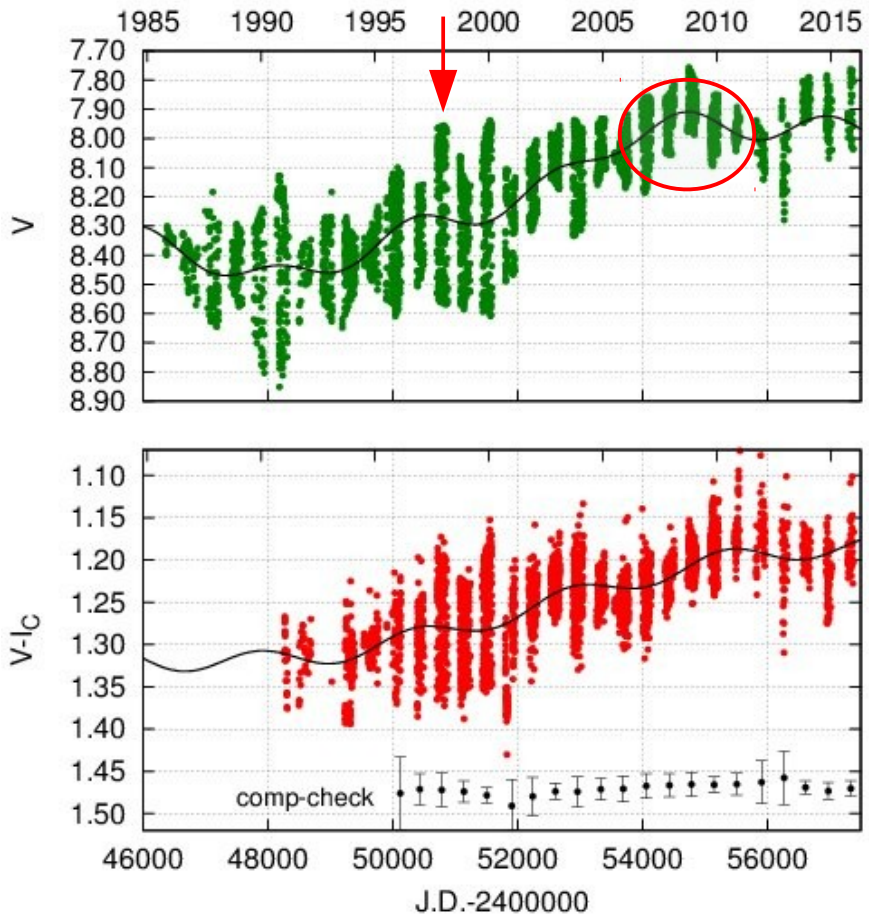


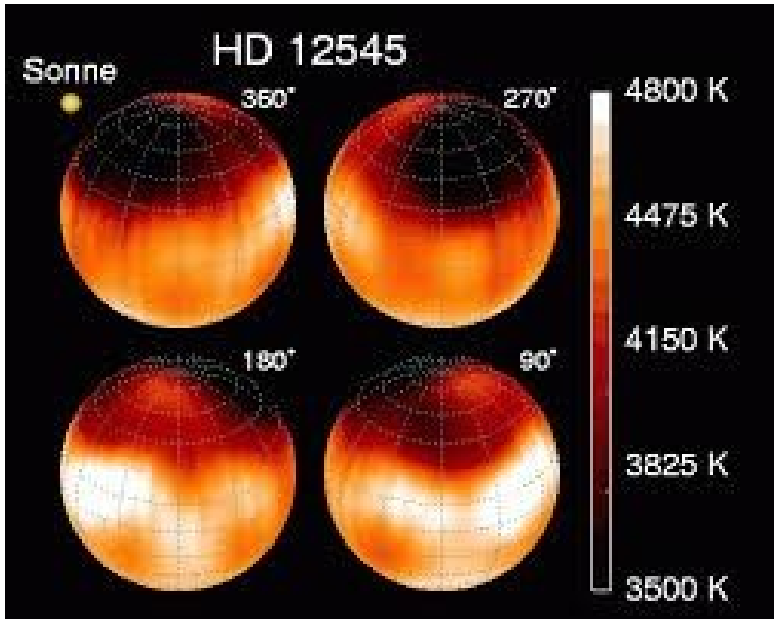




- huge spots from DI
  (already problem with unspotted mag.)
- long-term and about 6-yr changes
- overall change over 1.0 mag.
- rotational modulation with 0.65 mag.
- flux change cannot be explained by spots only

