The envelope, torus or disk in the symbiotic binary

YY Her?

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HARDY

Introduction

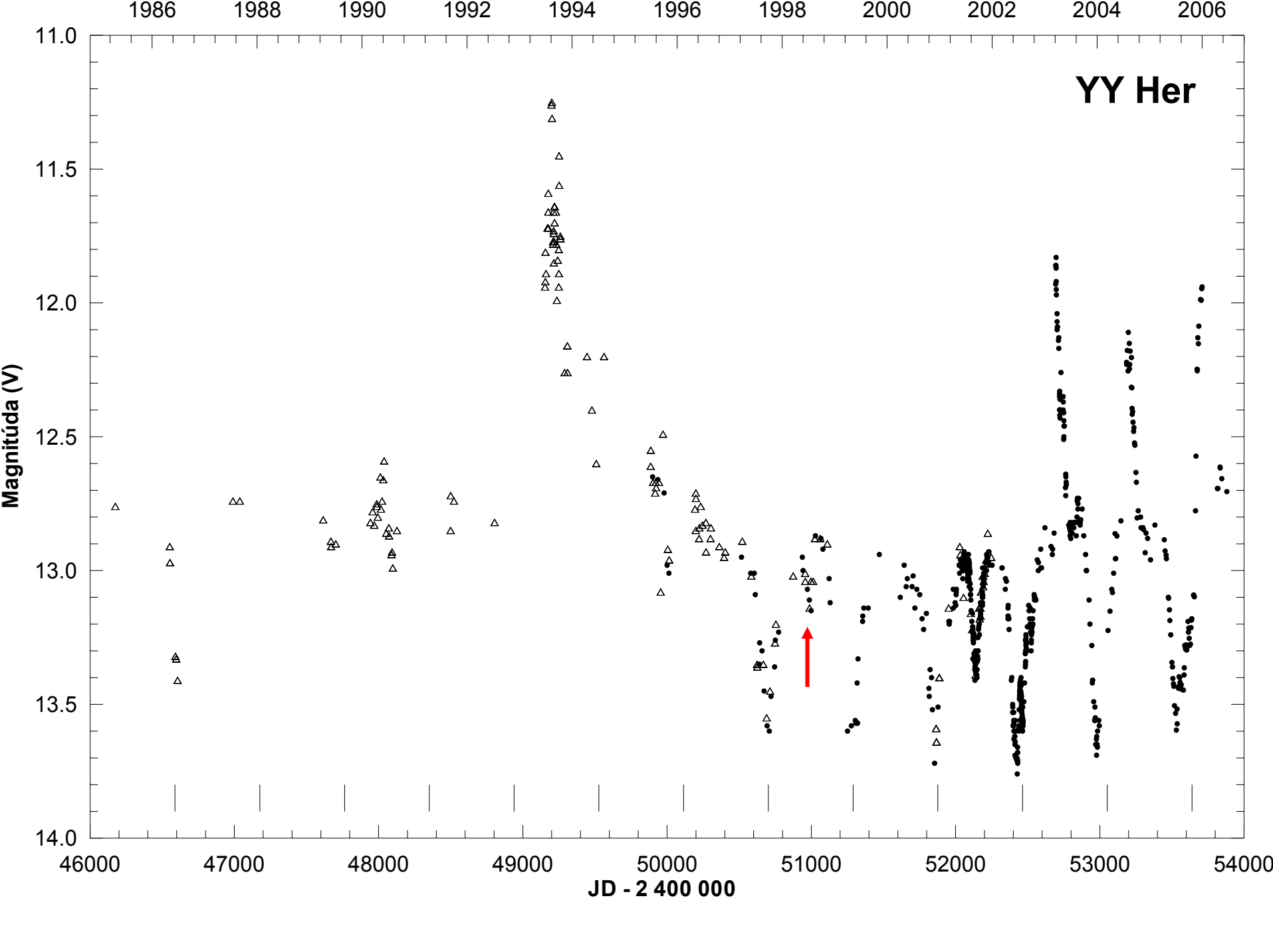
- YY Her belongs to the classical symbiotic binaries

