The WD environment and peculiar brightness changes during the nova outburst

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General connection between white dwarf and light curve of outbursting novae

- optically thick wind model (Kato & Hachisu, 1994)
- accelerate wind mass loss depends on metalicity
- accelerations occurs deep inside the photosphere (Friedjung, 1966)

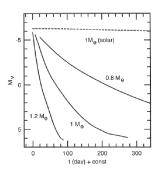


Figure: Kato & Iben (1992)

Peculiar brightness variations during transition phase

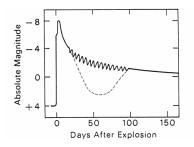
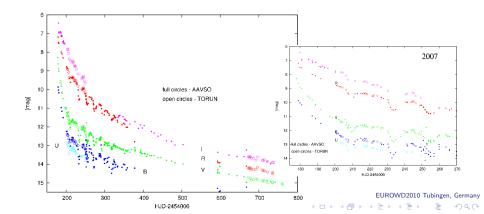


Figure: McLaughlin (1960)

- transition phase starts about 4 mag below maximum
- dust formation as explanation of deep minimum (McLaughlin, 1935)
- no commonly accepted explanations for oscillations (Warner, 1995)

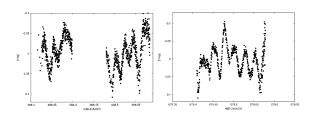
V2467 Cyg (NCyg 2007)

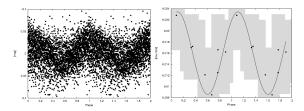
- ▶ discovered in March 2007 by Asihiko Tago (Nakano et al, 2007)
- progenitor identified as early A type star (Steegs et al, 2007)
- extremely strong OI 8446 Å (Tomov et al, 2007)
- oscillations during the transition phase (Kato, 2007)



Magnetic features of V2467 Cvg

one-night variations monitorings with VR filters in 2007 and without any filters in 2008 (Swierczynski et al, 2009)





- period 3h40min connected with orbital period found in periodogram
- rapid changes with period about 40 min and amplitude about 0.1 mag
- X-ray observations obtained with Swift XRT in range 0.3-10keV
- belongs to class of rare object called intermediate polars (?)



Possible explanation of transition phase

Retter's model (2002) based on intermediate polar properties

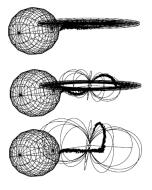
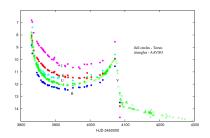


Figure: Wu et al (2003)

- disc destroyed only in intermediate polar type classical novae
- strong wind from recovered accretion disc
- relation between spin period of WD and mass loss rate
 - fast rotator very strong wind dust formation - optical minimum
 - slow rotator strong wind quasiperiodic oscillation

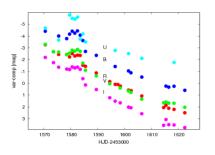
V2362 Cyg (NCyg 2006)& V2491 Cyg (NCyg 2008 No.2) - novae with rebrightening episodes



- ▶ V2491 Cyg
 - detected by Kabashima and Nishiyama in April, 2008
 - very broad H α emissions with FWHM of 4000 km s^{-1} in early spectra, recurrent nova? (Tomov et al, 2009)

▶ V2362 Cyg

- discovered by Nishimura in April, 2006
- unusual brightening between 130 and 250 day after the maximum (Henden et al, 2006)



Possible explanations for V2362 Cyg behaviour

- magnetic reconection in polar system (Hachisu & Kato, 2009)
 - magnetic activities strongest when pseudo-photosphere shrinks to near the orbit
 - nova light curve return to normal decline phase described by Hachisu & Kato (1994)
- second outburst and collision two envelopes causes energetic shocks (Akari et al. 2010)
 - X-ray activity but no periodicity connected with rotation of white dwarf
 - dust formation as indicator of strong mass loss.

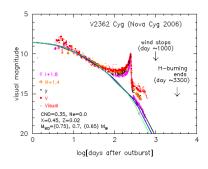
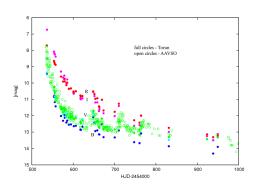


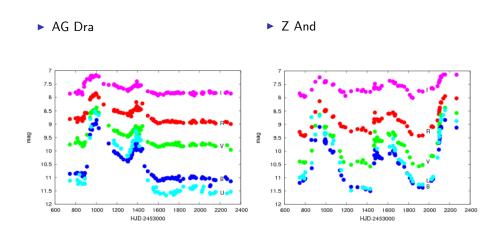
Figure: Hachisu & Kato (2009)

V2468 Cyg (NCyg 2008 No.1)- nova with series of rebrightening



- discovered by Hiroshi Kaneda in March, 2008 (Nakano et al, 2008)
- three strong flashes observed in all passbands
- mass transfer modulations between components (Swierczynski et al, 2010)

Classical novae and symbiotic stars



Thank you for your attention!