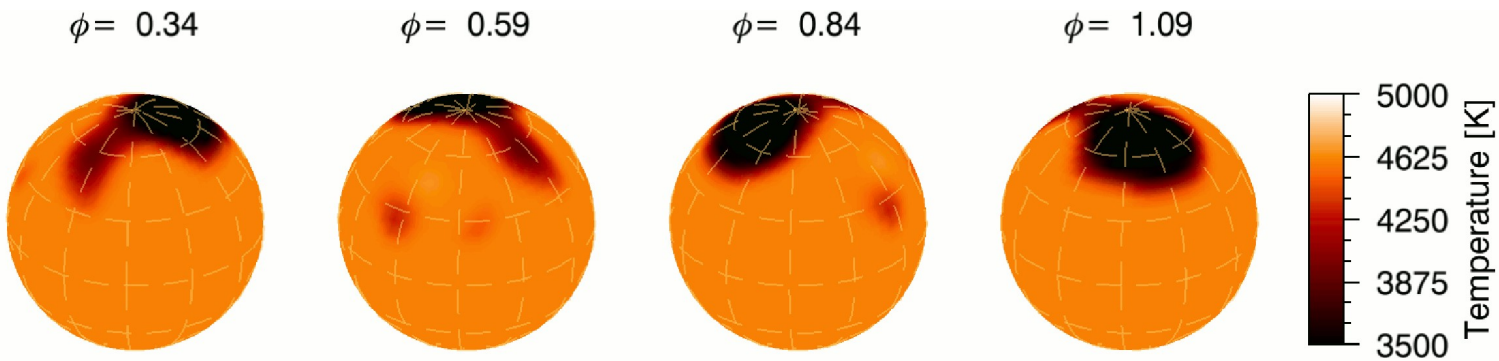
Strassmeier 1999
Oláh et al. 2014

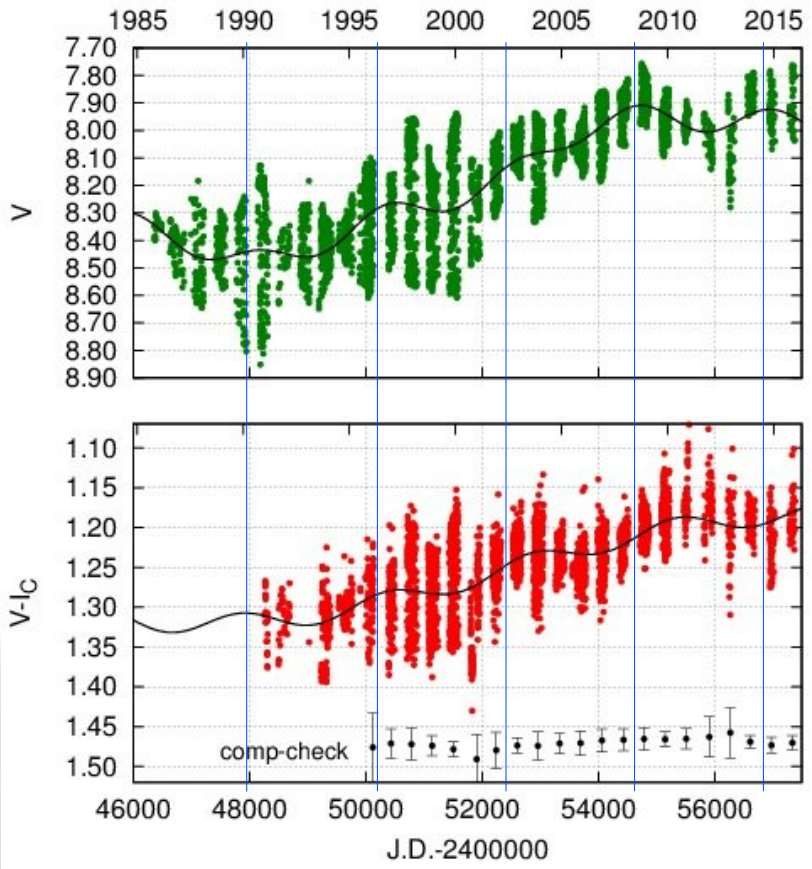


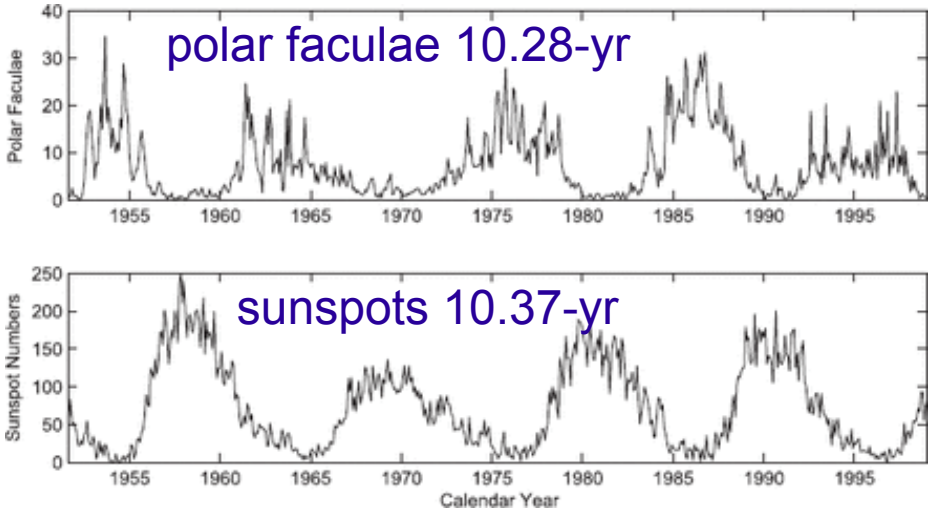


Strassmeier 1999

Künstler et al. 2015



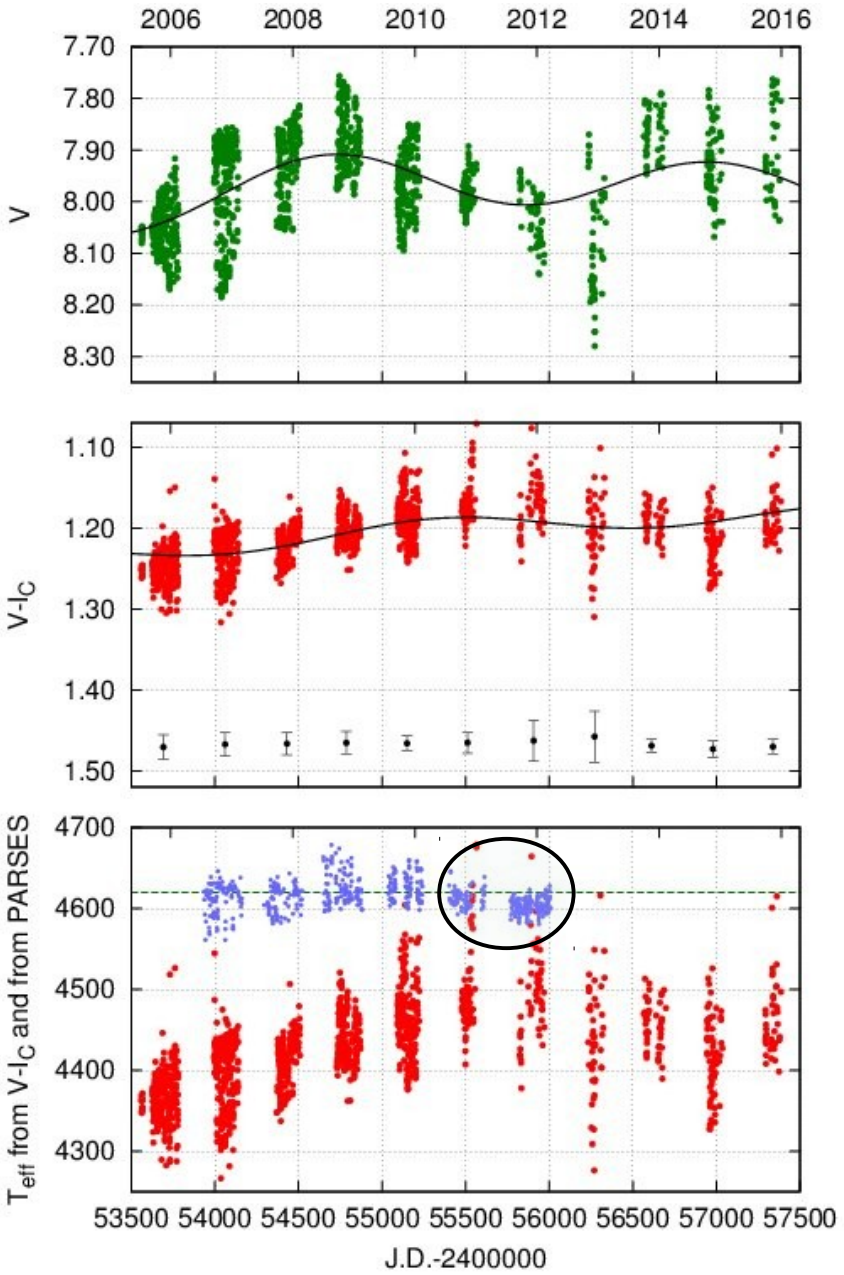


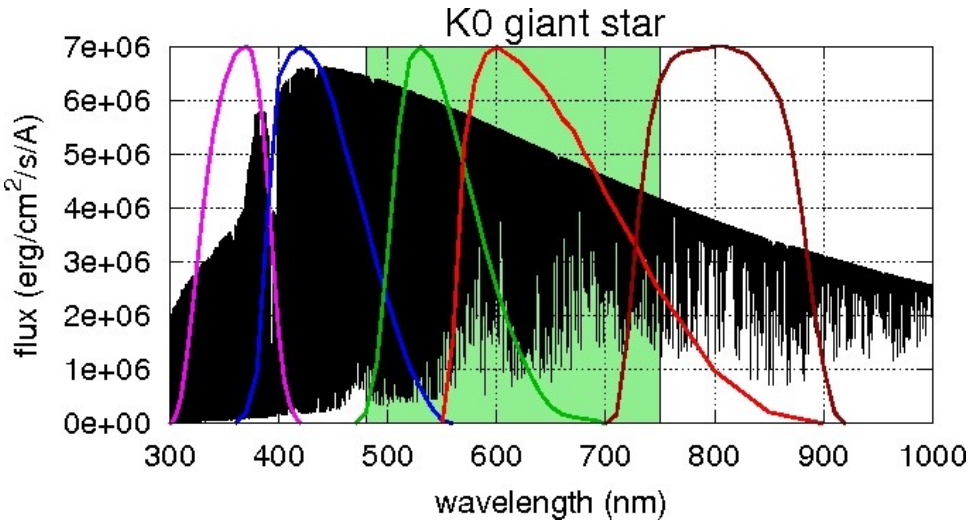


Deng et al. 2013,
PASJ 65, 11

XX Tri:
cycle from V ~ 6 years
$V-I_C$ ~ 6.8 years

