Observations of cataclysmic variable stars in TUG observatory

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Structure of non-magnetic systems

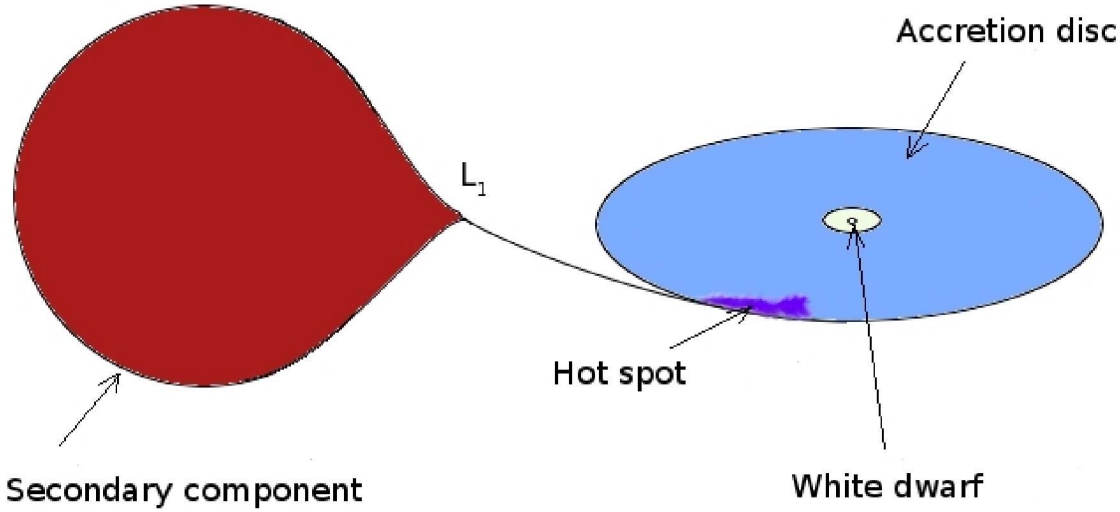
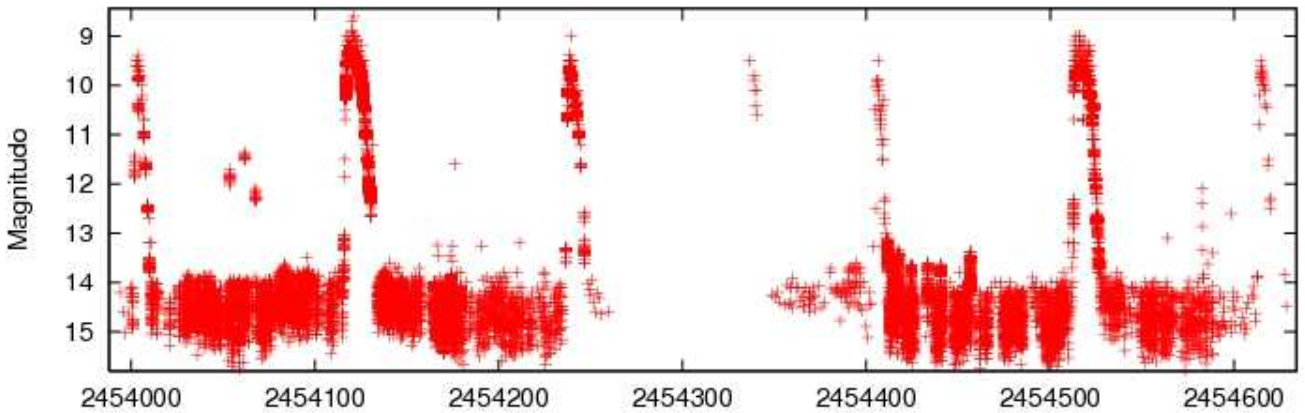


