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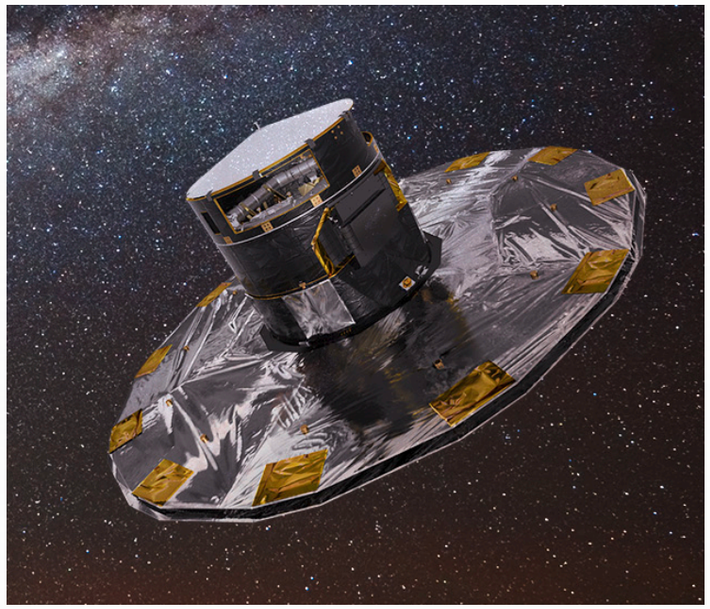
KU LEUVEN



Gaia & TESS

KITP, 21 March 2017

Conny Aerts, Joris De Ridder, May Gade Pedersen, Péter Pápics, Andrew Tkachenko

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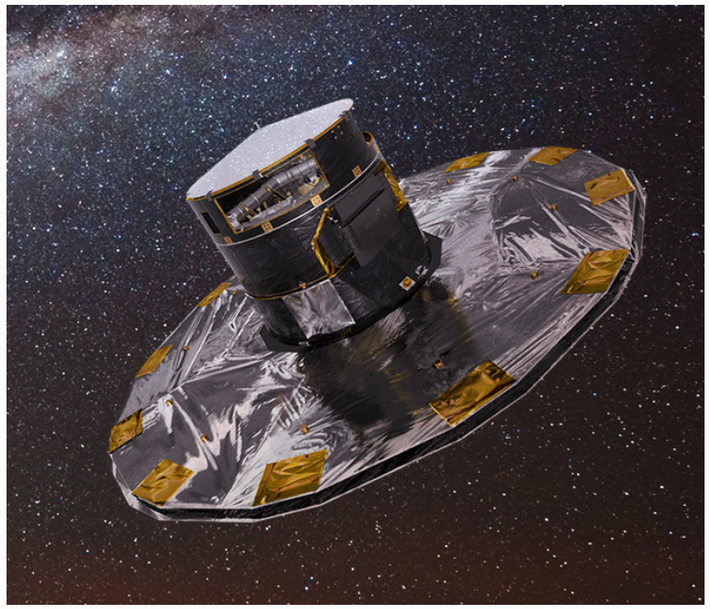


Gaia & TESS

What's in it for you?

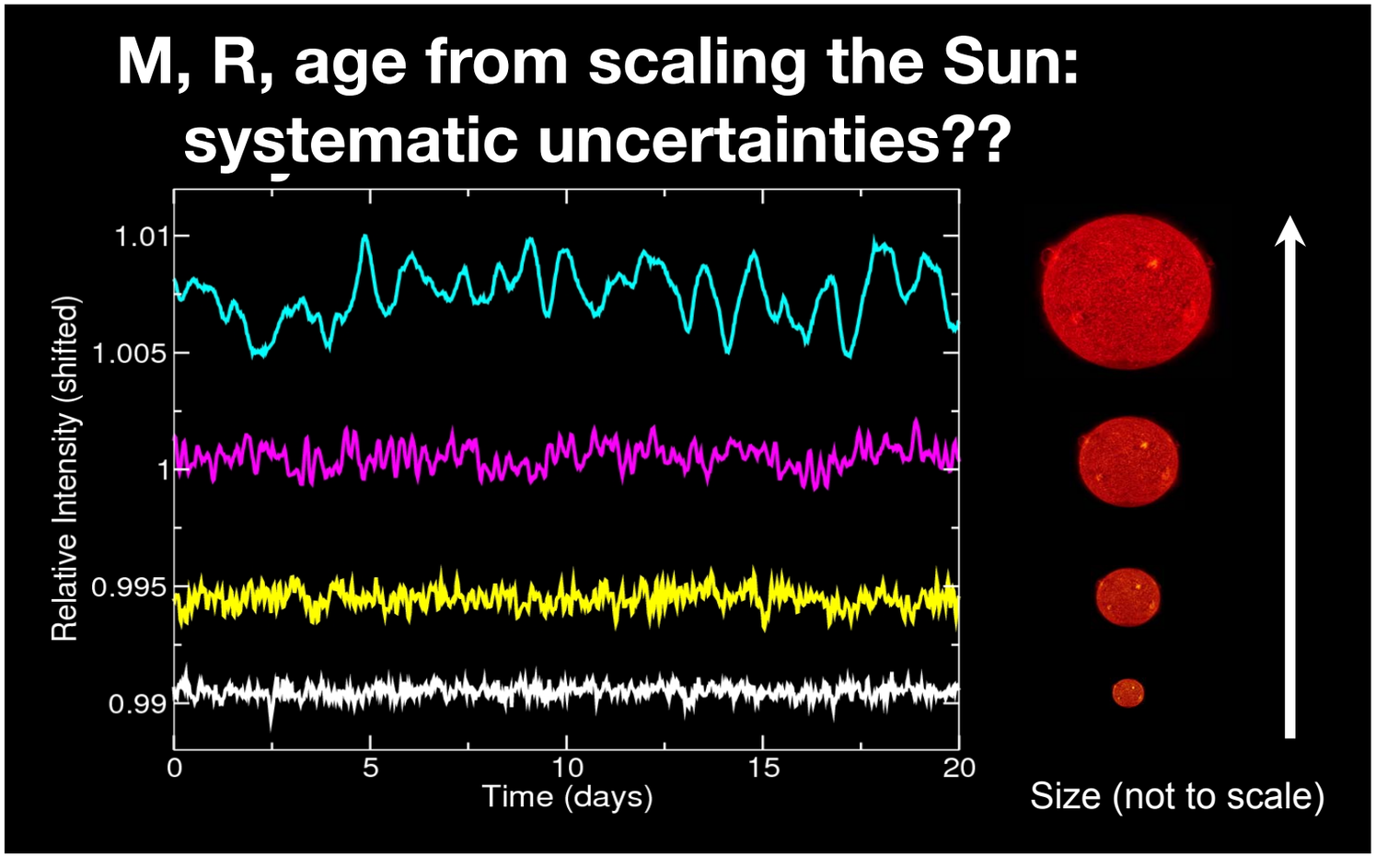
KITP, 21 March 2017

ESA Gaia mission (2013+)

- Launched 19/12/2013, nominal L2 operations 19/7/2014
- DR1 (14/9/2016): positions, parallaxes, proper motions after 14 months of monitoring for stars in Tycho-2 Catalogue (TGAS) https://gea.esac.esa.int/archive/
- DR2 (4/2018): 5-parameter astrometric solution & photometry of a billion stars, Teff for stars G<17, median RV for stars G<12
- DR3 (2019, tbc): orbital astrometric solutions of binaries with orbital periods > 2 months
- DR4 (tbd): variable star classifications
- Final full catalogue (2024)

Seismic versus astrometric distance?

