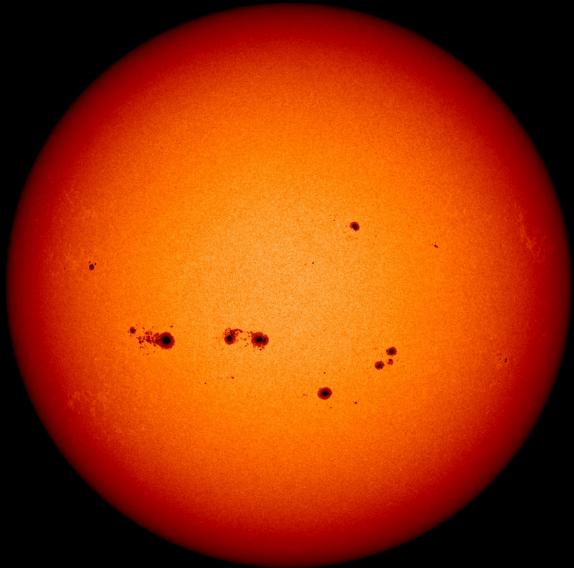


Stellar activity & high cadence photometry

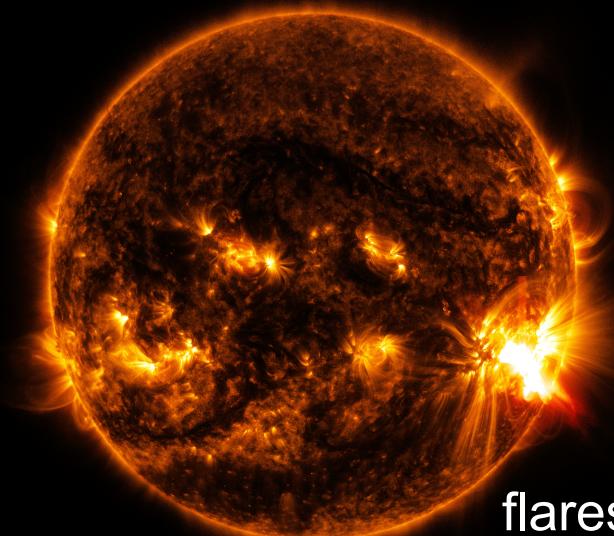
Krisztián Vida
Konkoly Observatory, MTA CSFK



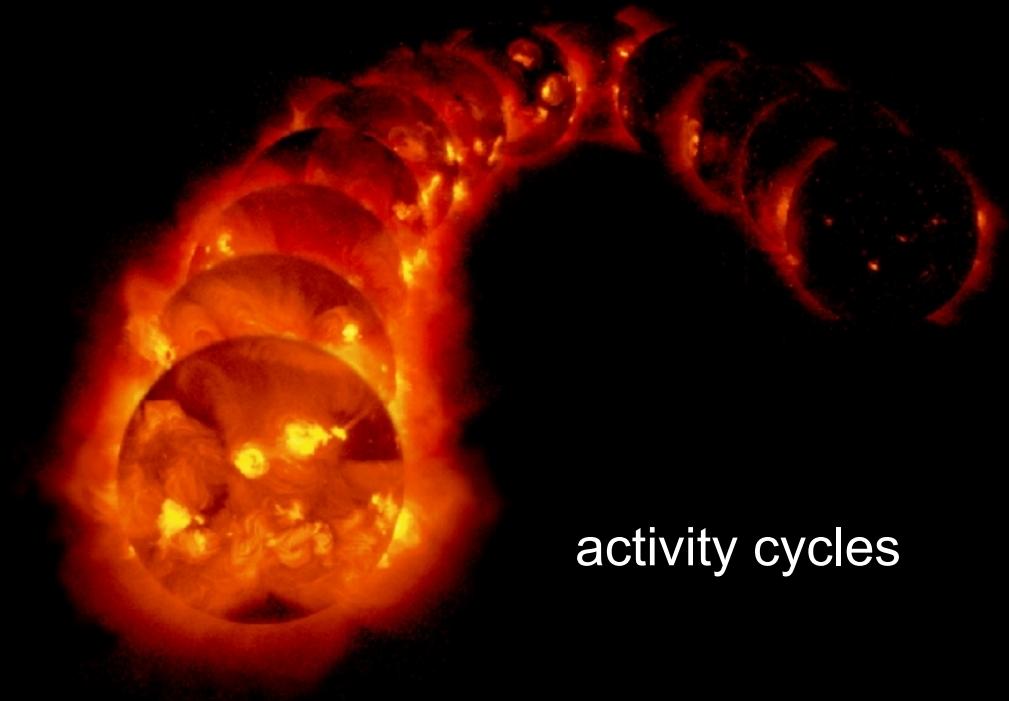
Rotation induces a magnetic dynamo in stars.
This dynamo can produce on the surface and
in the stellar atmosphere different activity
signatures, like...