Figure: dwarf nova scheme

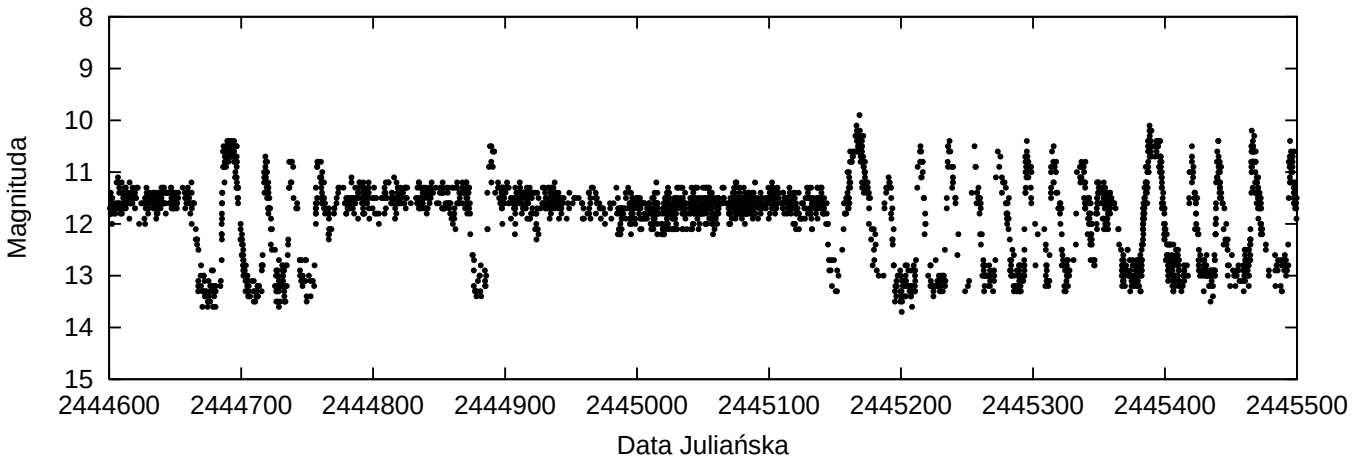
U Gem stars

- About 40% of the knows stars
- variability amplitude $\sim 2^m - 6^m$
- semi-regular outbursts occured 10–1000 days