Seismic mass, radius, age for **(exoplanet host) stars:**
systematic uncertainties due to assumed solar physics?

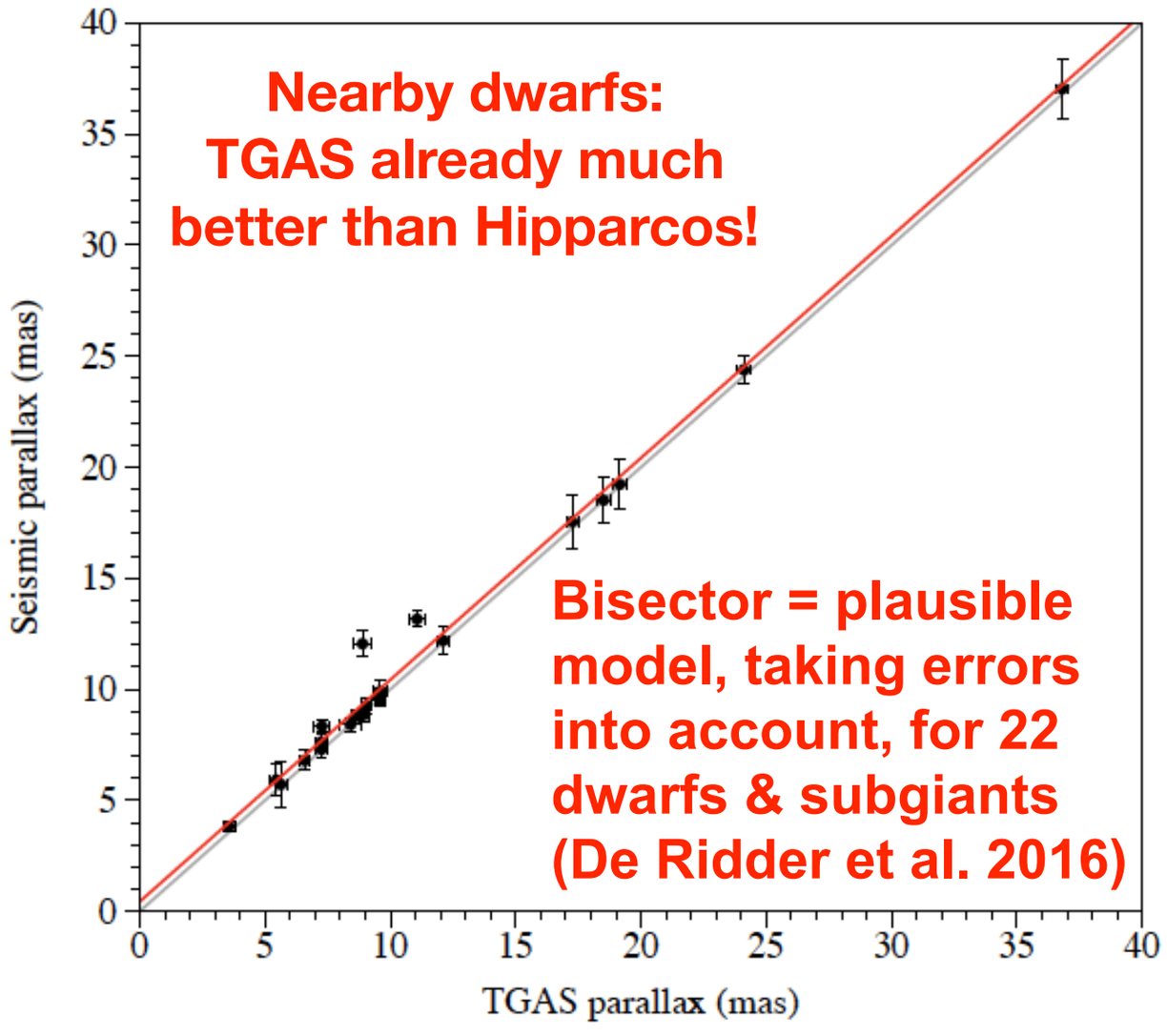


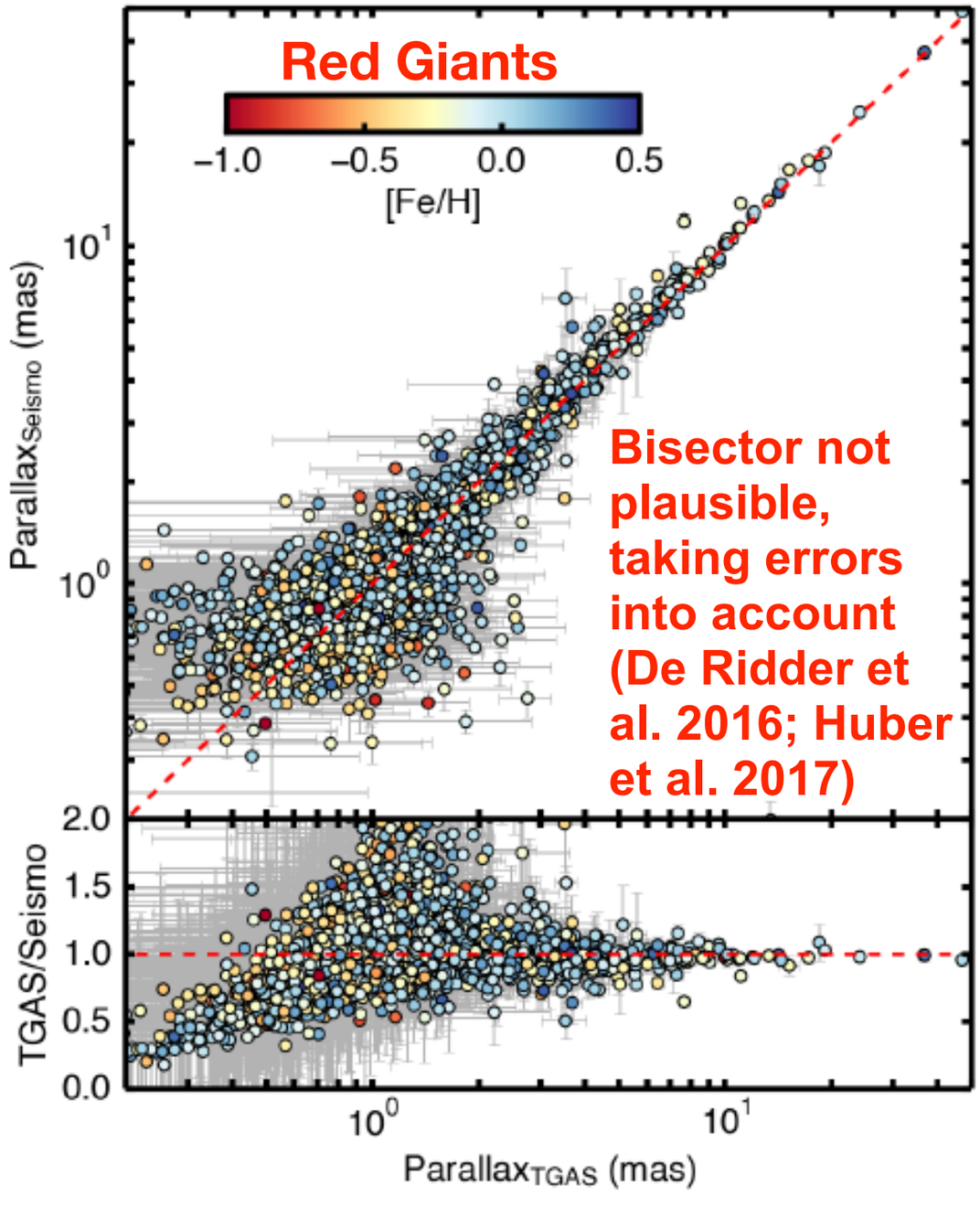
+ reddening
+ integration over Kepler passband

seismic distance
(Silva Aguirre et al. 2012)

Kepler ensemble asteroseismology + spectroscopy:
M: 3.7%, R: 1.3%, age (models!): 12% for solar-like Z