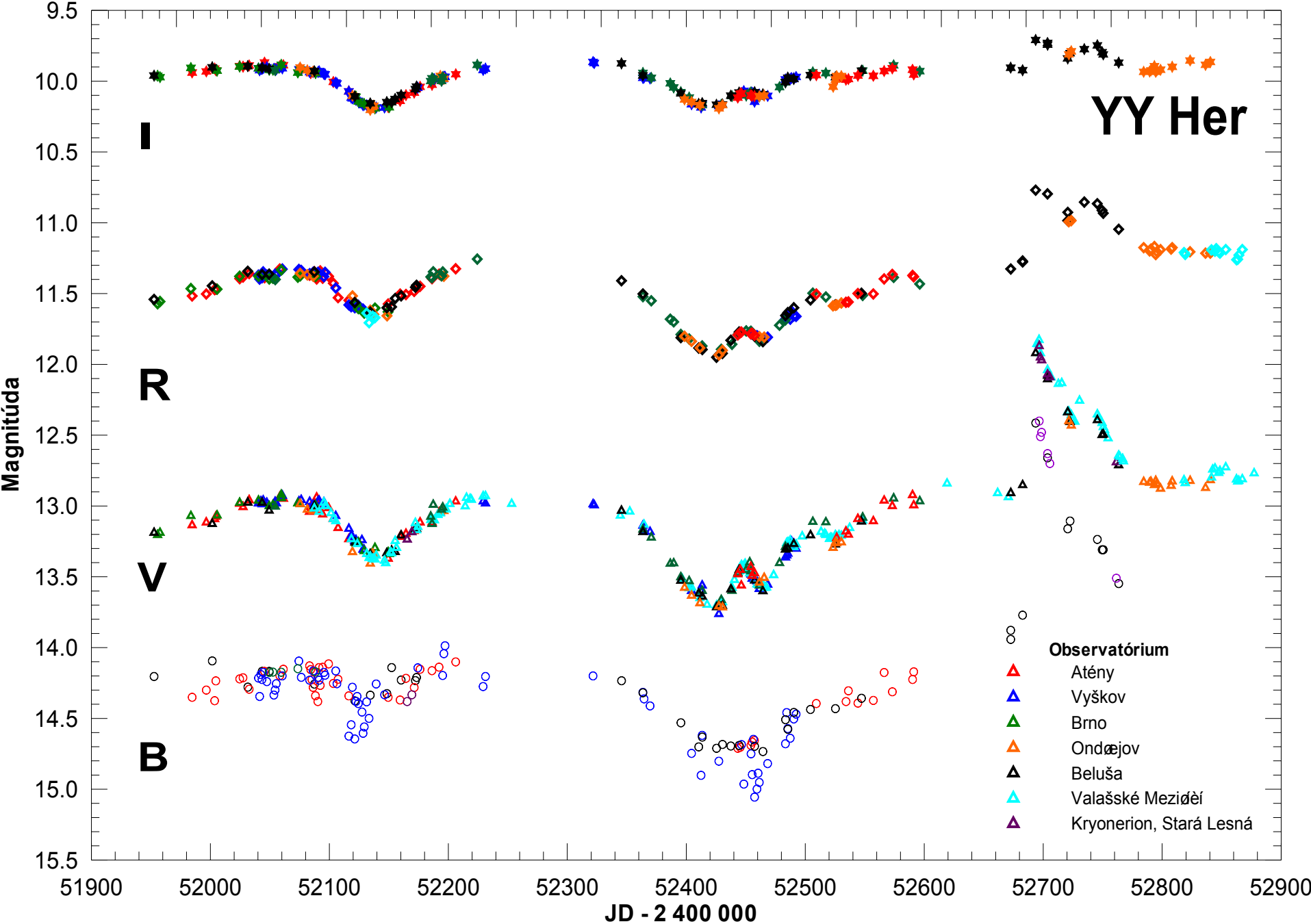
- 4 large outburts 1914-1918, 1930-1933, 1981-1982, 1993-1996
- 6 small eruptions in 1890, 1903, 1942, 1954, 1965 a 1974

Our international photometric campaign

- Discovery of the secondary minimum
- Covering of the primary minimum
- Detection of the outburst activity
- Hric et al. (2001) new ephemeris

$$JD(I)_{min} = 2450701,^{d}6 \pm 1,^{d}0 + 587,^{d}54 \pm 0,^{d}50 \times E$$


YY Her
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
11.0
11.5
12.0
12.5
13.0
13.5
14.0
Magnitúda (V)
46000
47000
48000
49000
50000
51000
52000
53000
54000
JD - 2 400 000