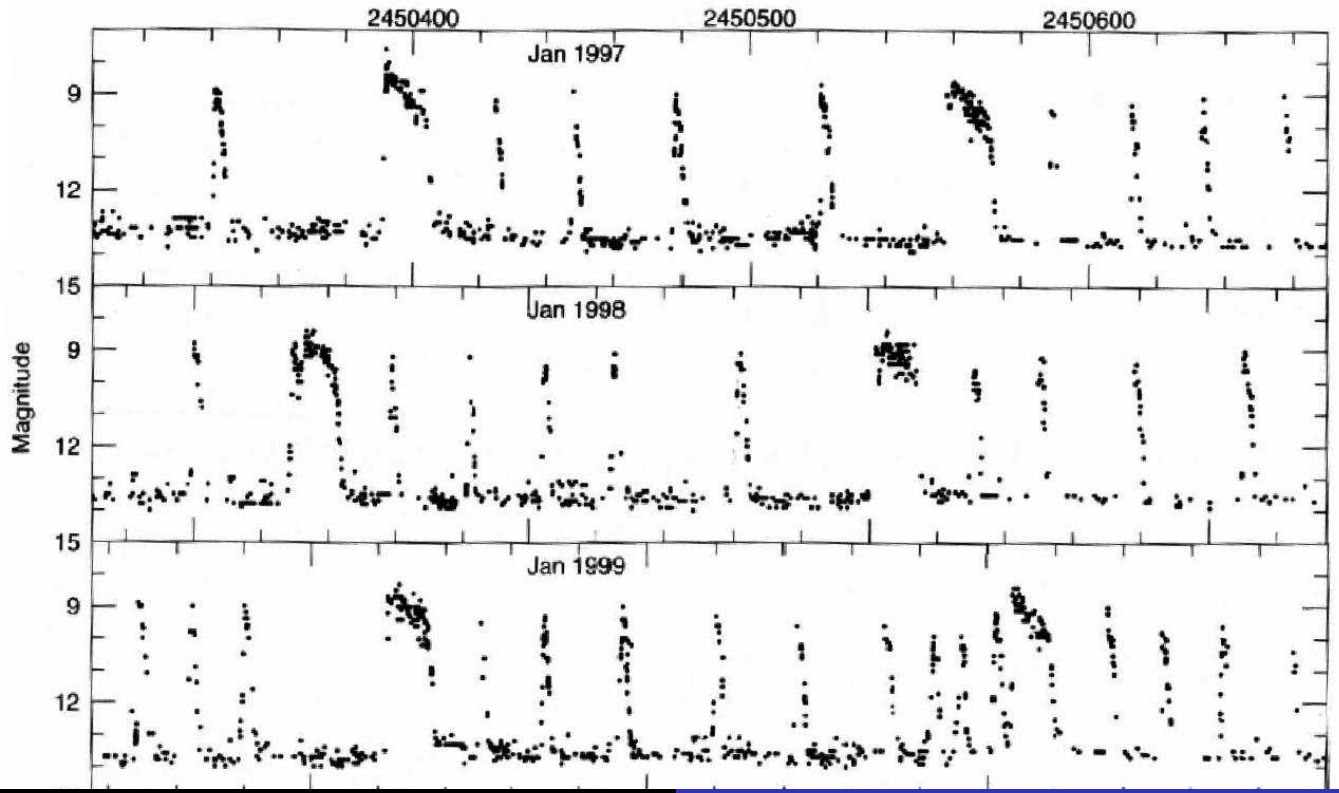
Z Cam stars

- occurrence of random standstill

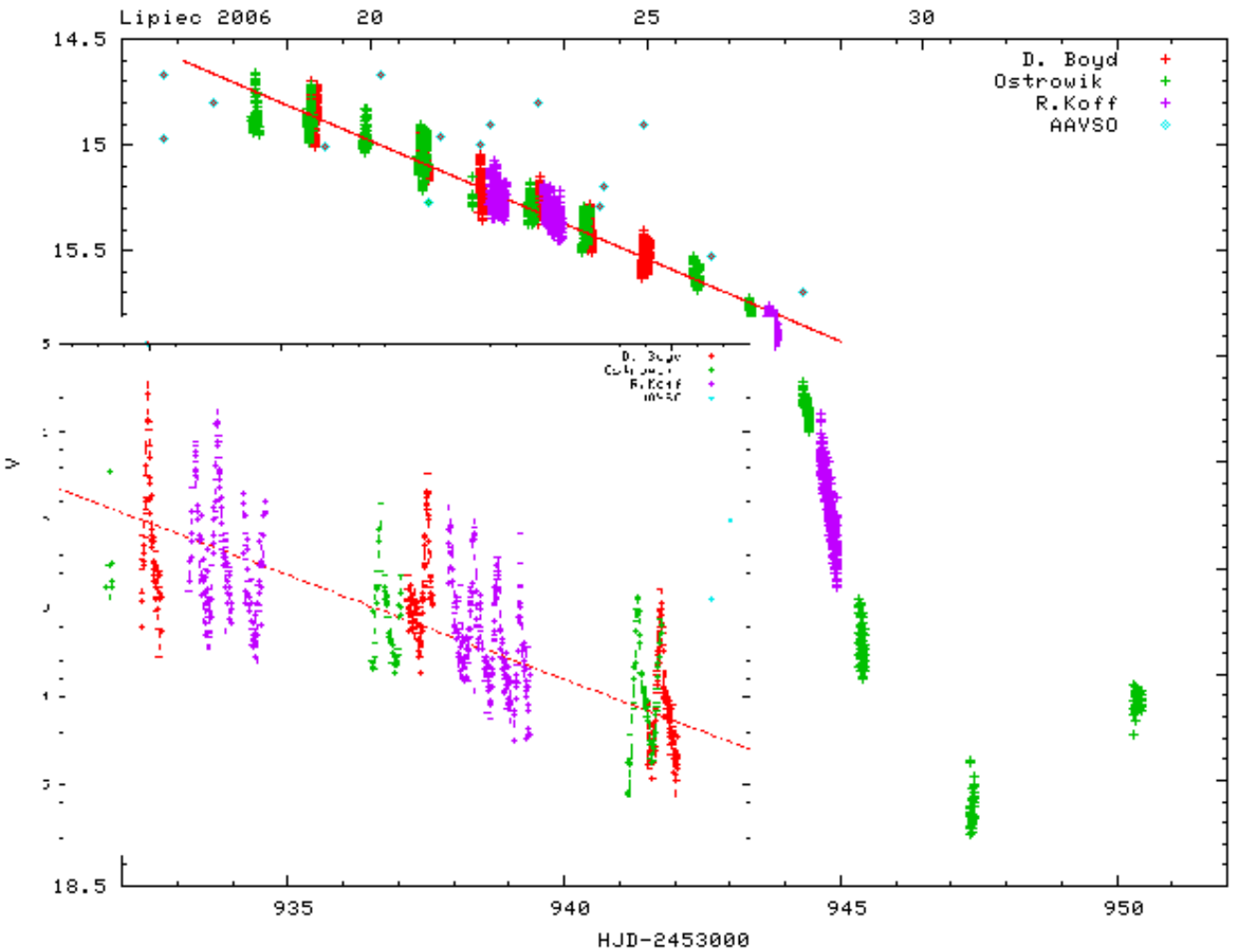


SU UMa stars

- two types of outburst
- additional modulation present in light curve - superhumps.
- orbital periods shorter than 2.5 h

