Magnetic activity of two similar subgiants in binaries with very different mass ratios: EI Eri and V711 Tau

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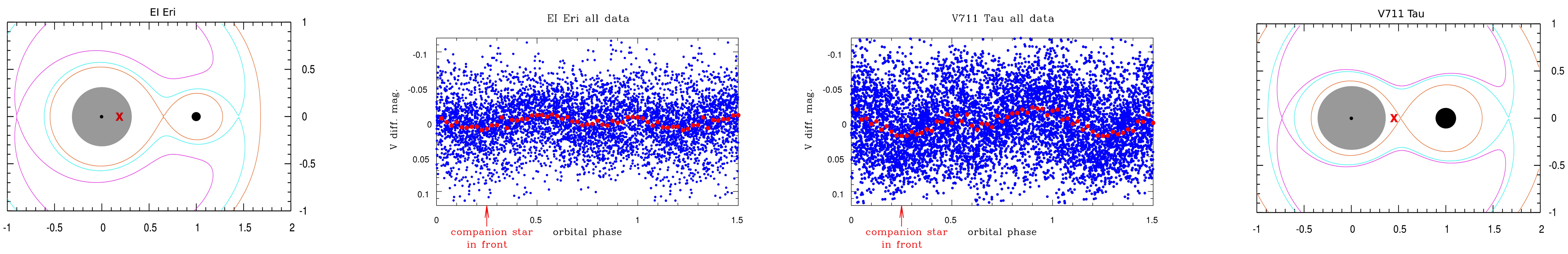


Configuration of EI Eri (left) and V711 Tau (right). Red crosses mark the mass centers of the systems. In the middle panels photometry (detrended) from about three decades are plotted versus orbital phases. Phase-binned data are shown as big red dots.

EI Eri

G5IV+dM4-5(?)