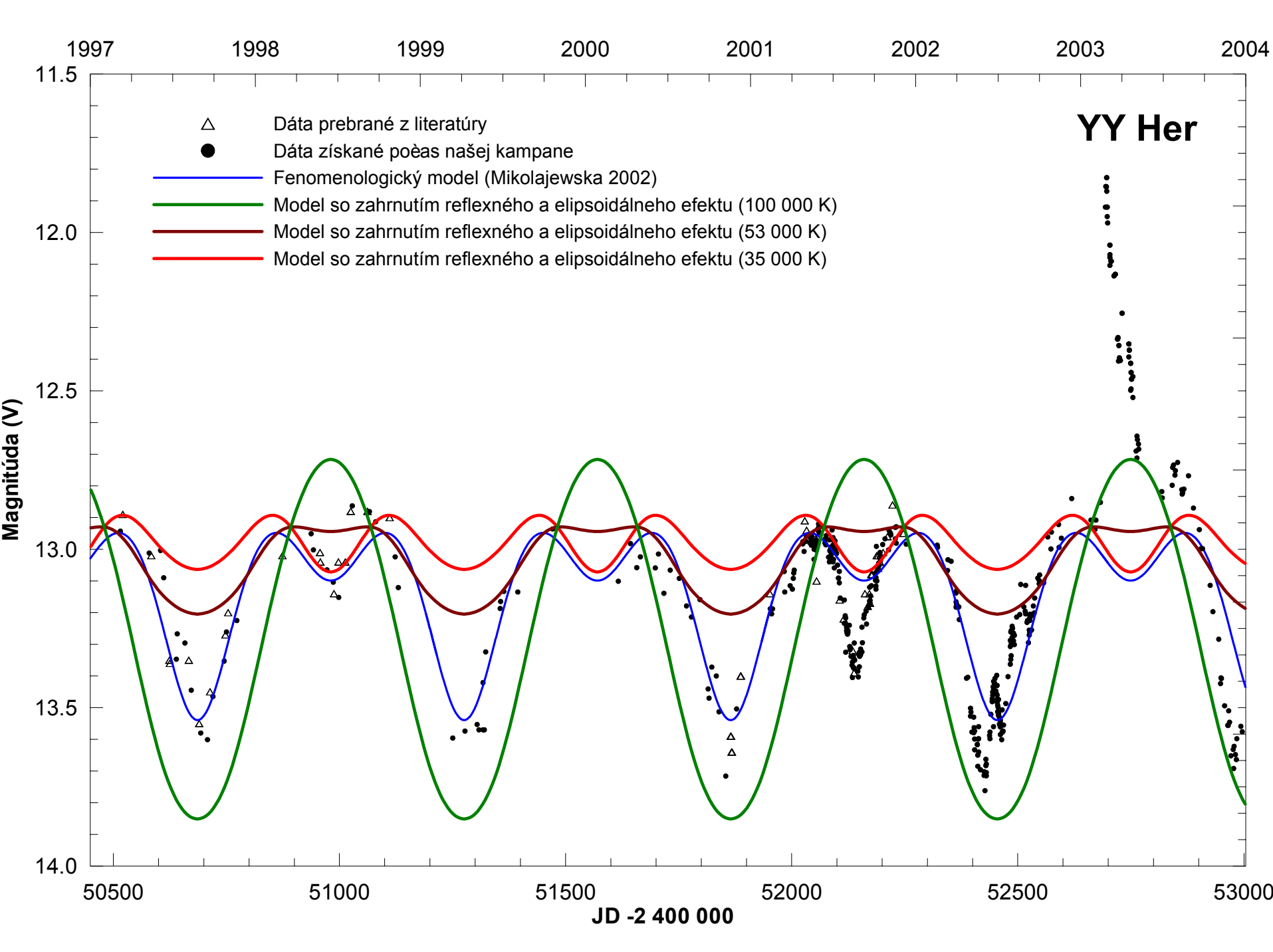

YY Her
I
R
V
B
Magnitúda
JD - 2 400 000
Observatórium
Atény
Vyškov
Brno
Ondæejov
Beluša
Valašské Meziøíèí
Kryonerion, Stará Lesná