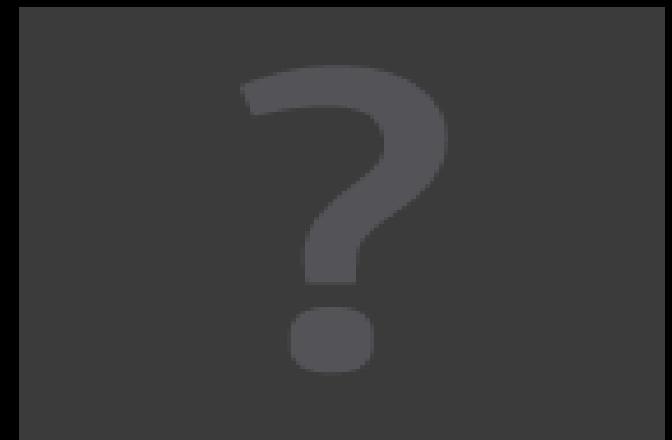
cool, dark spots



flares/coronal mass ejections
due to reconnection

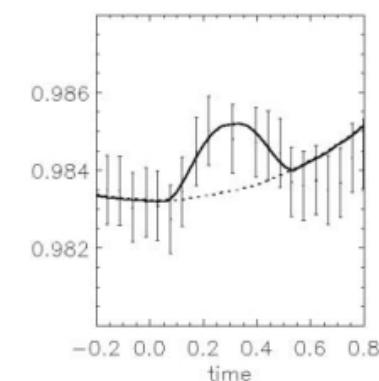
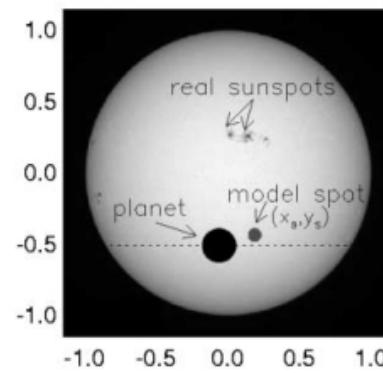
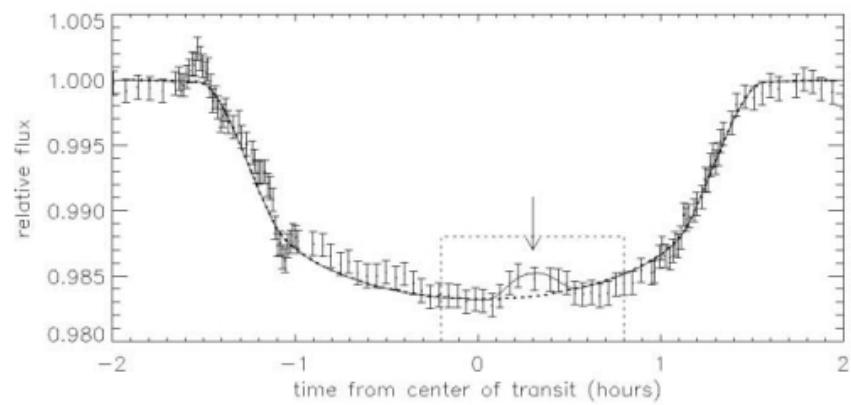
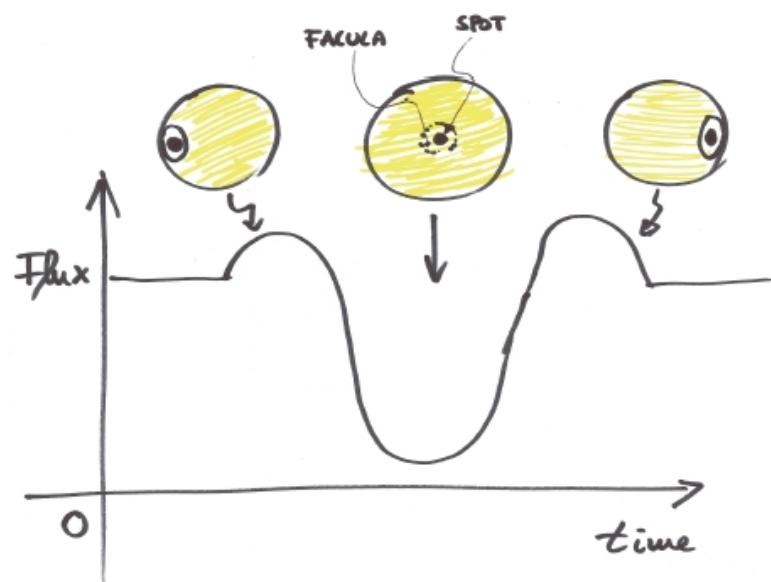