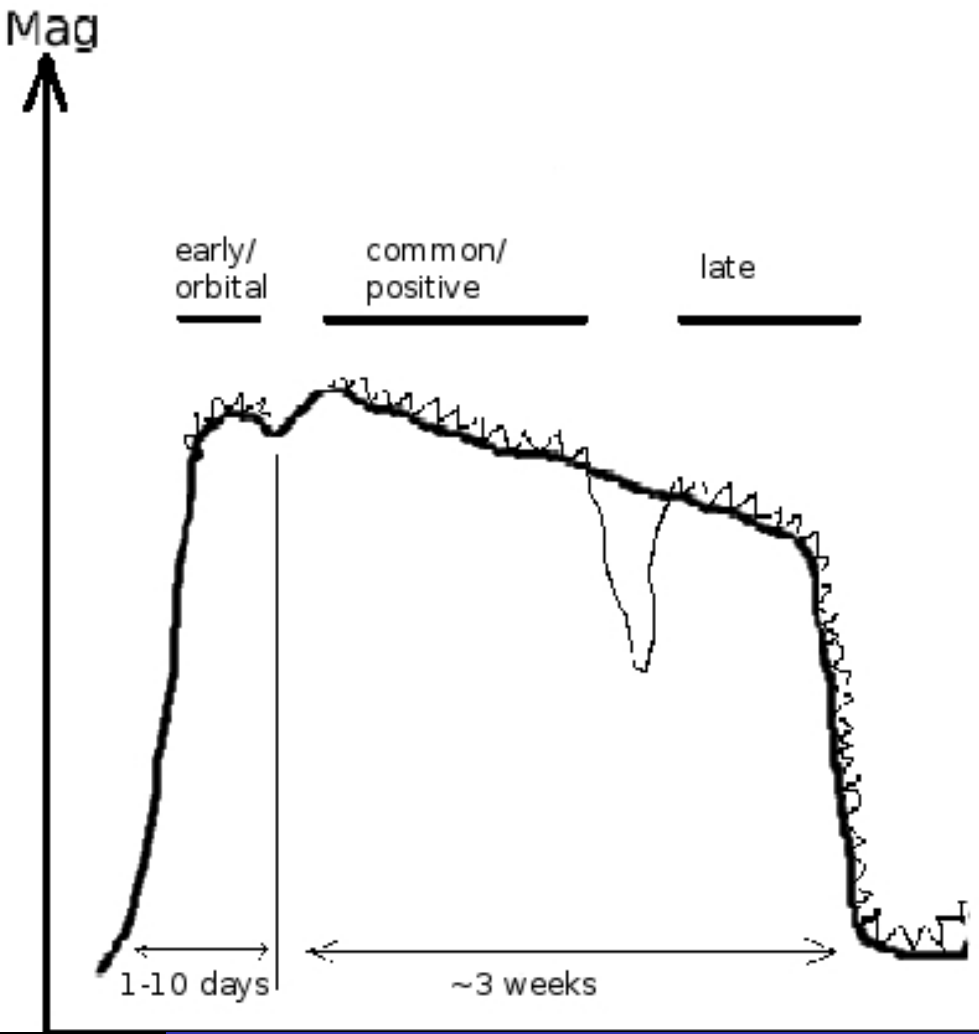


Superoutburst



Superhumps

- common/positive
- orbital
- negative
- early
- late
- permanent



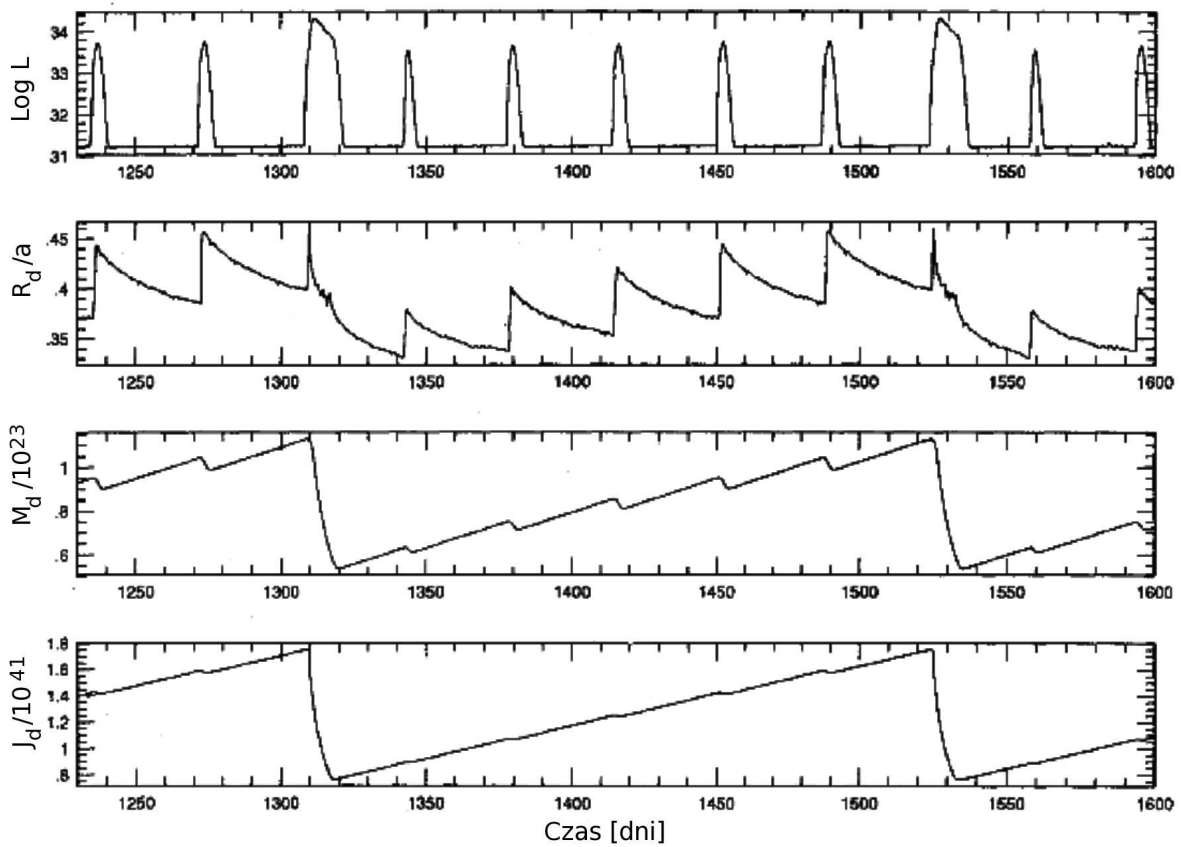
Observational properties of superhumps

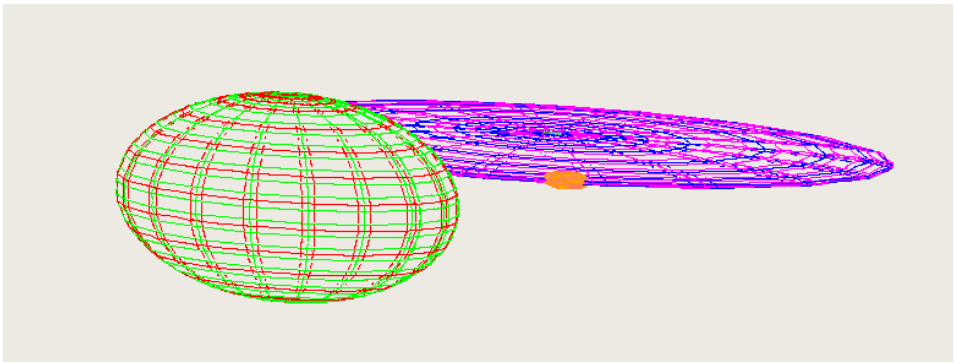
second presentation

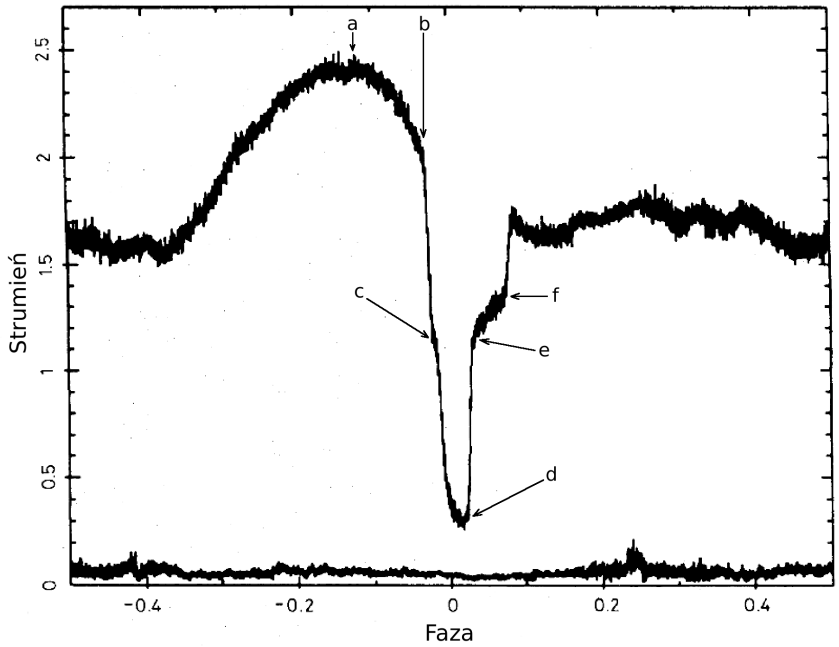
Theoretical models

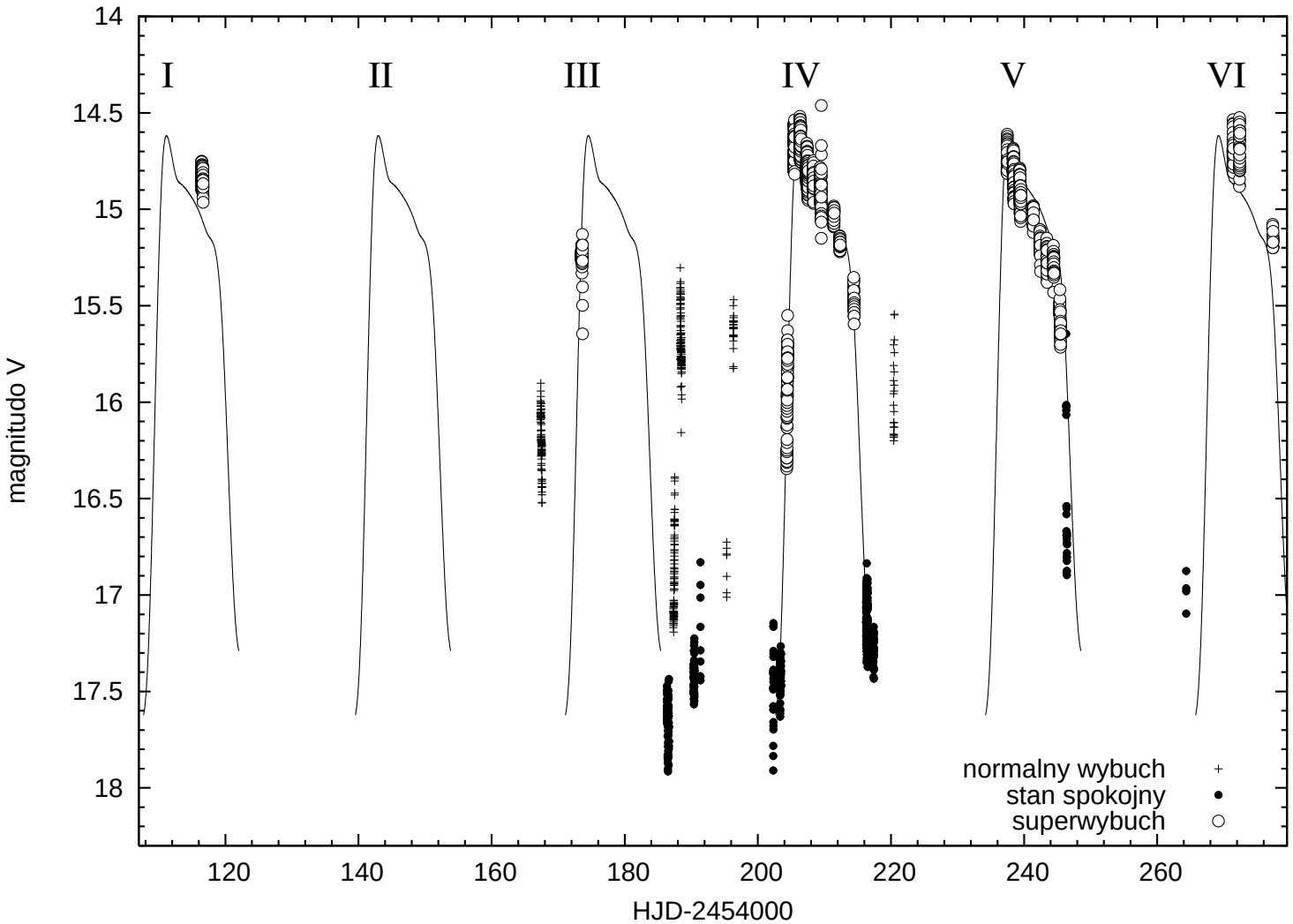
- Termal - tidal instability model TTI Osaki(1989) (outburst are preduced by termal instability in accretion disc composed of partialy ionized hydrogen. Superhumps are produced by tidal interaction of secondary and disc)
- Enhanced mass transfer model (superhumps are preduced by enhanced dissipation of the kinetic energy of the stream - Smak (2009))