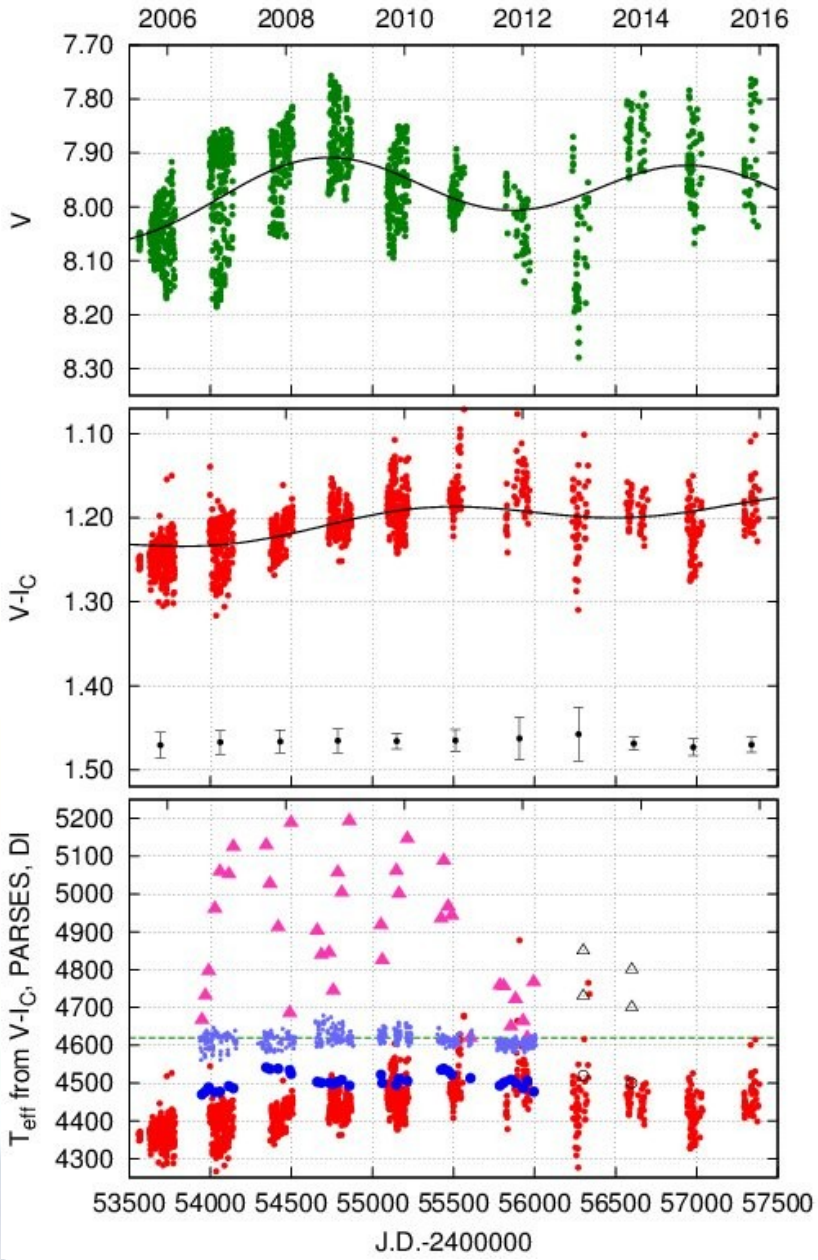
Phase shift between the V and $V-I_C$ (temperature) variation





In addition to luminosity change by spots, radius change, originating from effects of strong magnetic field may play a role in the overall light variation.

- temperature from PARSES
  Allende Prieto, yesterday
- temperature from $V-I_C$
  Worthey & Lee, 2011, ApJS 193, 1