activity cycles

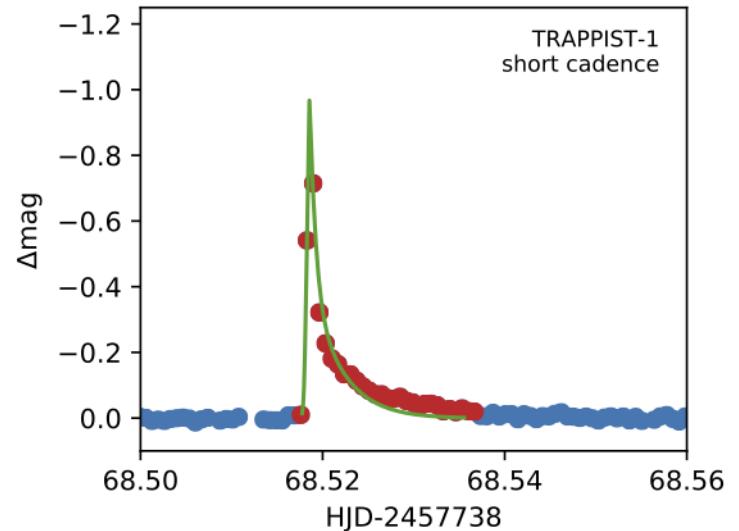


ARIEL & stellar activity

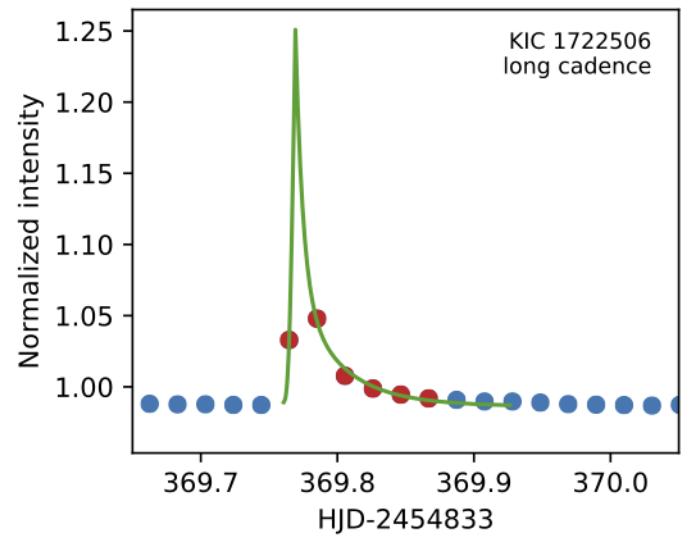
Mapping surface features more precisely



High resolution photometry can be crucial for fast transients – e.g. determining flare parameters: energy estimation depends heavily on sampling!