Huber et al. (2013), Chaplin et al. (2014), Silva Aguirre et al. (2016)

Seismic/Astrometric parallax





Seismic parallaxes currently far better than TGAS parallaxes for distant red giants: binarity? systematics in seismo/TGAS (errors)?

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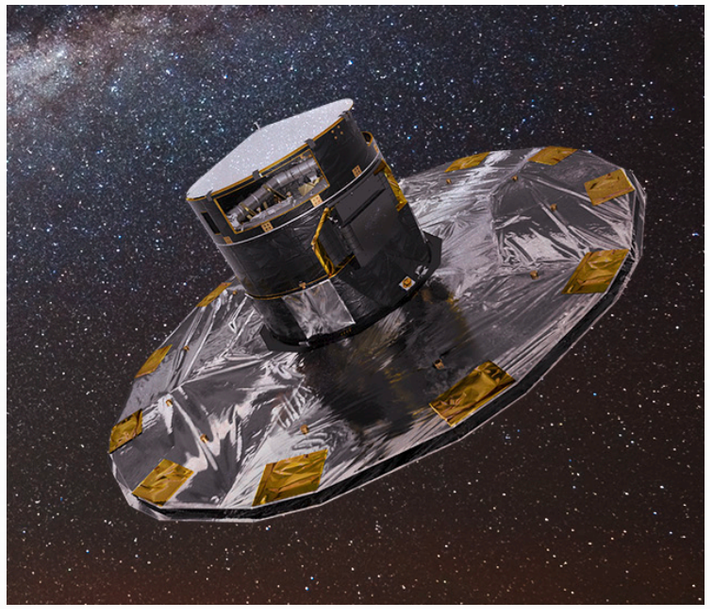

Gaia & TESS

What's in it for you?