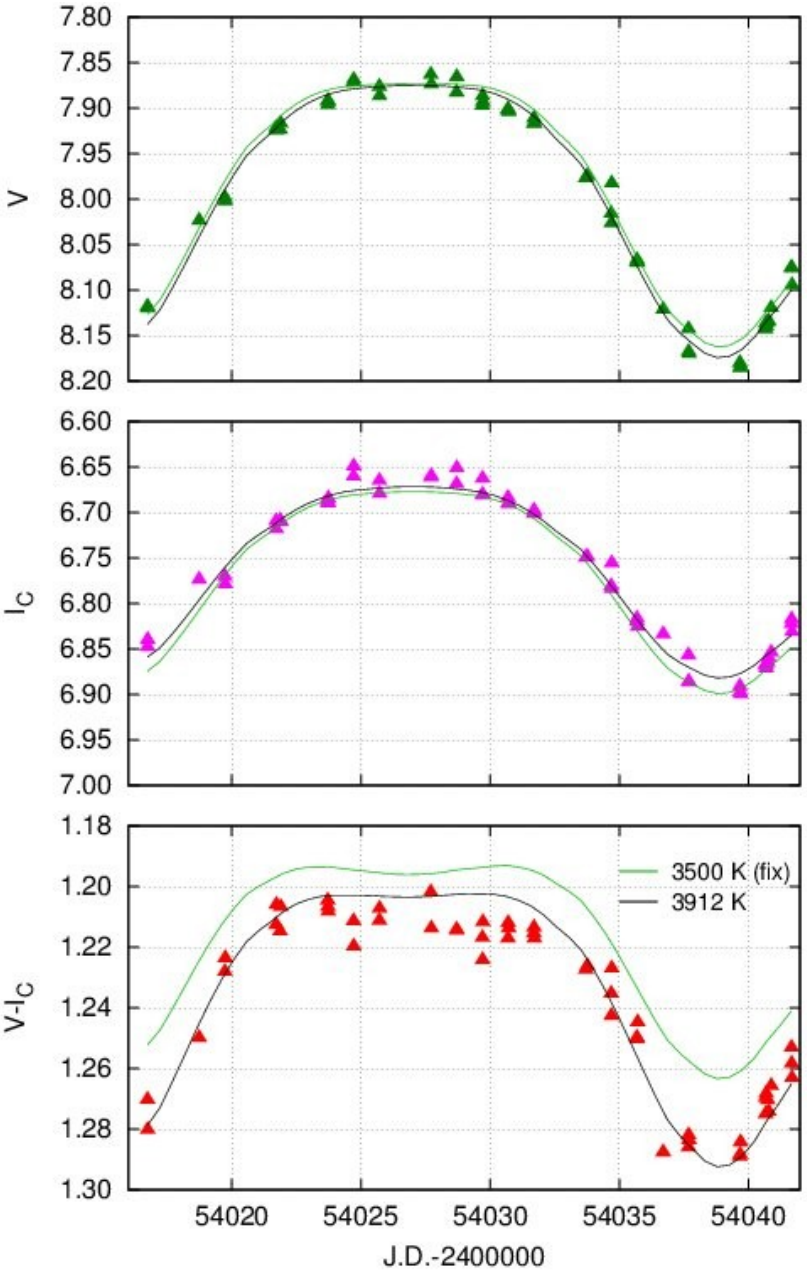


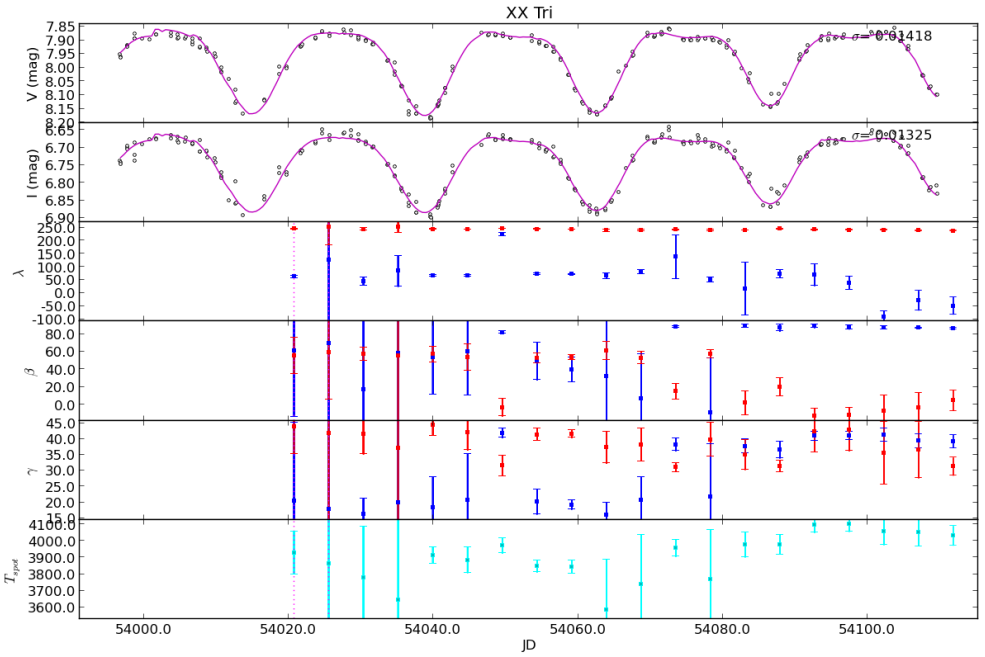
What can we learn from the simultaneous measurements by STELLA and Amadeus?

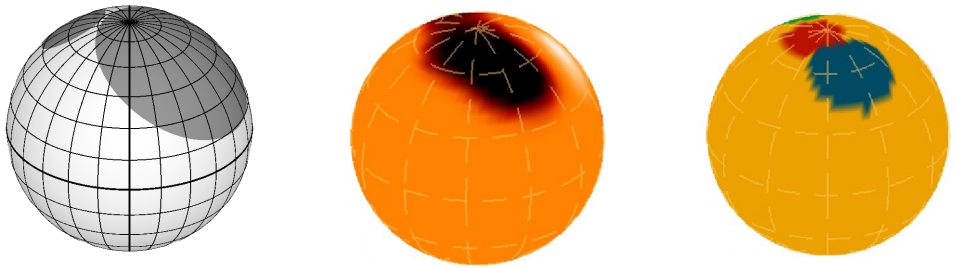