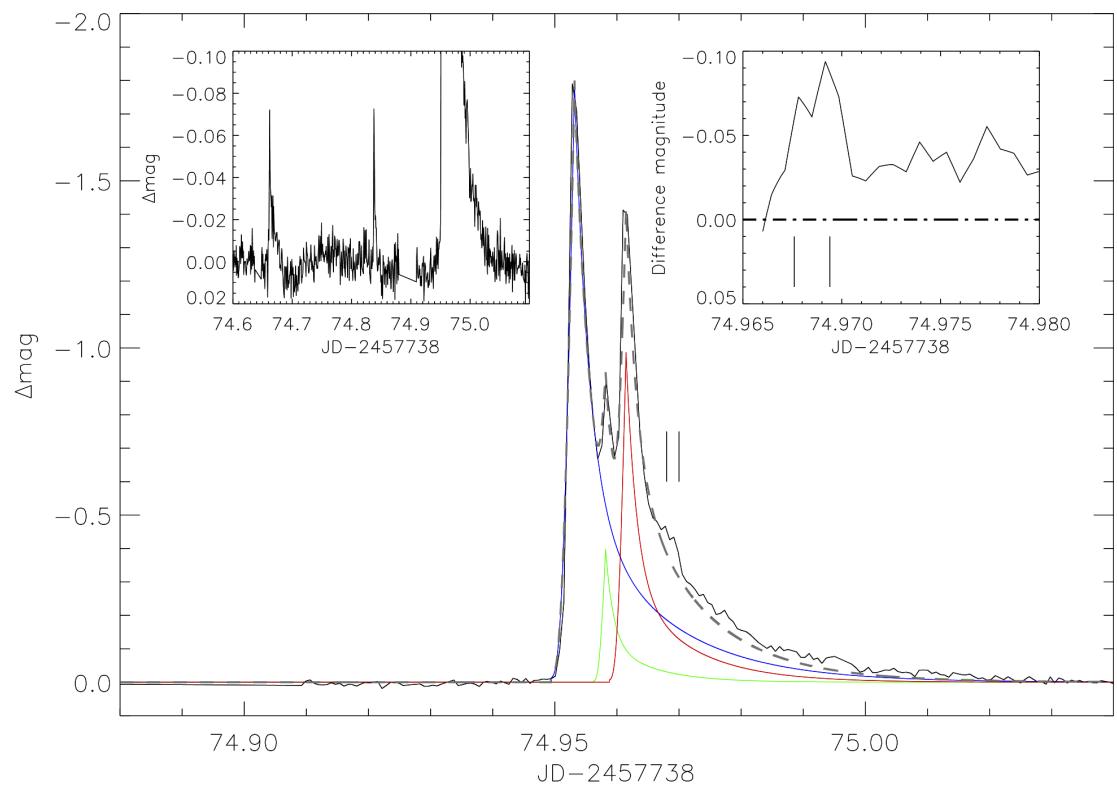
Flare analysis with machine learning on Kepler light curves: energy estimation of long cadence events can be nasty...



Short/long cadence flares from Kepler observations

- Study of flaring activity of the TRAPPIST-1 system
- The observed frequent strong flares in such systems can change/destroy planetary atmospheres
- We could get a more detailed view on the events

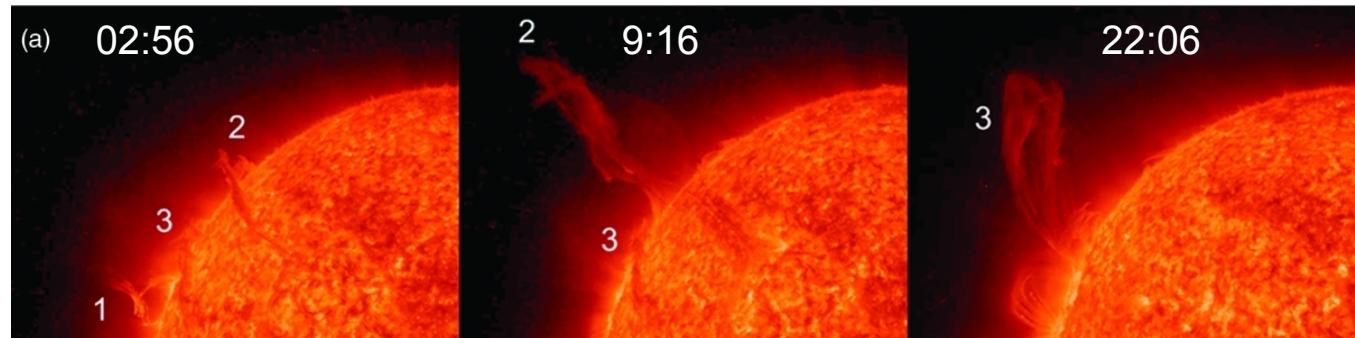
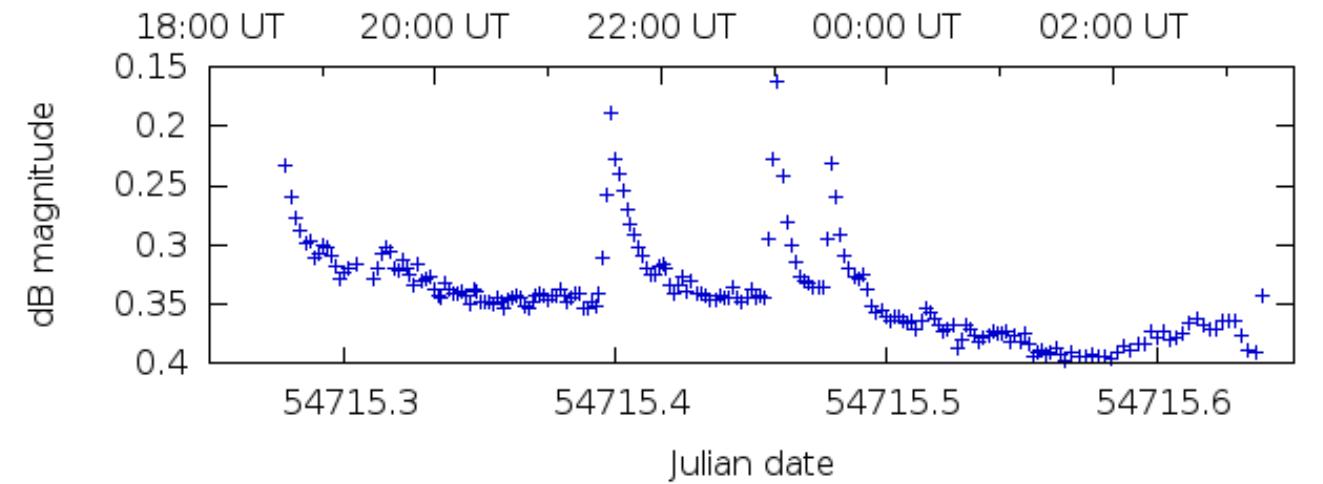
max. $\Delta\text{mag} \sim 1.8$