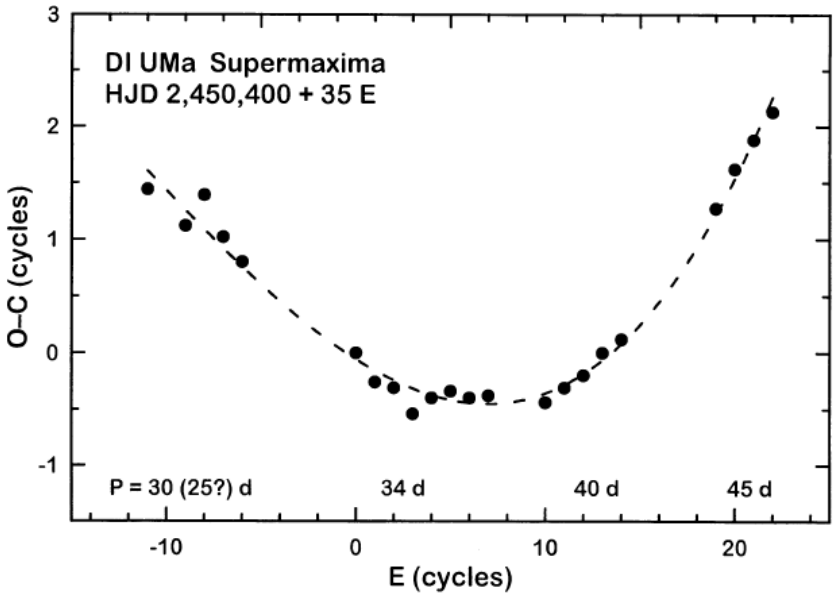
TTI model or Smak's model?