T_{eff} ~5500K

masses: 1.09/0.25 M_{Sun}

radii: 2.37/0.3 R_{Sun}

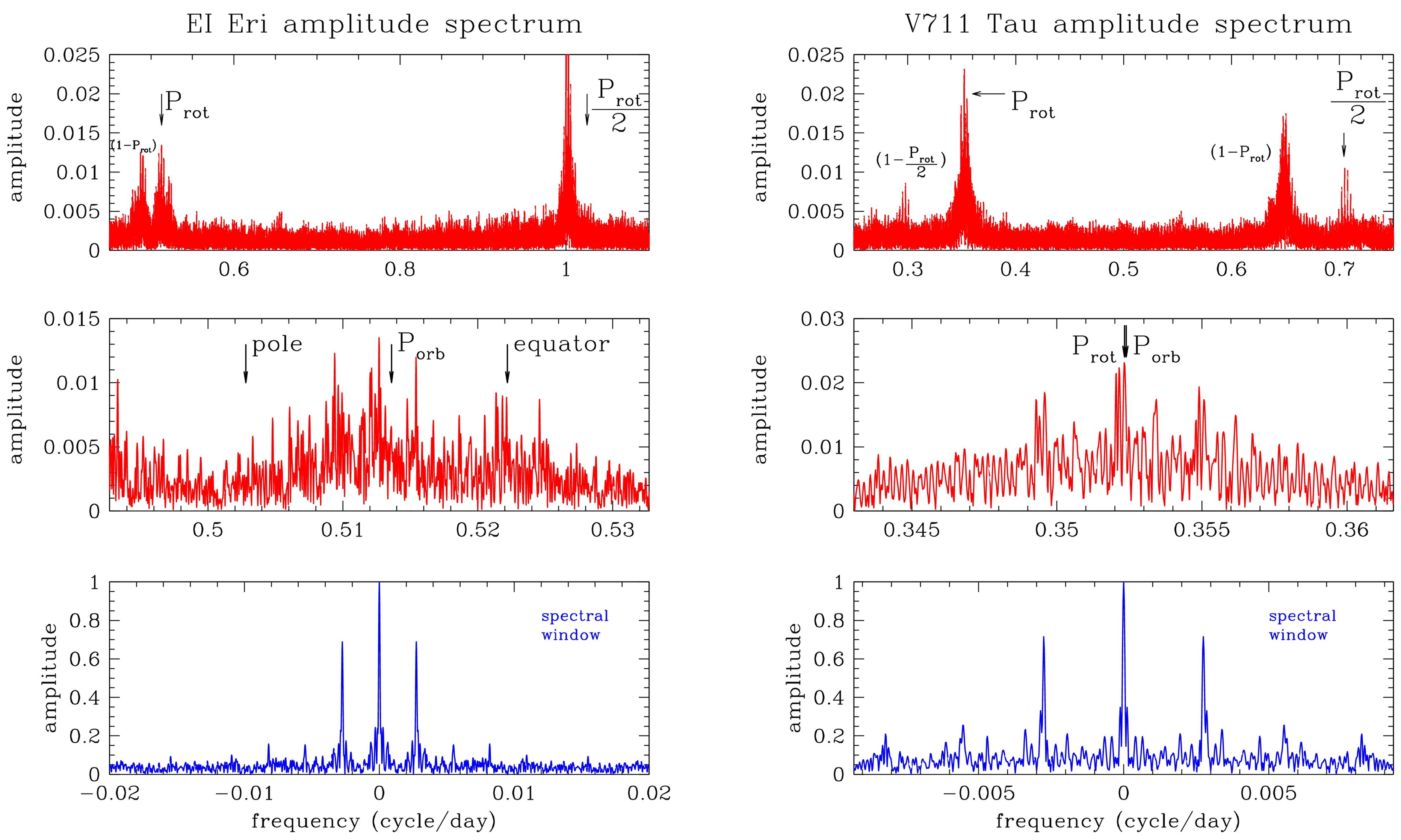
$v \sin i$ = 51 km/s

i ~ 56°

P_{orb} = 1.947232 days

$a = 5.0 \cdot 10^6$ km

Several periods are present due to differential rotation, corotating latitude is at ~ 40°.