Fun fact: the time scale of the smaller eruptions is compatible with a CME hitting one of the planets

Flares / sympathetic eruption(s)

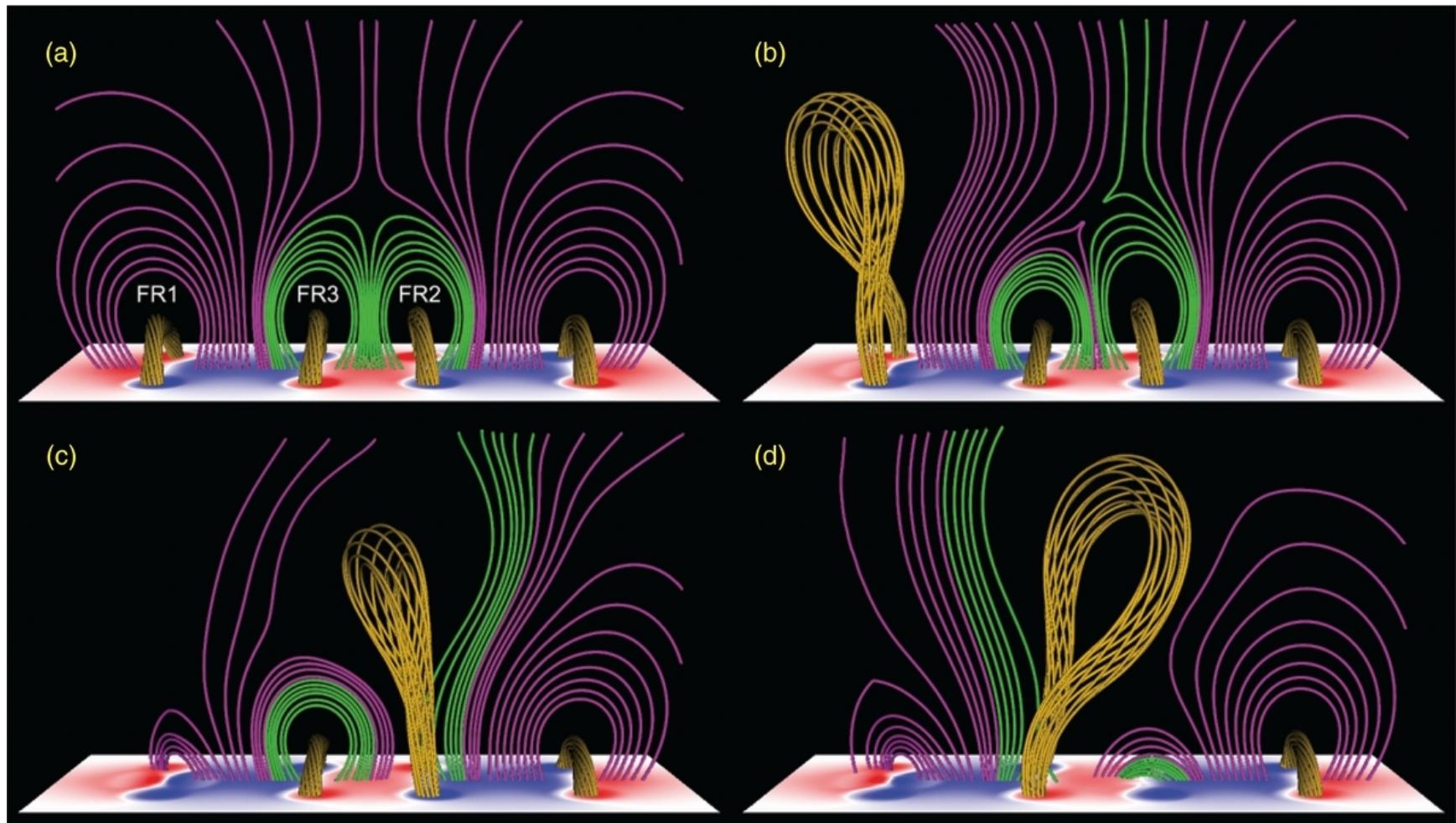
- Flares started by earlier eruptions
- May be similar to solar events, e.g. on 2010 Aug. 1.
- Model of the event: Török et al. 2011 ApJ 739 L63