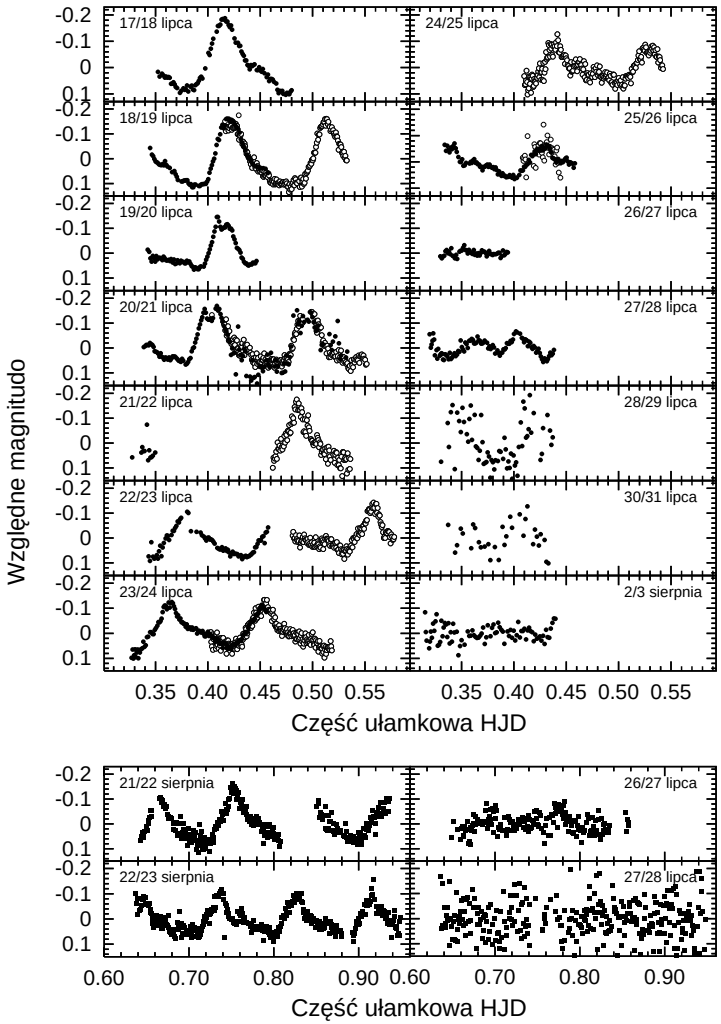



a
b
c
d
e
f
Strumień
Faza
0
0.5
1
1.5
2
2.5
-0.4
-0.2
0
0.2
0.4


I
II
III
IV
V
VI
magnitudo V
HJD-2454000
normalny wybuch
stan spokojny
superwybuch



- $\sim 31.45d$ Rutkowski et al.(2009)
- $\sim 30 - 45d$ Fried et al. (1999)
- $\sim 25d$ Kato et al. (1996)


17/18 lipca
24/25 lipca
18/19 lipca
25/26 lipca
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27/28 lipca
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28/29 lipca
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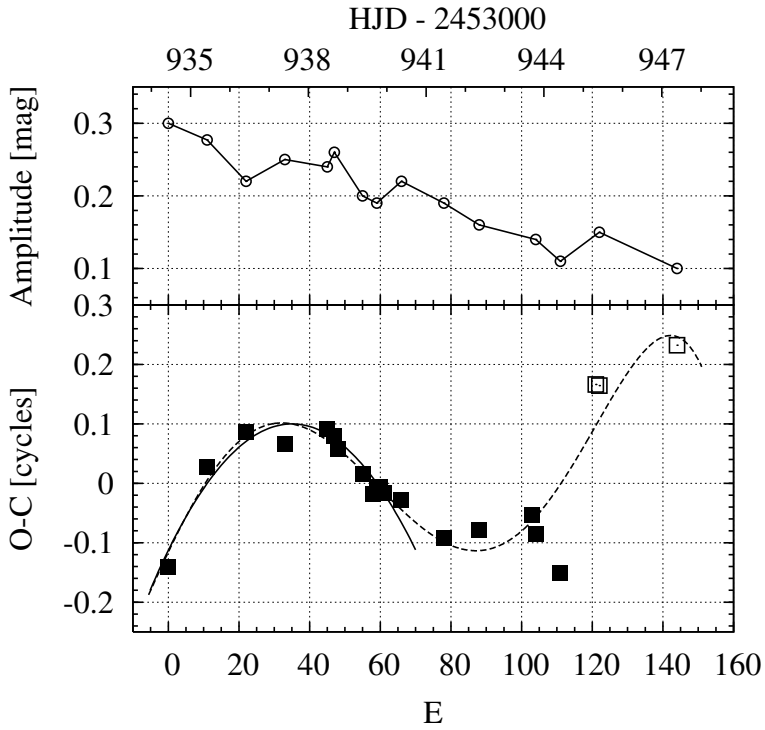
2/3 sierpnia
21/22 sierpnia
26/27 lipca
22/23 sierpnia
27/28 lipca
Względne magnitudo
Część ułamkowa HJD
Część ułamkowa HJD


HJD - 2453000
Amplitude [mag]
O-C [cycles]
E

the third component?