V711 Tau

K1IV+G5V

T_{eff} ~4750/5500K

masses: 1.45/1.14 M_{Sun}

radii: 4.12/1.32 R_{Sun}

$v \sin i$ = 51 km/s

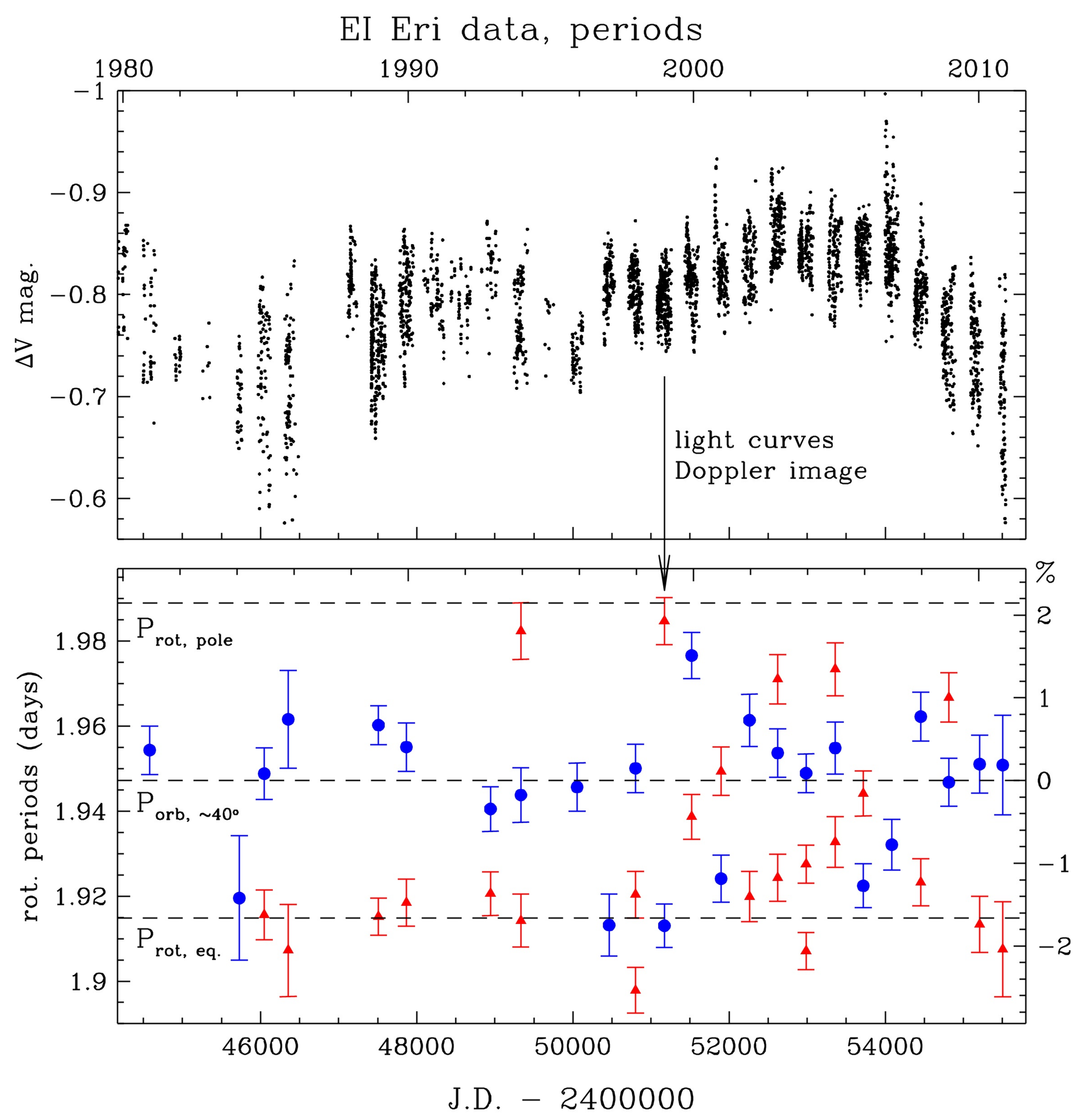
i ~ 33°

P_{orb} = 2.83774 days

$a = 8.06 \cdot 10^6$ km

One period and its half are both present. There is no, or very small differential rotation.

Amplitude spectra of the photometric data. Marked are the orbital and rotational periods.



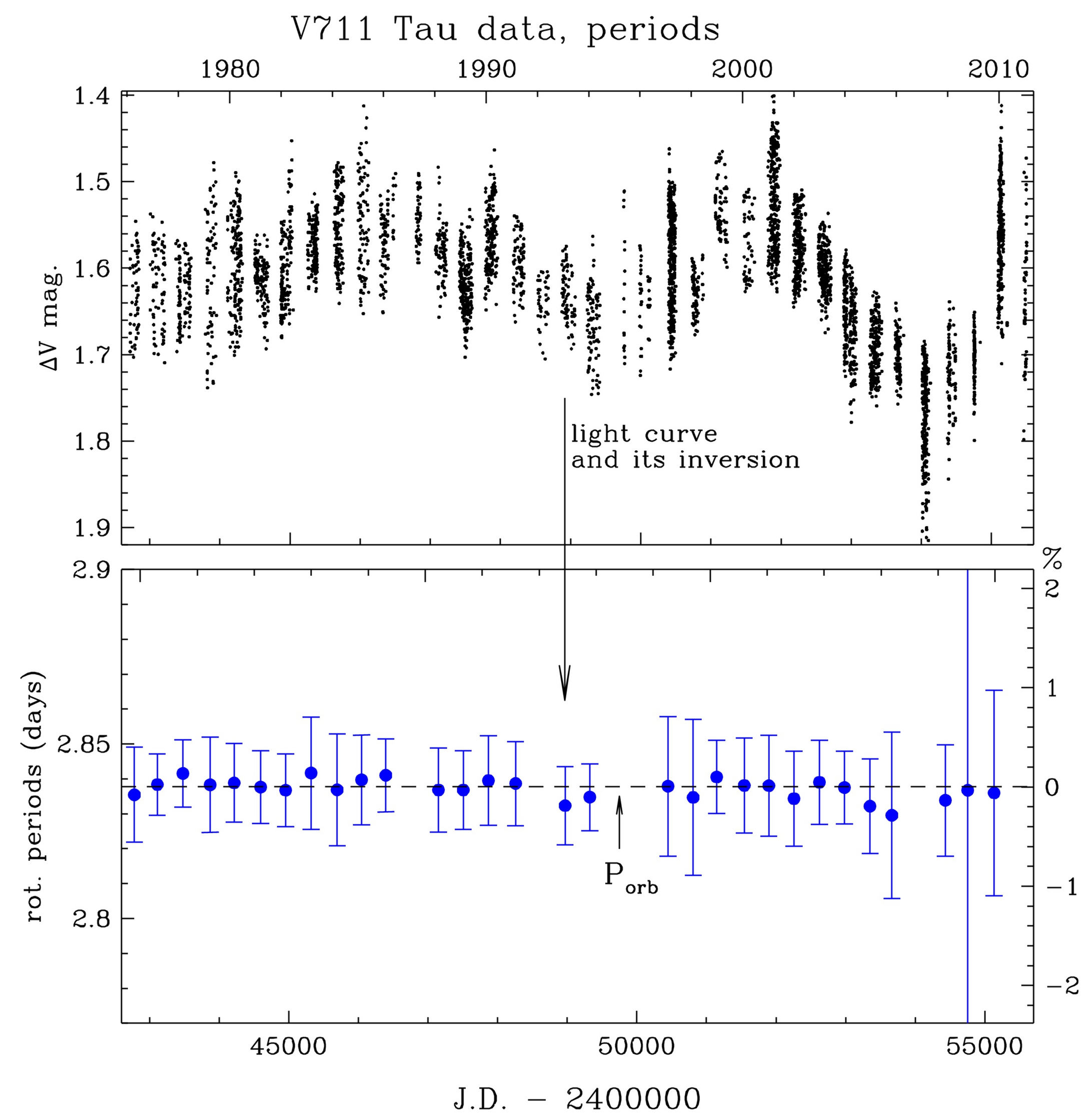
Observational data (top) and yearly mean periods: the right y-axis shows the deviation from the orbital period.