KITP, 21 March 2017

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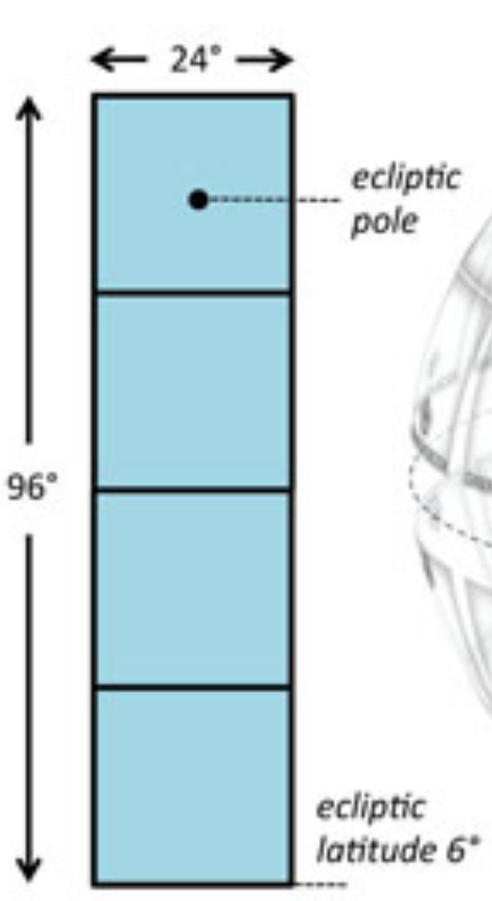
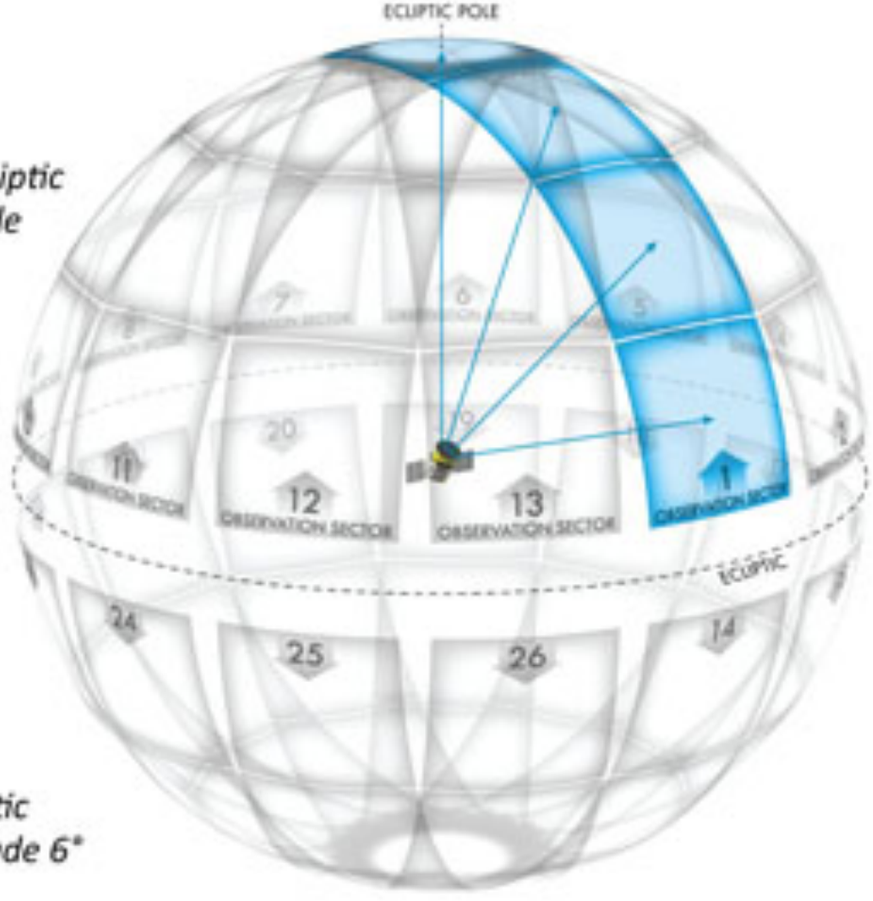
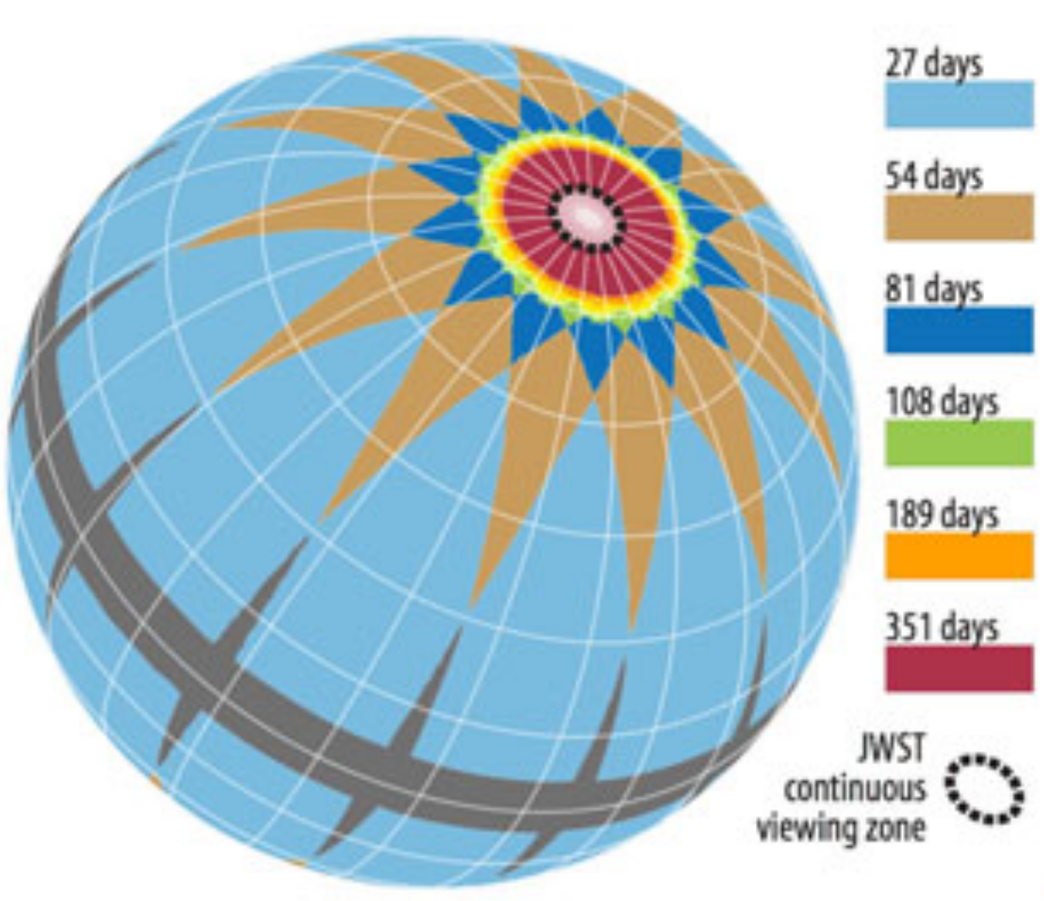
NASA TESS mission (3/2018; 2 years)

All-sky survey, 27d/FoV, 1-year CVZ on ecliptic poles
full frame images 30-min integration times +
pixel maps for 750 stars@2-min & 60 stars@20-sec
highly competitive slots!!







What's in it for us?