- T_{max} from *iMap*
- T from PARSES
- T_{mean} from *iMap*
- T from $V-I_C$

△ ○ preliminary results

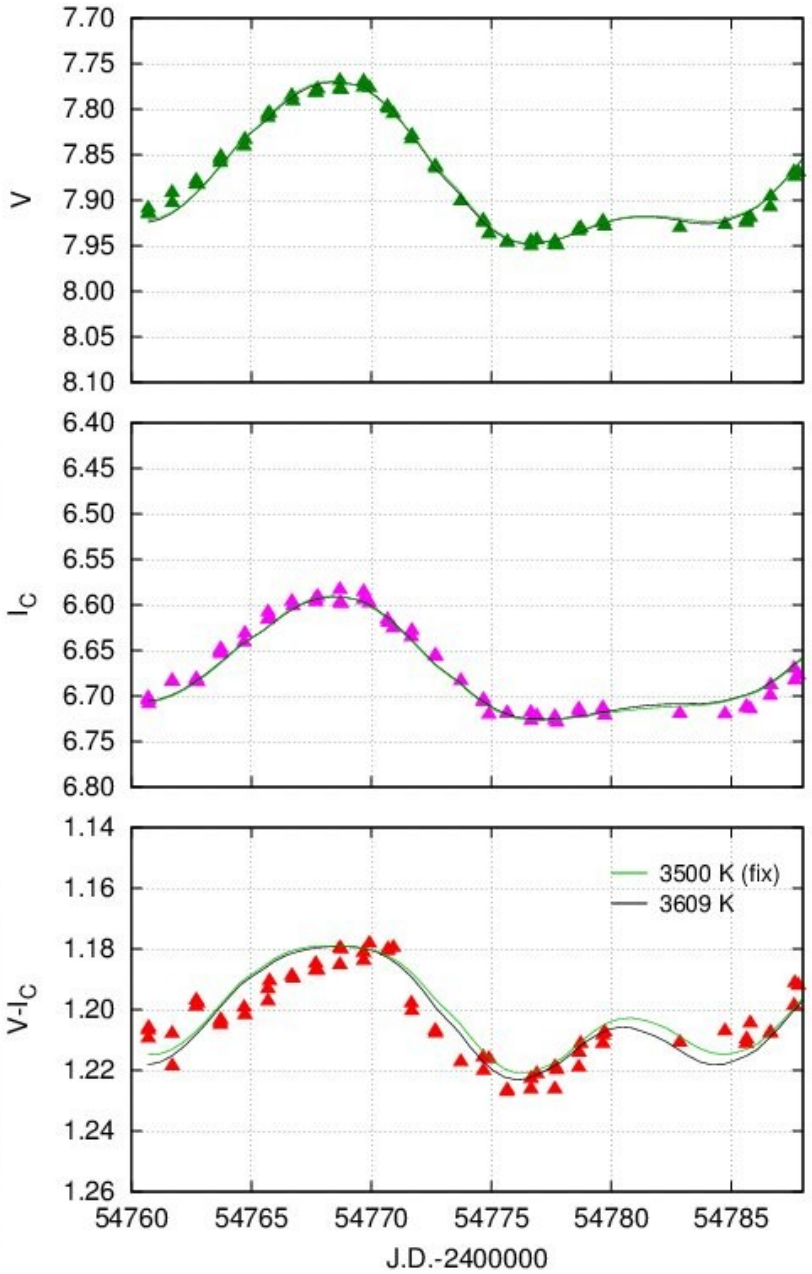
Temperature fit vs. constant spot temperature