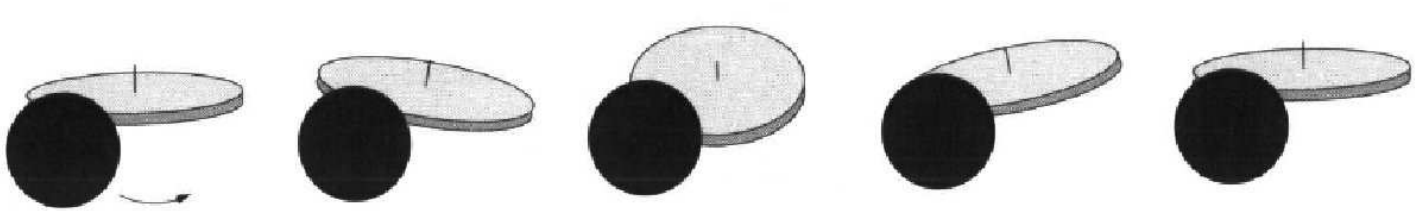


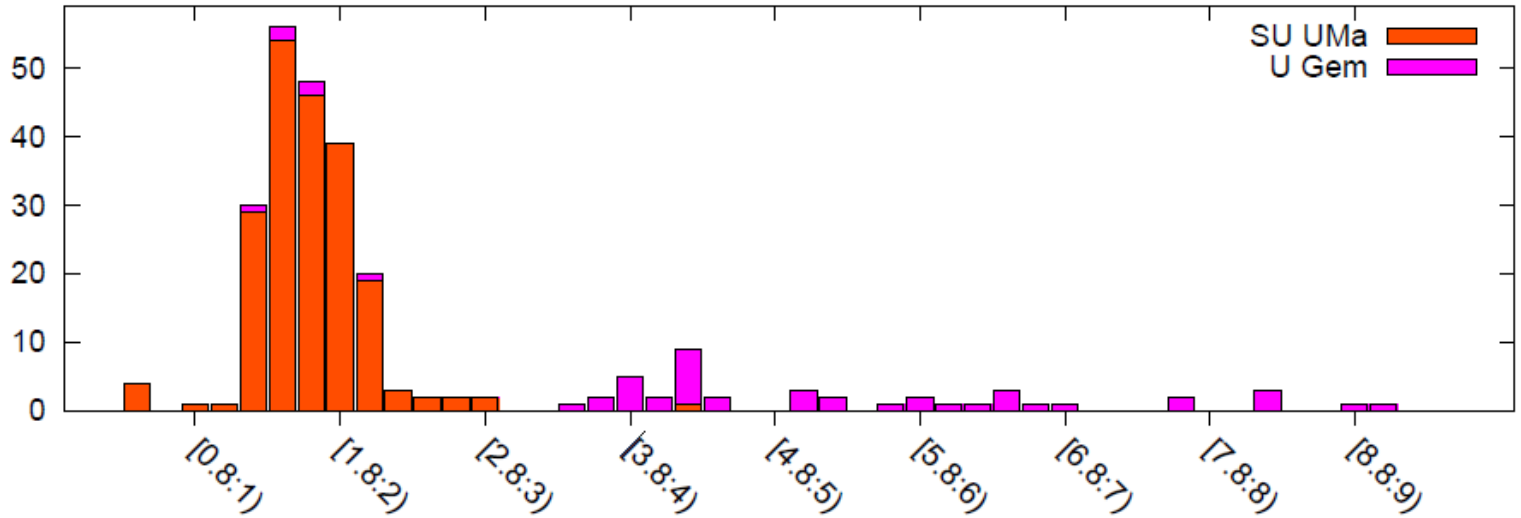
Figure: Presence of the negative superhumps in quiescense state? Olech, Rutkowski, Schwarzenberg-Czerny (2008,2009)

35-40 cm telescope

1. ES Dra
2. YZ Cnc
3. V592 Cas
4. 1RXS J053234+624755

35-40 cm telescope

1. ES Dra
   Bright SU UMa about we know very little, $13.9^m - 16.3^m$, $P_{sh} = 0.179$d !



2. YZ Cnc
3. V592 Cas
4. 1RXS J053234+624755

35-40 cm telescope

1. ES Dra
2. YZ Cnc
   Bright and active 10-15.5, worth to know her cycle and supercycle
3. V592 Cas
4. 1RXS J053234+624755

35-40 cm telescope

1. ES Dra
2. YZ Cnc
3. V592 Cas
   Eclipsing dwarf nova (nova-like) with negative superhumps.
   O-C diagram for orbital period should reveal presence of third component $12^m - 14^m$
4. 1RXS J053234+624755

35-40 cm telescope

1. ES Dra
2. YZ Cnc
3. V592 Cas
4. 1RXS J053234+624755
   bright SU UMa with unknow cycle /supercycle period
   $(11.5^m - 15.5^m)$

60 cm telescope

1. SDSS J165359+20101
   little know dwarf nova ($14.8^m - 17.5^m$)
2. DW UMa
3. PX And
4. V1159 Or

60 cm telescope

1. SDSS J165359+20101
2. DW UMa
   Eclipsing dwarf nova with negative superhumps. O-C diagram for orbital period should reveal presence of third component $15^m - 18^m$
3. PX And
4. V1159 Ori

60 cm telescope

1. SDSS J165359+20101
2. DW UMa
3. PX And Eclipsing dwarf nova with negative superhumps. O-C diagram for orbital period should reveal presence of third component ($15^m - 17^m$)
4. V1159 Ori

60 cm telescope

1. SDSS J165359+20101
2. DW UMa
3. PX And
4. V1159 Ori
   very active ER UMa (subclass of SU UMa) joining program with Warsaw University Observatory.

100 cm telescope

Eclipsing SU UMa stars: goals: a) radius evolution of the disc, b) looking for thid component, c) analysis of superhumps source eclipse

1. IY UMa
2. HT Cas
3. SDSS J150240.98+333423.9

150 cm telescope

1. VS 0329+1250
   - shortest know superhump period 0.0533 (76.89)
2. SDSS J080434.20+510349.2
3. VSX J074727.6+065050
4. SDSS J102146.44+234926.3

150 cm telescope

1. VS 0329+1250
2. SDSS J080434.20+510349.2 WZ Sge (subclass of SU UMa), showedeclipses during superoutburst
3. VSX J074727.6+065050
4. SDSS J102146.44+234926.3

150 cm telescope

1. VS 0329+1250
2. SDSS J080434.20+510349.2
3. VSX J074727.6+065050
4. SDSS J102146.44+234926.3