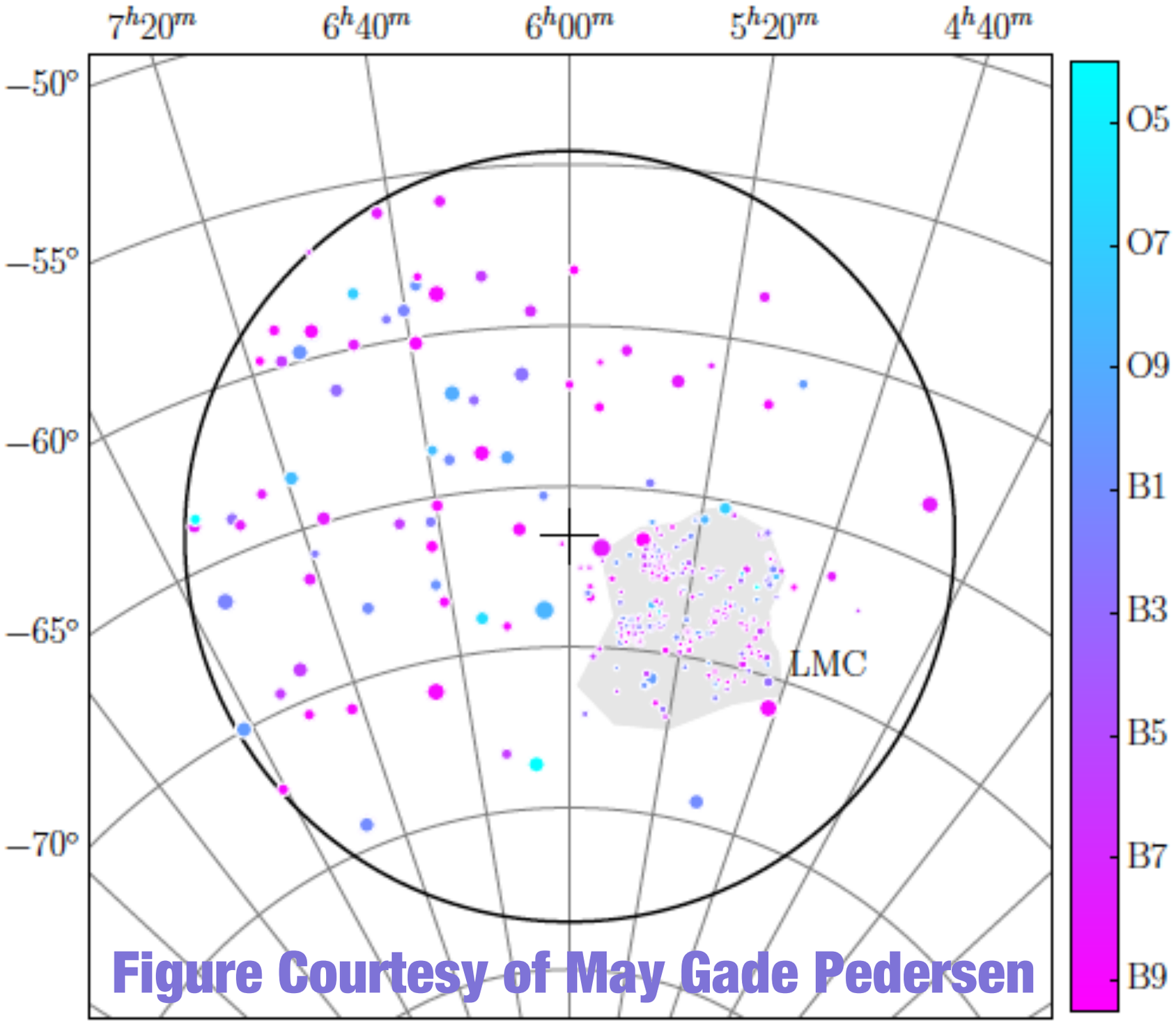
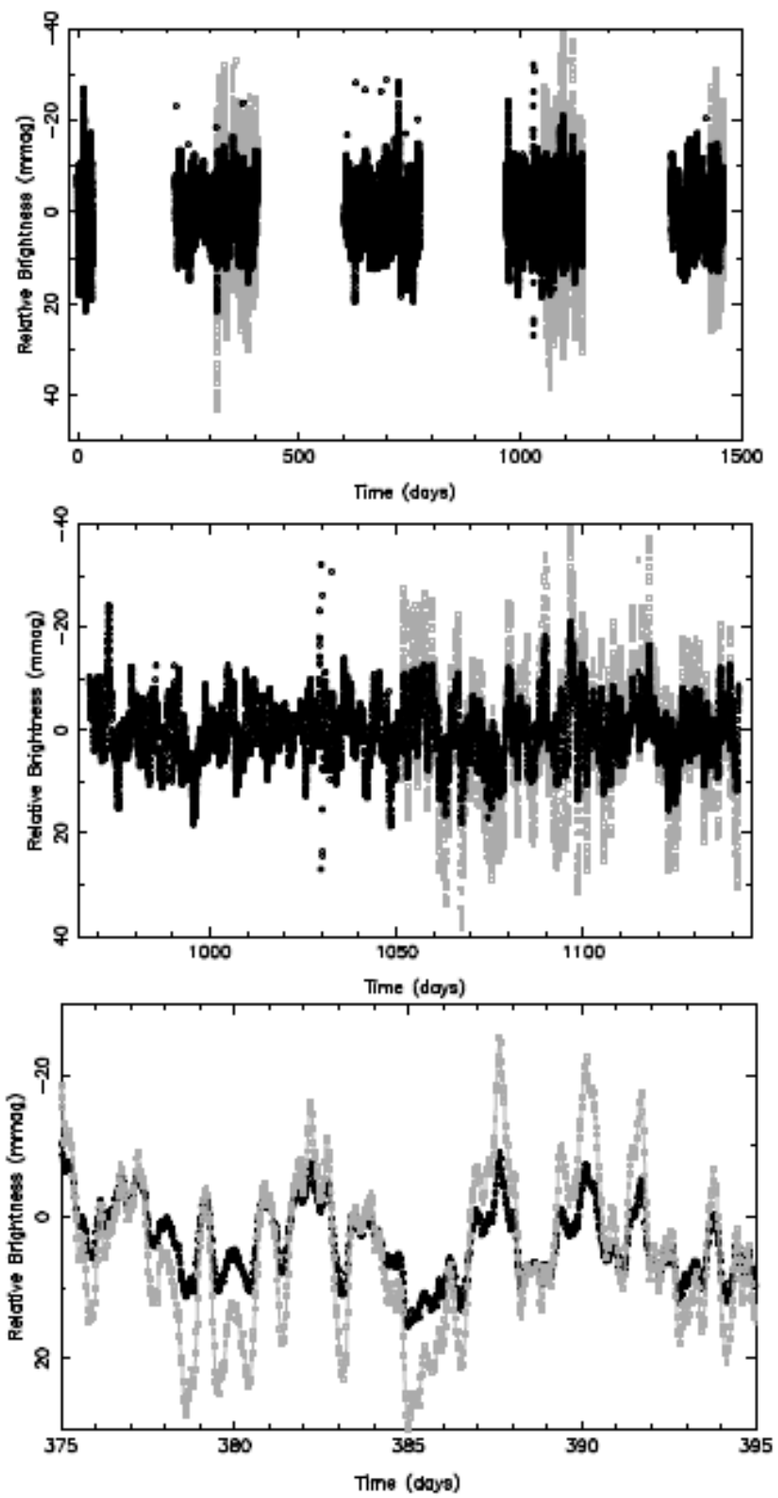