Possible sympathetic eruption(s)

fallback slide

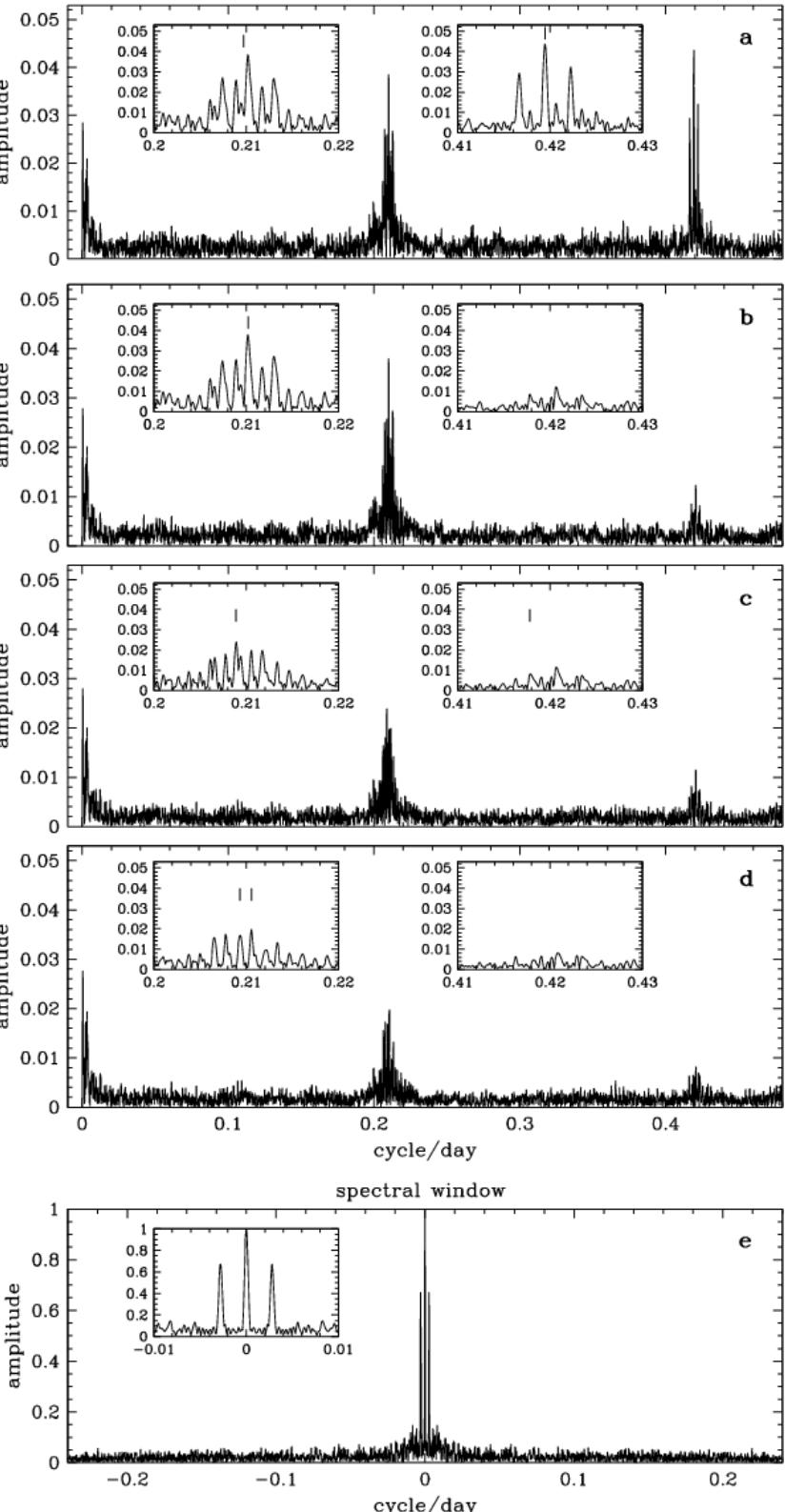
- Several similar events, one example from 2008 Sept. 5/6.
- May be similar to solar events, e.g. on 2010 Aug. 1.
- Model of the event: *Török et al. 2011 ApJ 739 L63*



