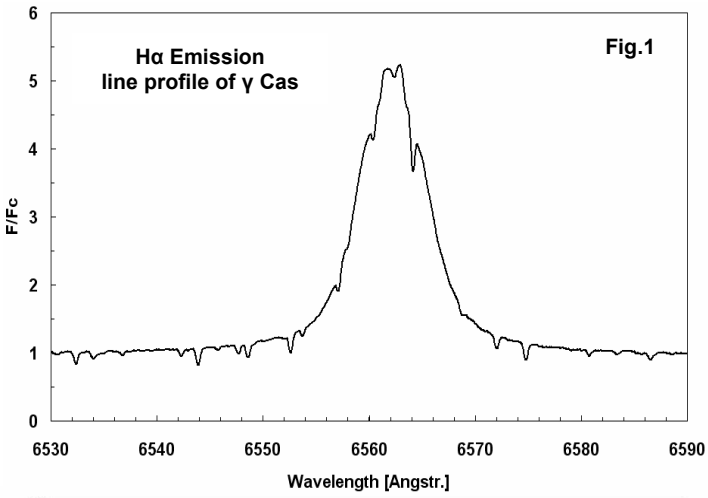
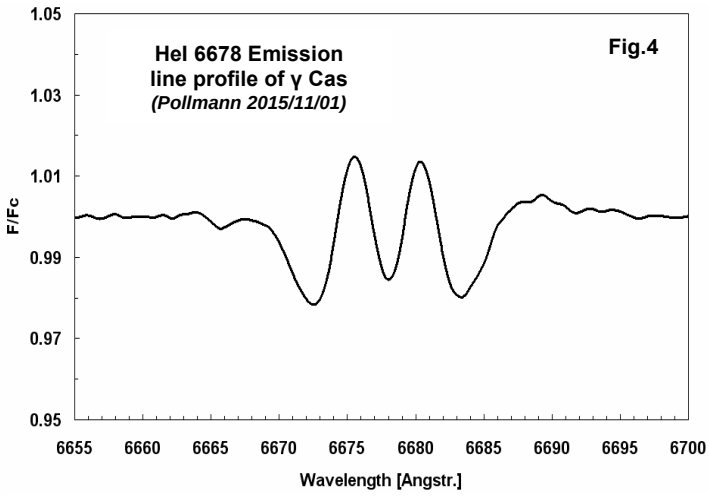
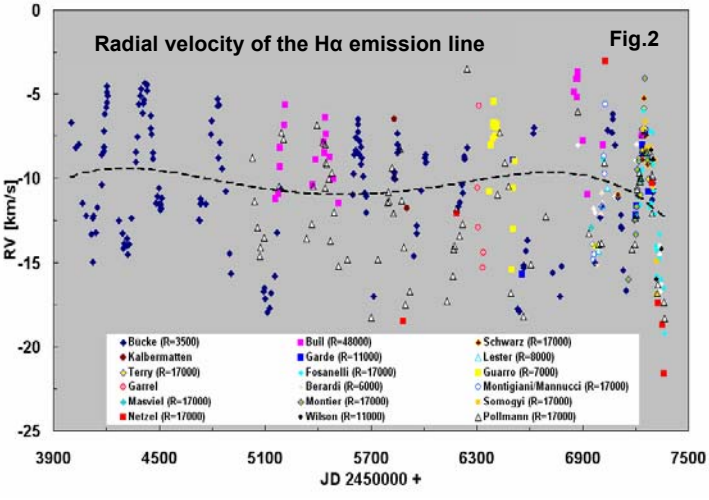
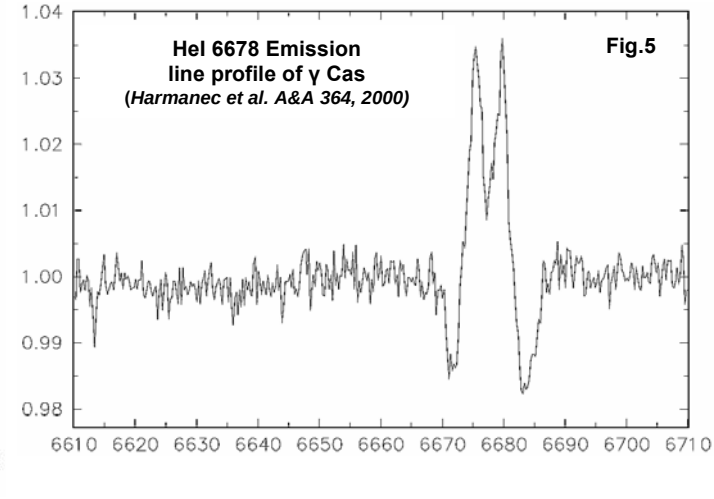
Campaign Monitoring Radial Velocity of HeI 6678 of γ Cas









P A R A M E T E R S U M M A R Y

Long. of Periastron = 41.924 +95.441 -94.492 degrees
Eccentricity = 0.02777 +0.03891 -0.02777

Semi-Amplitude = 3.8875 +0.1511 -0.1509 km/s
Systemic Velocity = -0.5478 +0.1070 -0.1070 km/s