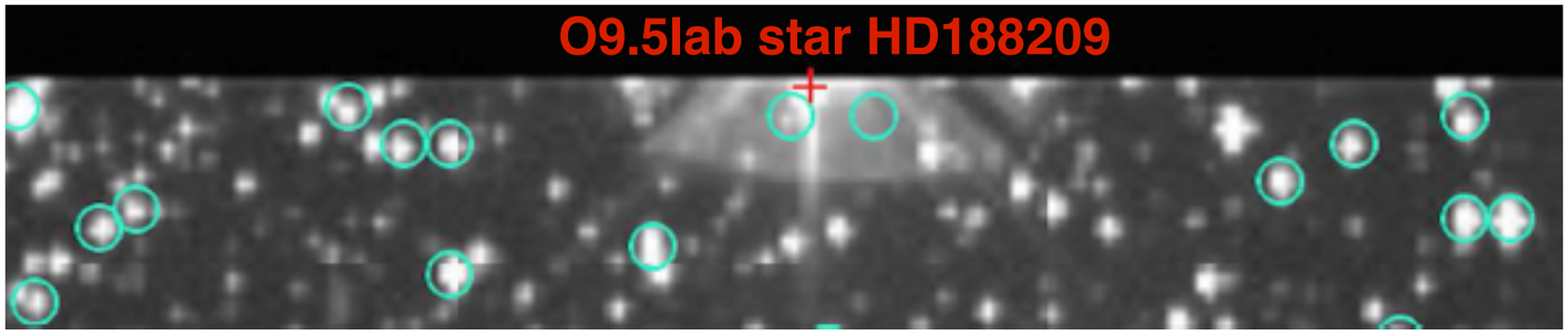
Figure Courtesy of May Gade Pedersen

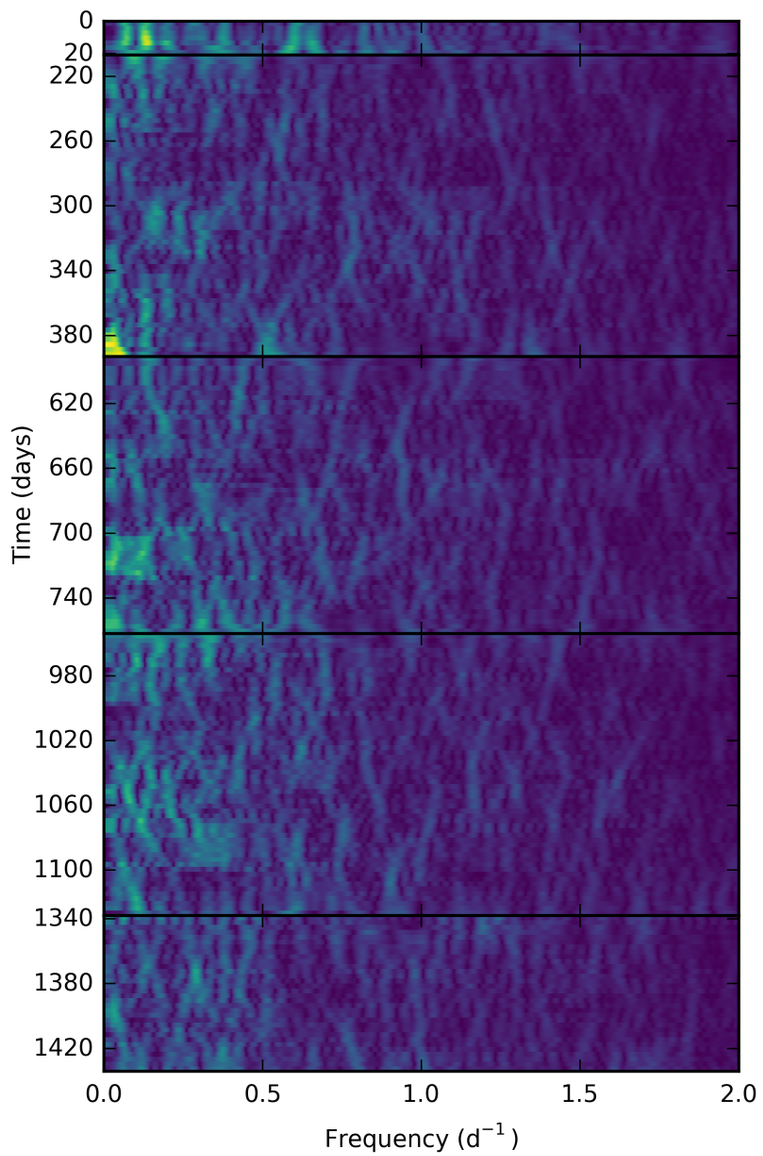
341 OB stars (V = 4 - 13) in TESS-CVZ, to be monitored for 351 d, including LMC stars (≈105@V<10)

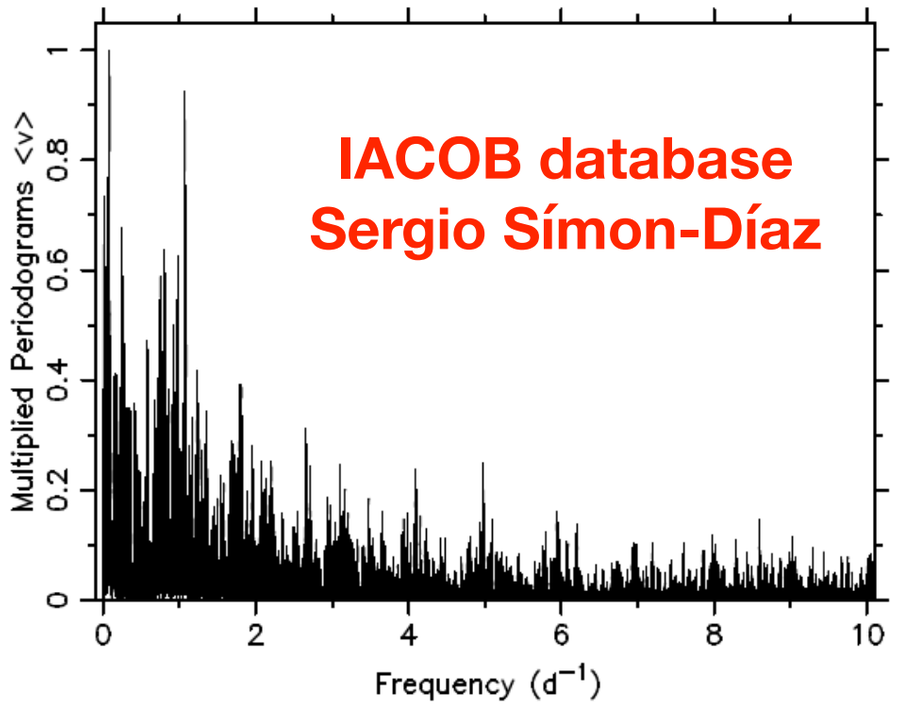
BUT: TESS pixels saturate at V ≈ 6.5 (10 to 20 stars)