Differential rotation can be estimated
by different methods:

- photometry + Fourier analysis

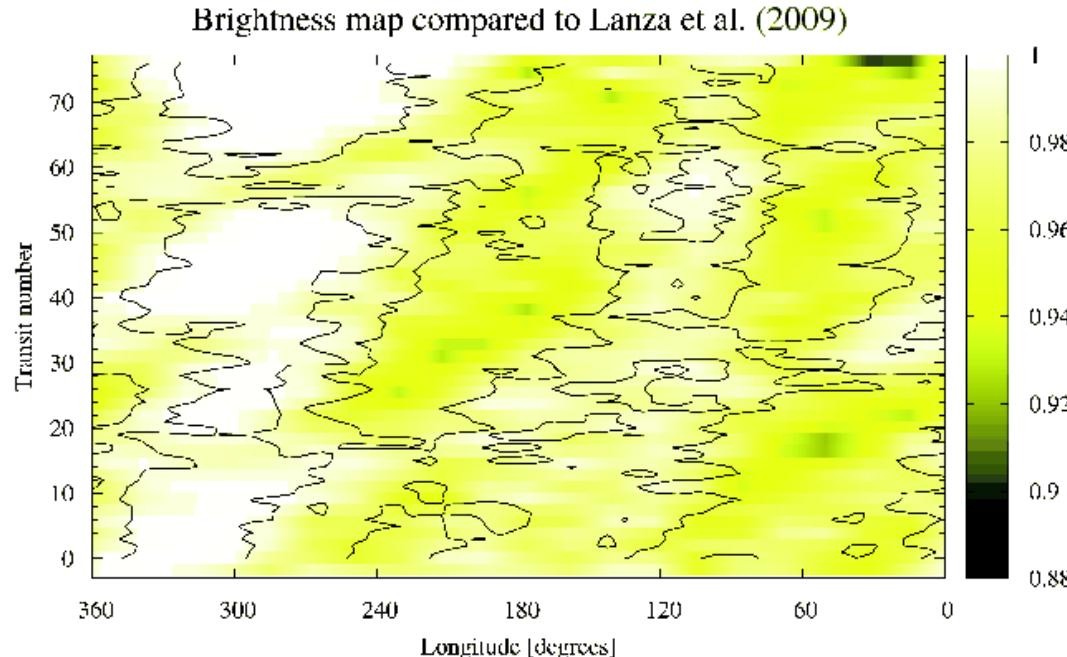
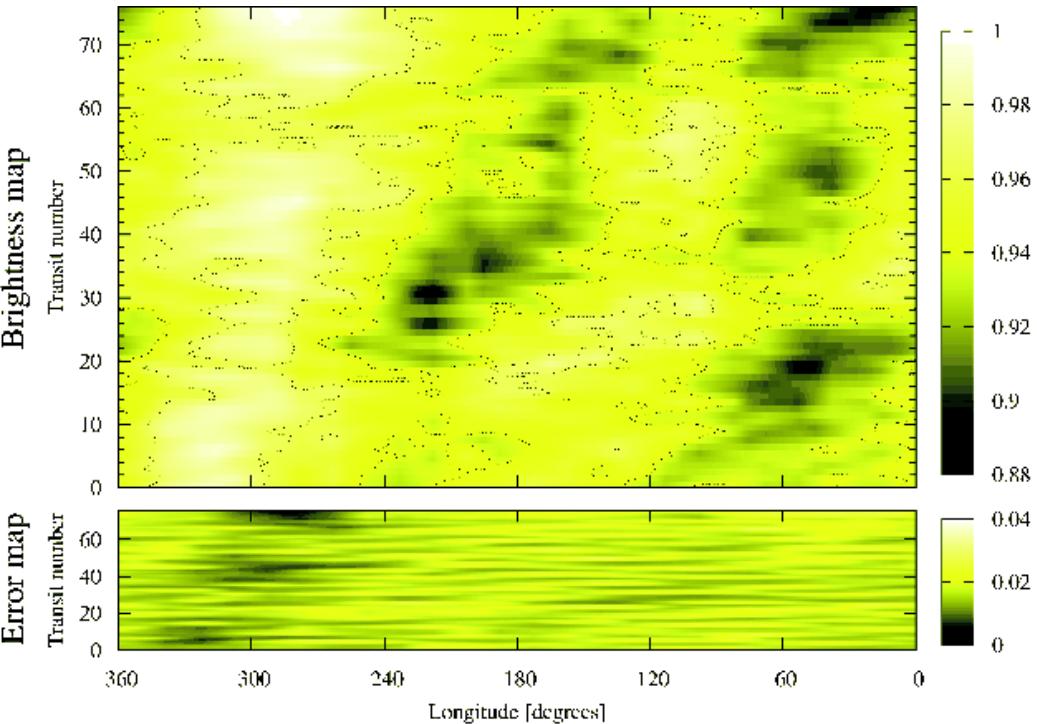
Differential rotation is one of the
key elements of solar-like stellar magnetism