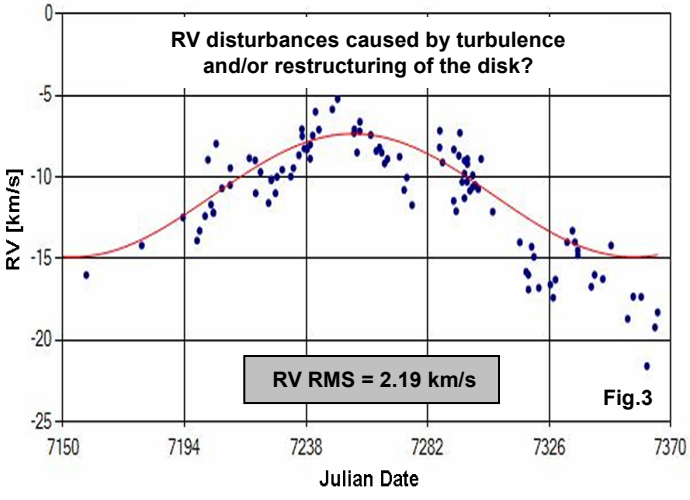
Orbital Period = 203.4064000 +2.31e-01 -2.29e-01 days
Time of Periastron = 3823.96165 ±2.37273 MJD

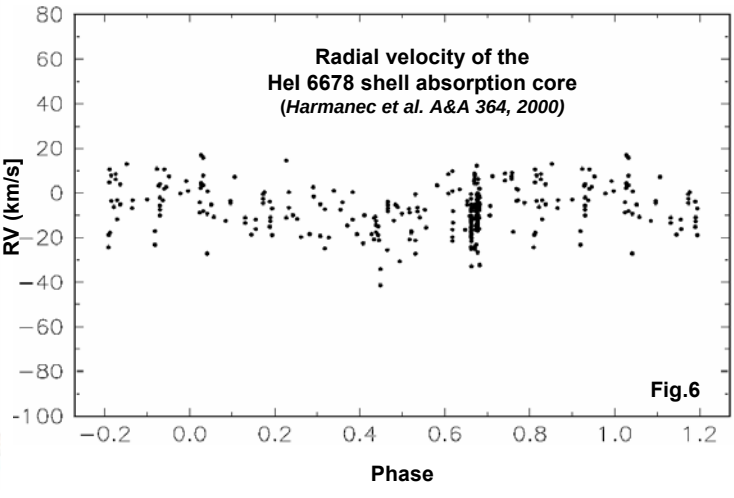
a sin(i) = 1.0869e+07 ±5.57e+05 km
f(m) = 1.2367e-03 ±1.90e-04 Msol

(Pollmann, Dec./2015)

Element	Hα emission	He I 6678 abs.
P (d)	$203^{d}.59 \pm 0.29$	$203^{d}.59$ fixed
$T_{\rm peri.}$	50578.7 ± 4.2	50576 ± 16
$T_{\rm upper\,c.}$	50592.8	50599.8
$T_{\rm lower\,c.}$	50513.9	50528.8
e	0.260 ± 0.035	0.260 fixed
ω (°)	47.9 ± 8.0	23 ± 27
K_1	4.68 ± 0.25	7.0 ± 1.5
γ	–	-7.38 ± 0.64

(Harmanec et al. A&A 364, 2000)





Campaign Monitoring Radial Velocity of HeI 6678 of gamma Cas

The ARAS radial velocity (RV) monitoring (Fig. 2) of the Hα emission profile (Fig. 1) of gamma Cas has revealed irregularities of the RV curve (Fig. 3), particularly within the period JD 2457150 to 2457370, probably caused by restructuring and/or turbulence in the disk.

On the other hand, our results confirm very well the basic orbital parameter of this binary system (see parameter summary). So, we are now confronted with the issue of the causes of the observed RV irregularities. The order of magnitude of the RV deviation of the calculated orbital curve is given with the RMS value of 2.19 km/s.

It is possible that monitoring the RV of the HeI 6678 emission of gamma Cas (Fig. 4 & Fig. 5) will offer an opportunity to observe an "undisturbed" process. The HeI 6678 emission develops close to star´s photosphere and, therefore, it should be possible to measure RV without restructuring or turbulence effects, as in the outer region of the disk at H-alpha.

RV measurements of Harmanec et al. (A&A, 364, L85-L88, 2000) at the HeI 6678 emission profile (Fig. 6) led to the same orbital parameter as measurements at Hα (see orbital parameter Harmanec et al.).

With our instruments (telescope, spectrograph and CCD camera), we can achieve a much better signal to noise ratio (S/N) than Harmanec, particularly by using spline smoothing (Vondrak, 1969, Bull. Astron. Inst. Czechosl. 20, 349 & Vondrak, 1977, Bull. Astron. Inst. Czechosl. 28, 84).

This is why, with this report, I want to start a corresponding campaign, in order to contribute to and clarify this issue. It would be great if observers could dedicate as much as possible to this campaign.

December 12th, 2015
Ernst Pollmann