Trick: scattered-light photometry





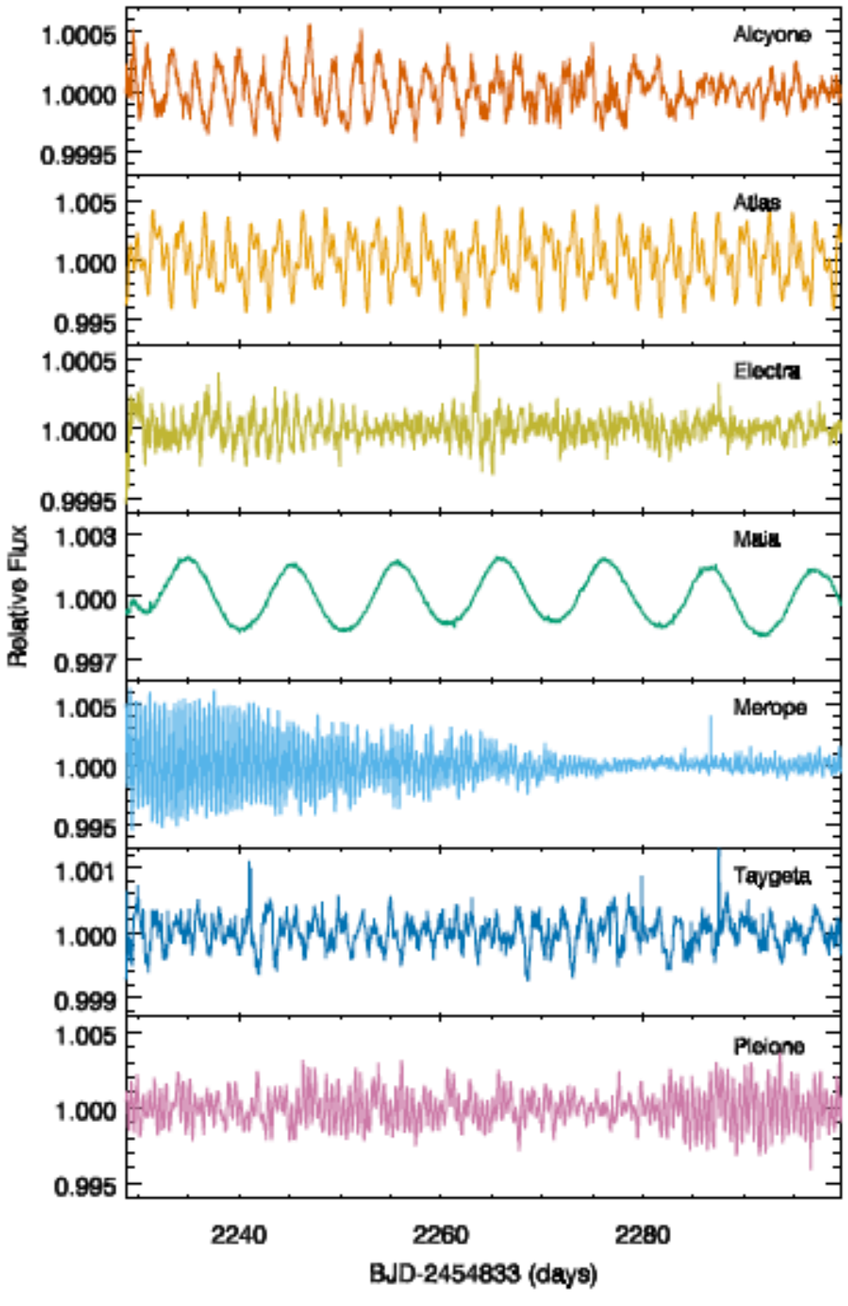


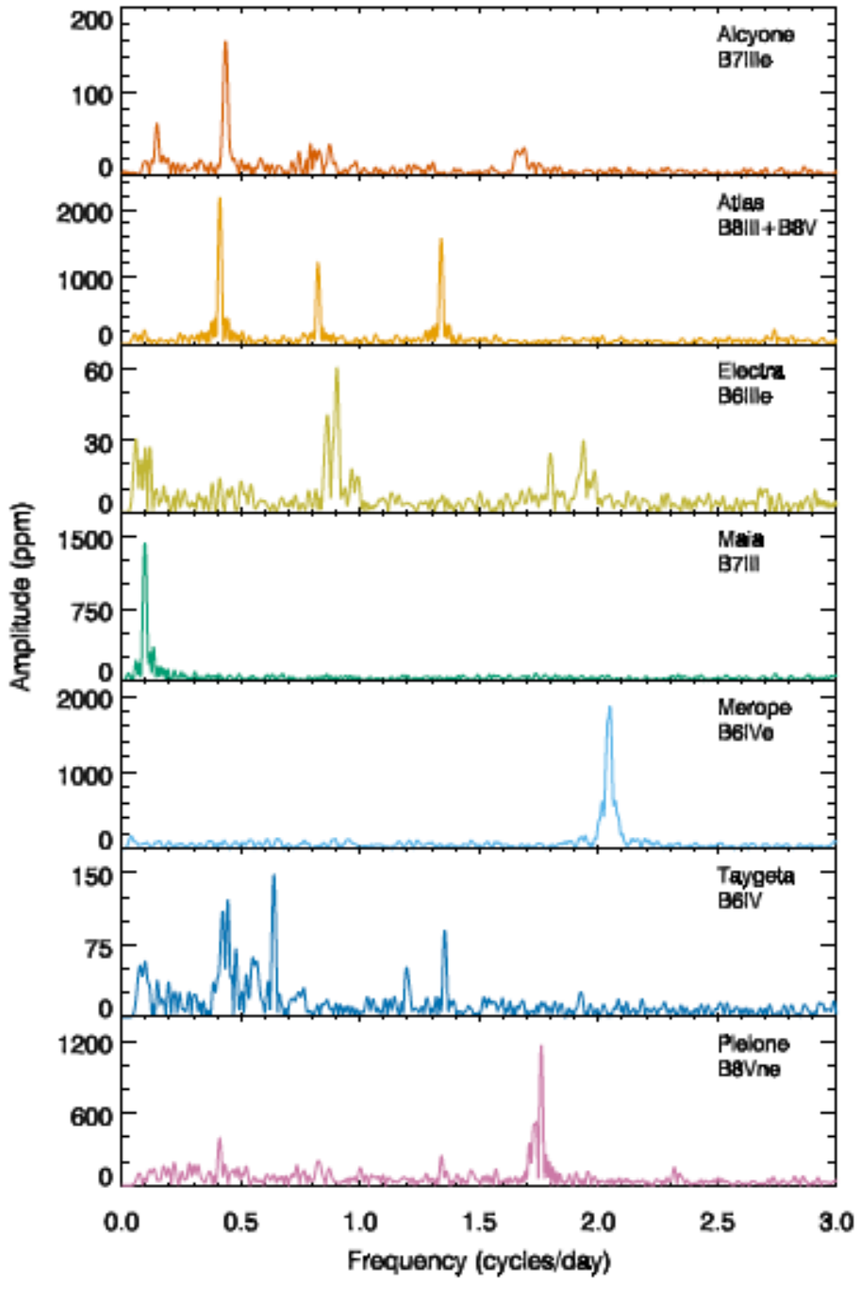


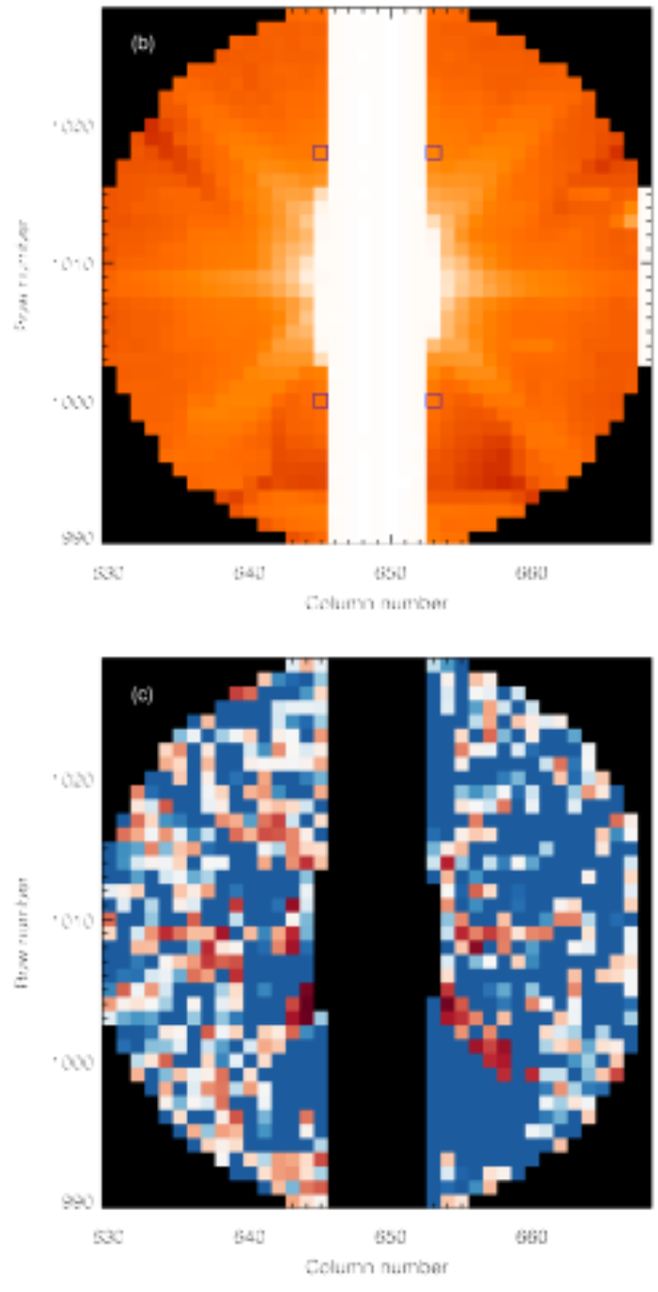
IACOB database
Sergio Símon-Díaz

Confirmed by 1800d of ground-based spectroscopy
Aerts et al. (2017)

Halo photometry to the rescue