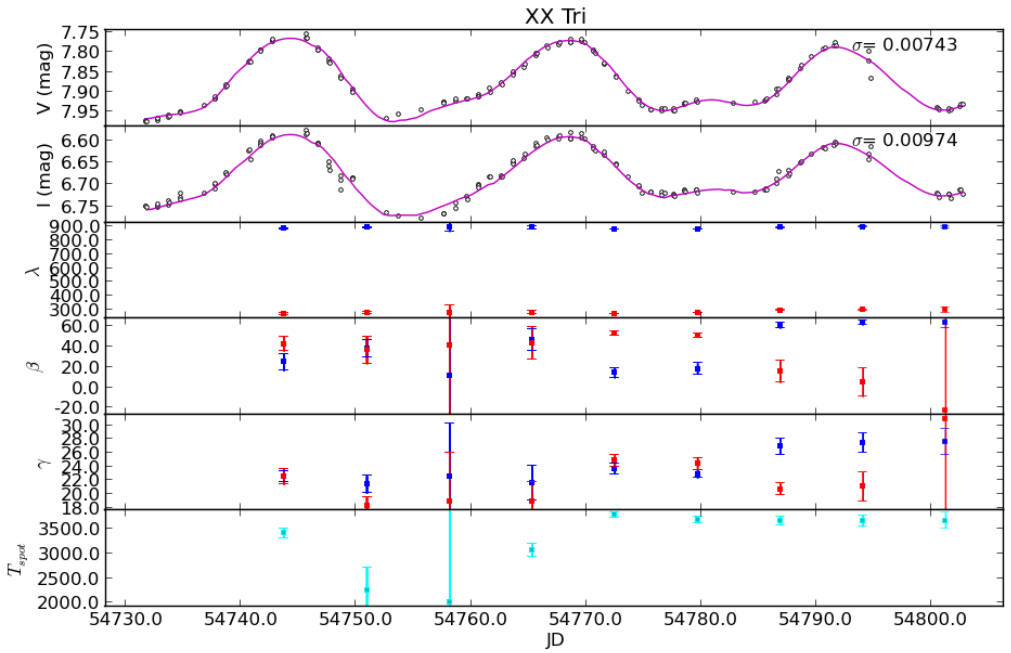


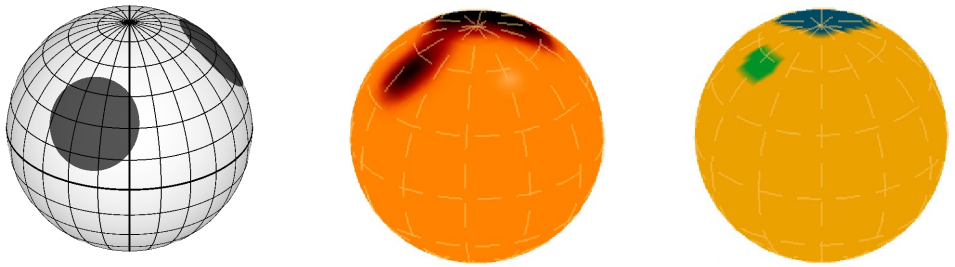


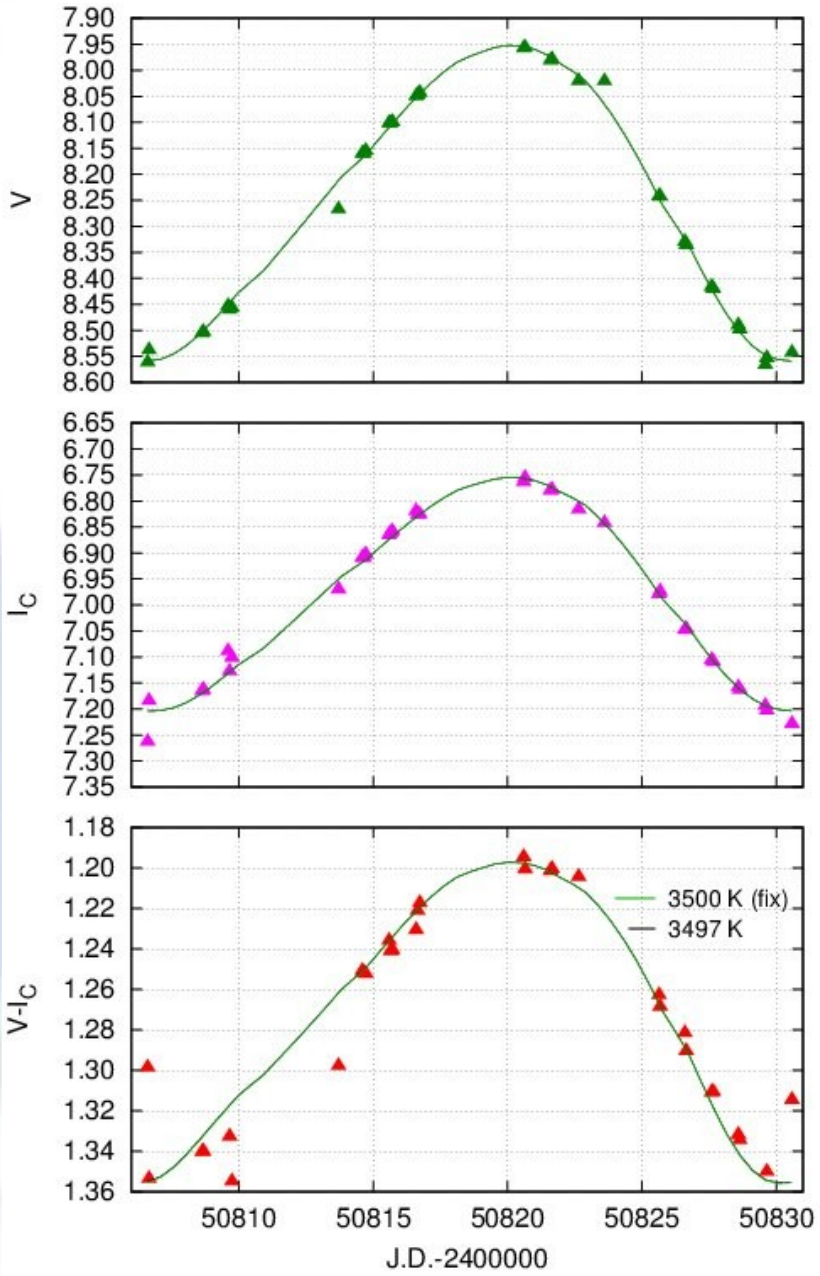


Temperature fit vs. constant spot temperature



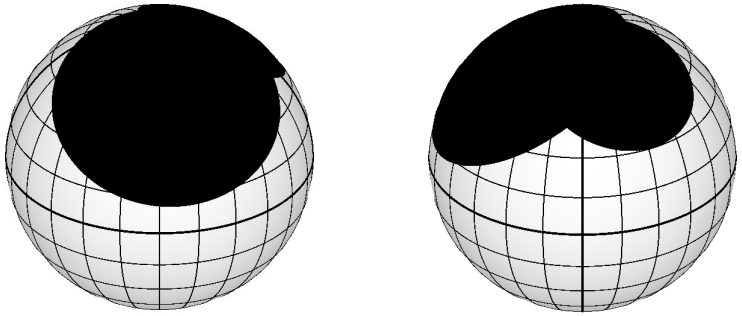


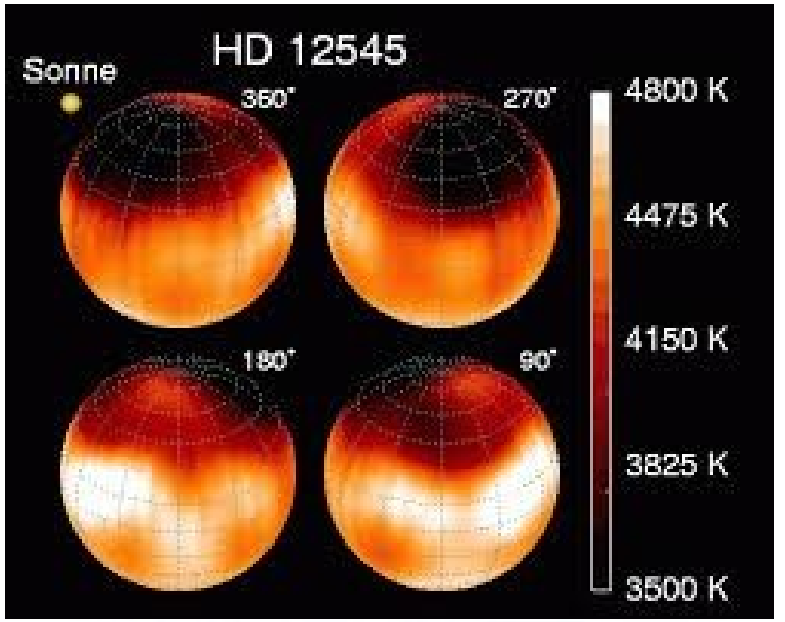


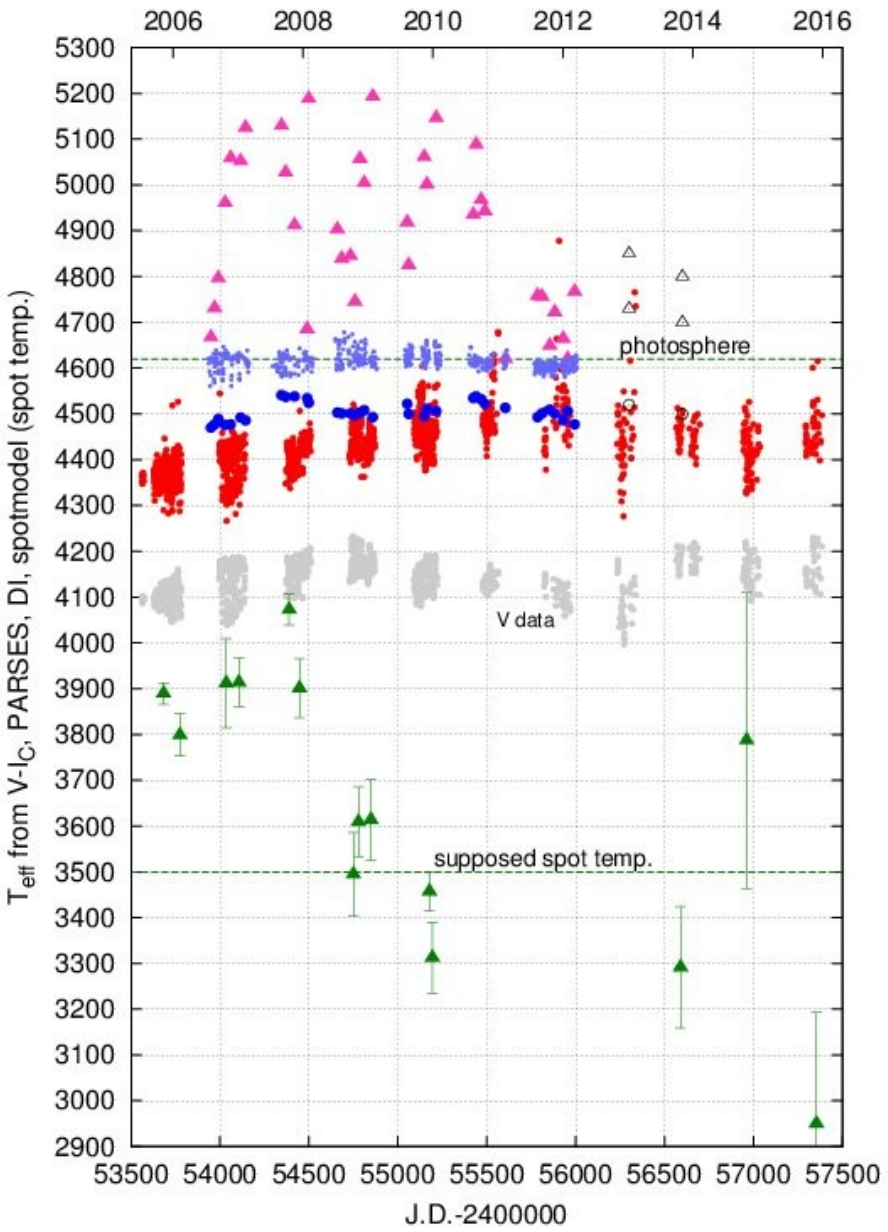


V_{max} was ~0.2 mag. fainter in 1998 than at maximum brightness in 2009.

Photometry can only be fitted with very cool strongly overlapping spots.