A marked difference appears when we plot the yearly mean rotational period(s) of the systems.

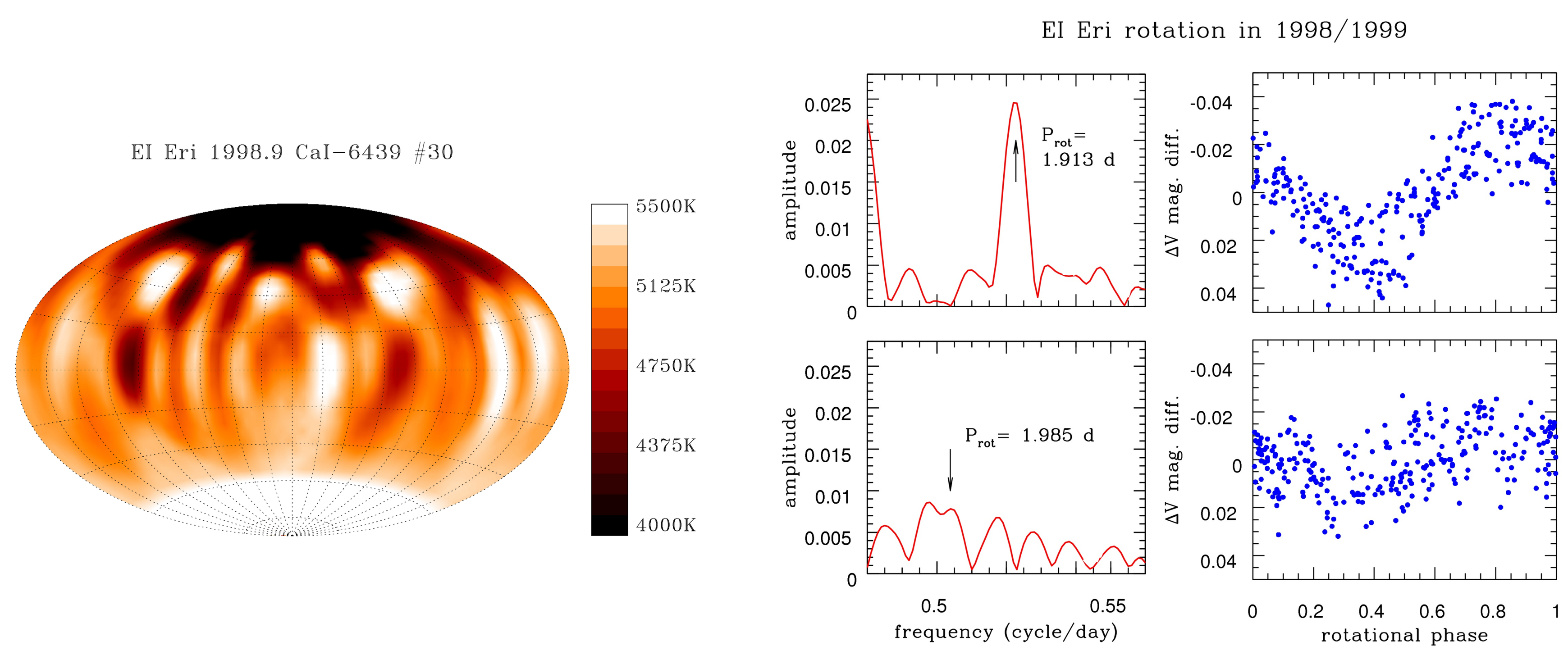
The multiple yearly periods of **EI Eri**, reaching 2% deviation from the orbital period, is a clear signature of differential rotation.