K2 Pleiades (Tim White et al., submitted)

All 341 OB stars potentially….

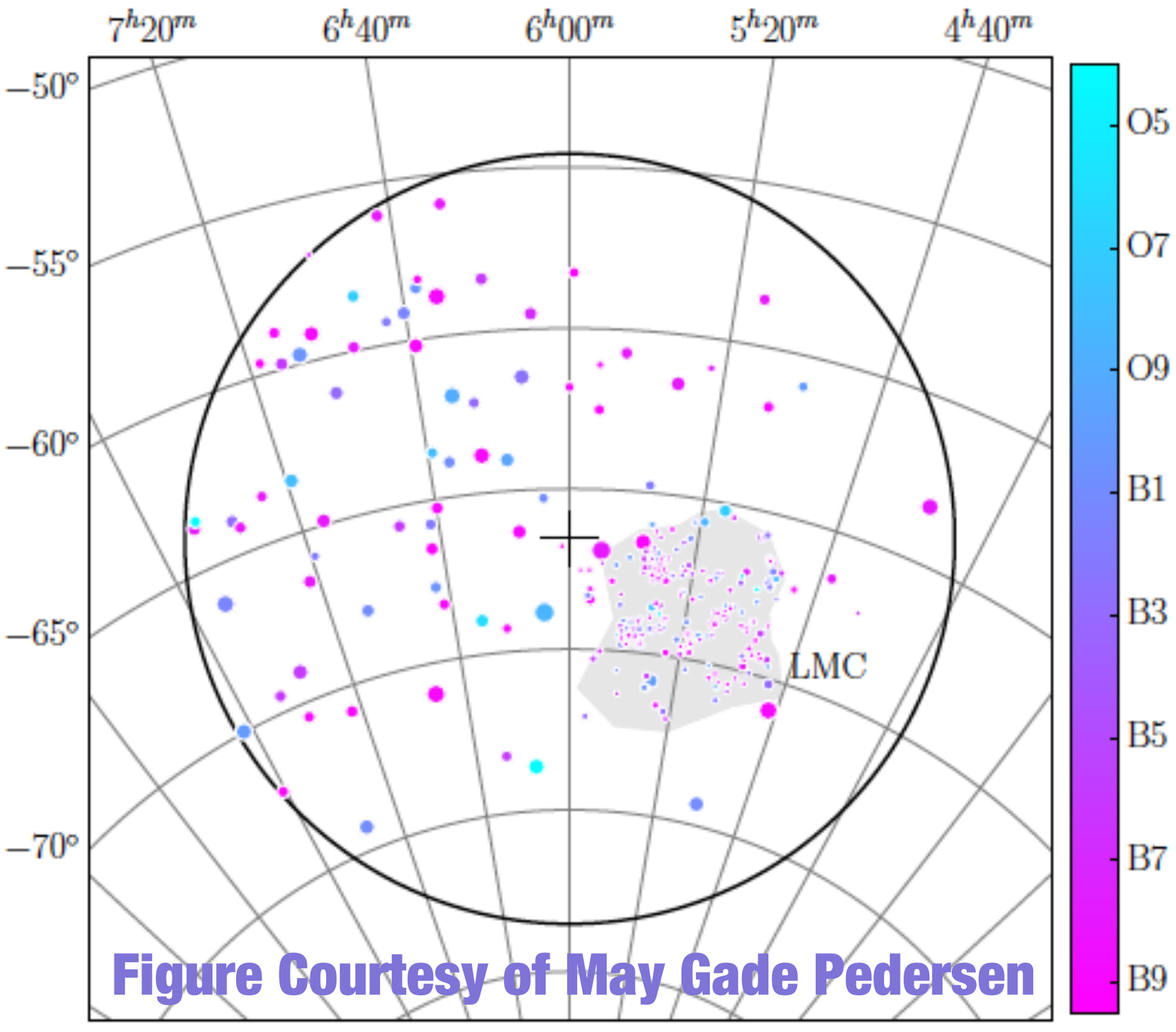


Figure Courtesy of May Gade Pedersen

BUT: LMC stars are faint for TESS; needs specific data treatments

BUT: TESS 2’ and 20” pixel slots highly competitive, particularly in CVZ