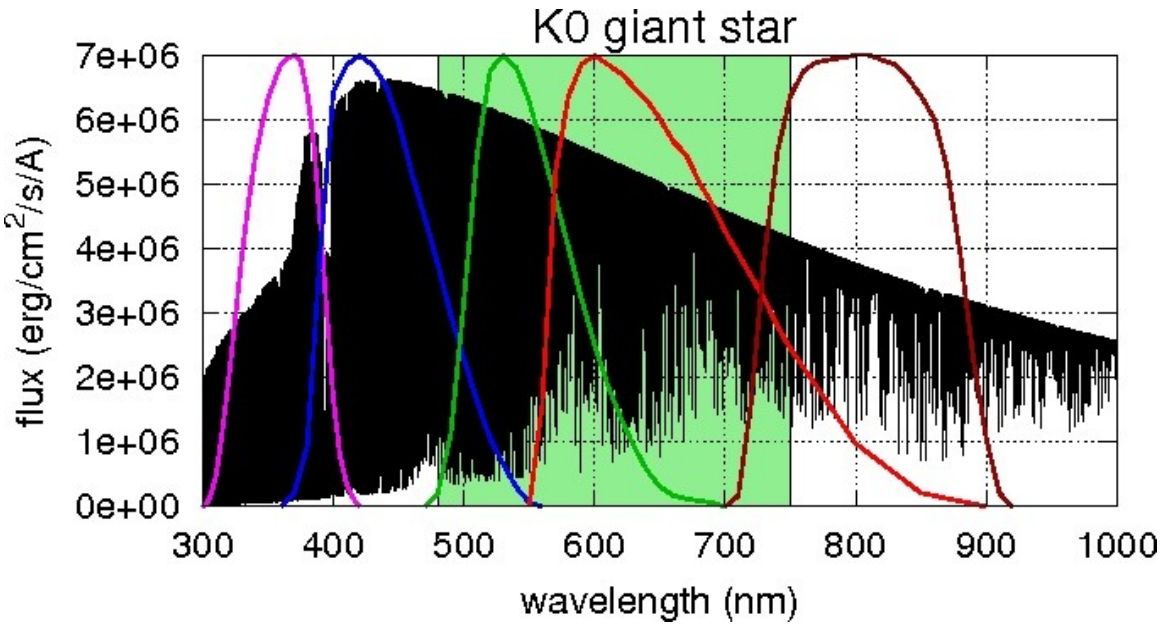


The whole temperature range

- ▲ T_{max} from *iMap*
- ● T_{eff} from PARSES
- ● T_{mean} from *iMap*
- ● T_{eff} from $V-I_C$
- △ ○ preliminary results
- ▲ spot temperature from SpotModeL ($V-I_C$)
- ● *V* data

Morals:

- Average spot (≈ active region) temperatures are not constant but show smooth variability with the cycle
- STELLA + Amadeus together can tell more about the hot and cool temperature signatures on stellar surfaces



U and *B* are sadly missing

Possibilities:

- Sum up the hot pixels ($T > T_{phot}$) and see how it varies within seasons or shorter timescale
- With the results check in detail what happens from maximum brightness until bluest state and around
- Use T_{spot} from spot modeling to construct spots from *iMap* images for area change study
- Get $v \sin i$ from temperature insensitive lines


Thank you for your attention!