V711 Tau has just one rotational period close to the orbital one each year, and its first harmonic, indicating two spotted regions opposite to each other.

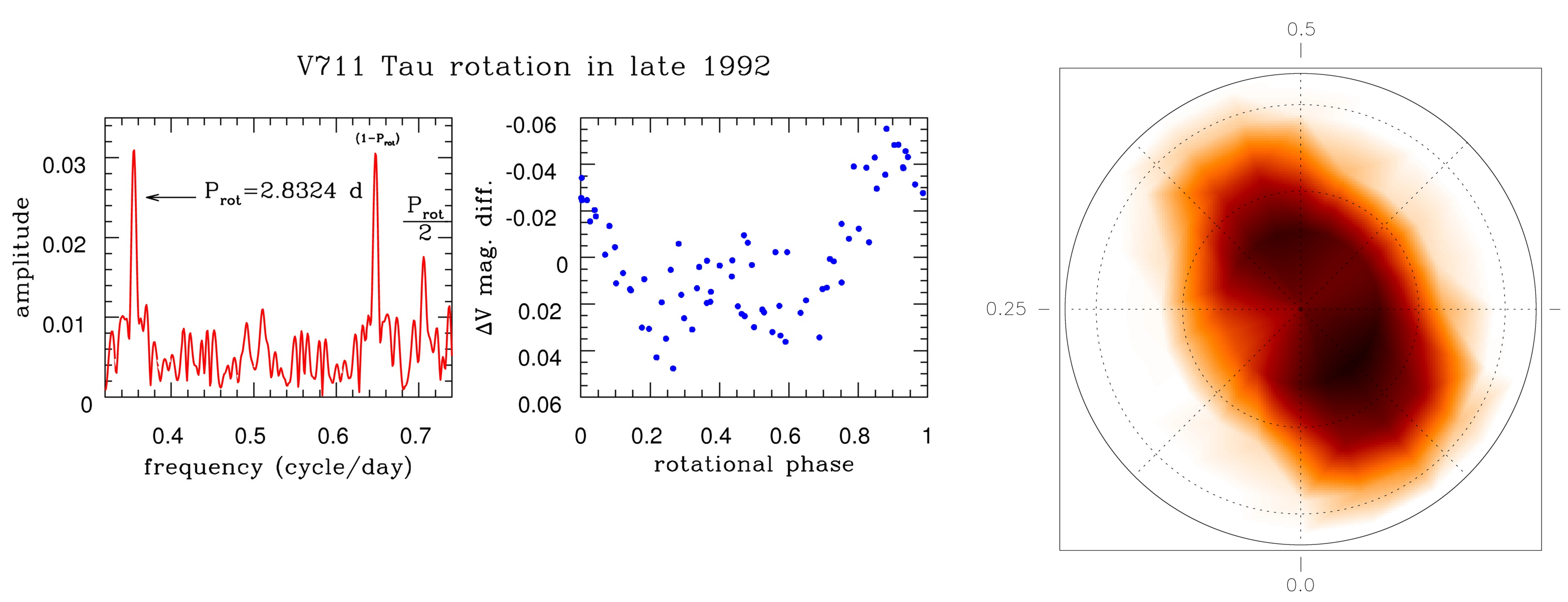
This difference originates very possibly from the difference between the secondaries. Theoretically not much is known about the behaviour of the magnetic flux tubes in the gravitational field of a close binary system.



Observational data (top) and yearly mean periods: the right y-axis shows the deviation from the orbital period.



Doppler image and the corresponding light variation with two periods, one belongs to high latitude, the other to near the equator.



Light curve inversion and the corresponding light variation with one period and its half, resulting in a clear double-humped light curve.