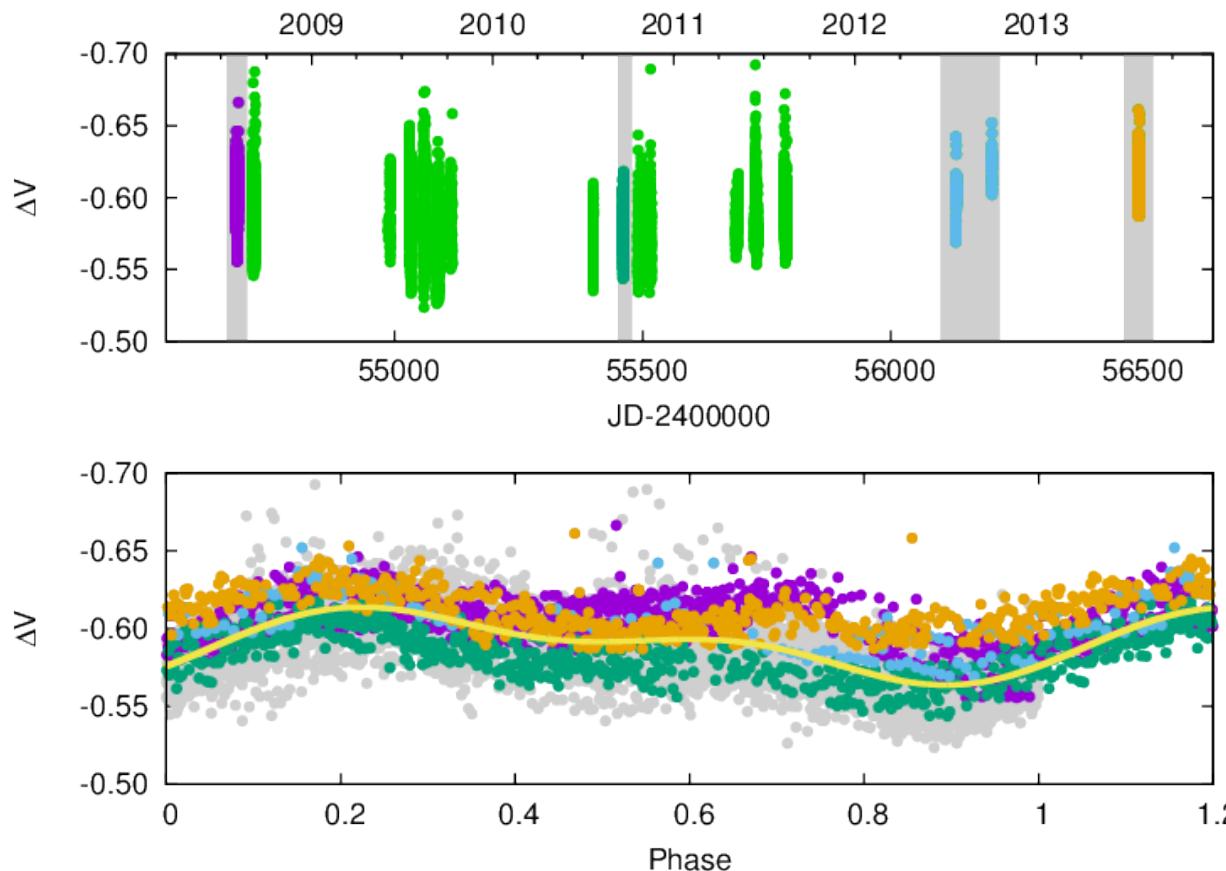
Differential rotation can be estimated
by different methods:

- photometry + Fourier analysis
- eclipse mapping (if planets are present)

Huber et al.
2010A&A...514A..39H



Fast variations of the surface?



stable light curve over 5 years!

there are still short-term
changes: emerging/decaying
active nests?