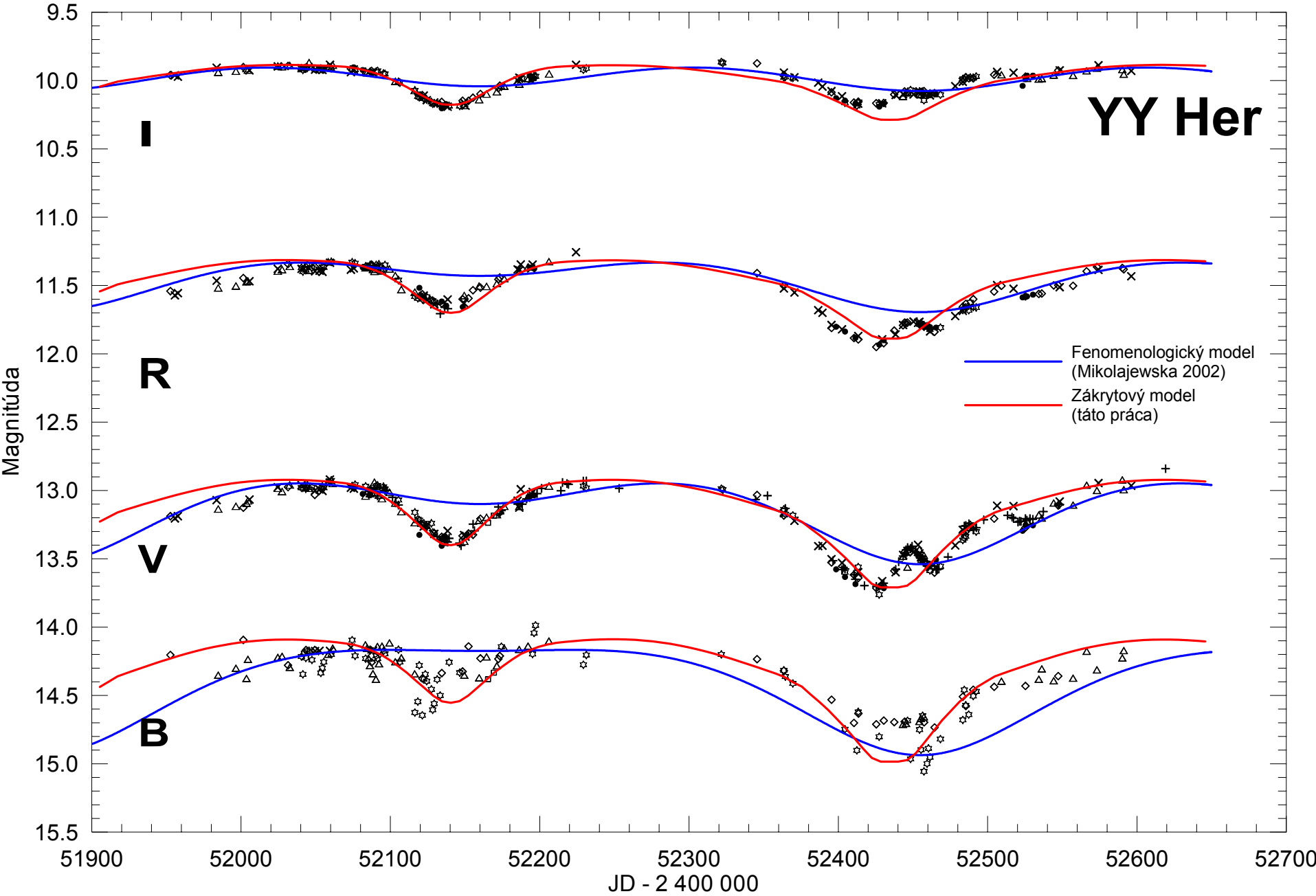
Recent research of YY Her

- Munari *et al.* (1997a) excluded eclipses as the cause of the light variability.
- Mikolajewska *et al.* (2002) explained the light variability of YY Her by combination of the ellipsoidal changes and sinusoidal variations of the nebular continuum and line emission.
- Formiggini & Leibowitz (2006) proposed to explain the secondary minimum by dark spots on the surface of the rotating red giant.

Our explanation

- **Eclipsing model**
- T_{WD} = 100 000 K, Tc = 3 500 K,
  q = Mc / M_{WD} = 2
- red giant near to its Roche lobe
- white dwarf embedded in the envelope with the temperature T_{en} = 4 000 K


YY Her
Dáta prebrané z literatúry
Dáta získané poèas našej kampane
Fenomenologický model (Mikolajewska 2002)
Model so zahrnutím reflexného a elipsoidálneho efektu (100 000 K)
Model so zahrnutím reflexného a elipsoidálneho efektu (53 000 K)
Model so zahrnutím reflexného a elipsoidálneho efektu (35 000 K)
1997
1998
1999
2000
2001
2002
2003
2004
11.5
12.0
12.5
13.0
13.5
14.0
Magnitúda (V)
50500
51000
51500
52000
52500
53000
JD -2 400 000


YY Her
I
R
V
B
Fenomenologický model
(Mikolajewska 2002)
Zákrytový model
(táto práca)
Magnitúda
JD - 2 400 000
9.5
10.0
10.5
11.0
11.5
12.0
12.5
13.0
13.5
14.0
14.5
15.0
15.5
51900
52000
52100
52200
52300
52400
52500
52600
52700

Eclipsing model fits well the photometric behaviour of the system, but the question is: What nature and shape has the envelope around the white dwarf – is it envelope, torus or disk ?

The thickness of the envelope is 0.27 times of its radius, i. e. $H_{en} = 27\ R_{\odot}$

very probably disk


Thank you for your attention
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