Old Novae: When New Becomes Old

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Classical Novae: An Introduction

Classical Novae are thermonuclear explosions which occur on the surface of a white dwarf (WD) in a close binary system with a less evolved companion which is filling its Roche–lobe. To have a CN, you need:

- Pressure of the accreted envelope
- Accretion rate (see Nomoto & Kondo 1991)

Classical Novae: the Recurrence Time and the Recurrent Nova Phenomenon

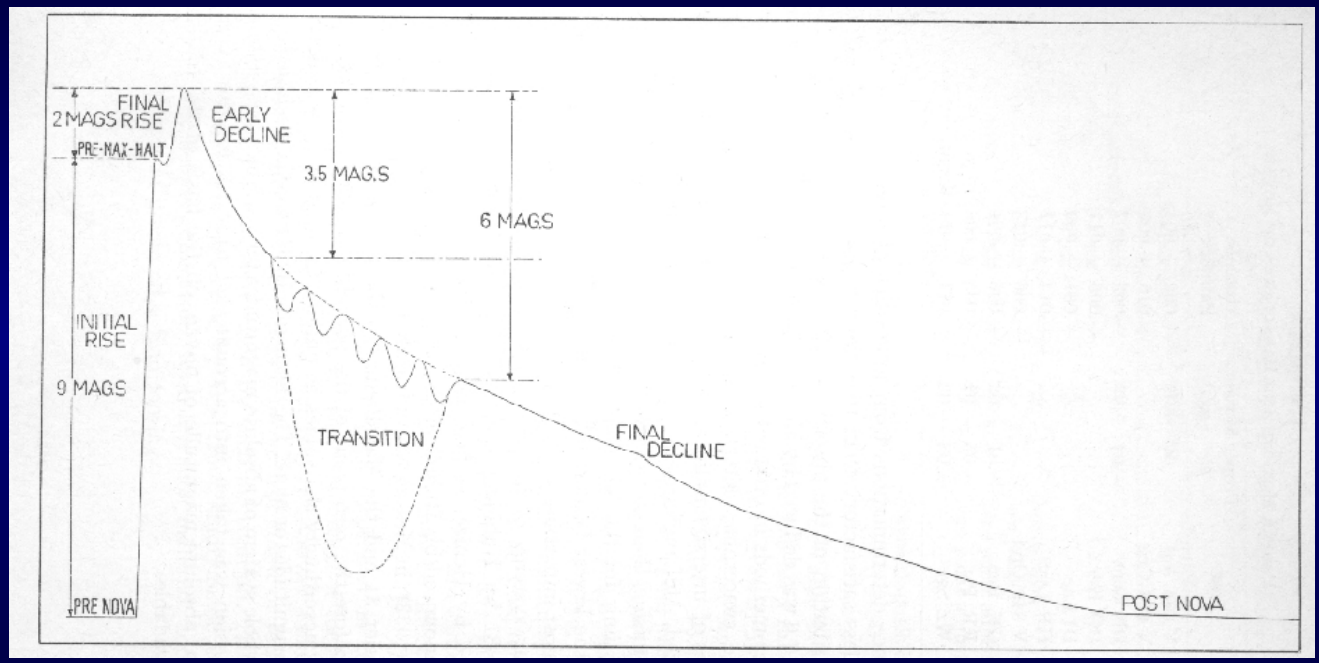


Figure: The prototypical light curve of a nova (from McLaughlin 1960a)

Classical Novae: an Evolutionary Perspective

Shara et al. (1986) proposed the "hibernation scenario". Recently, Schaefer et al. (2009) proposed that T Pyx may be on its way to hibernation.

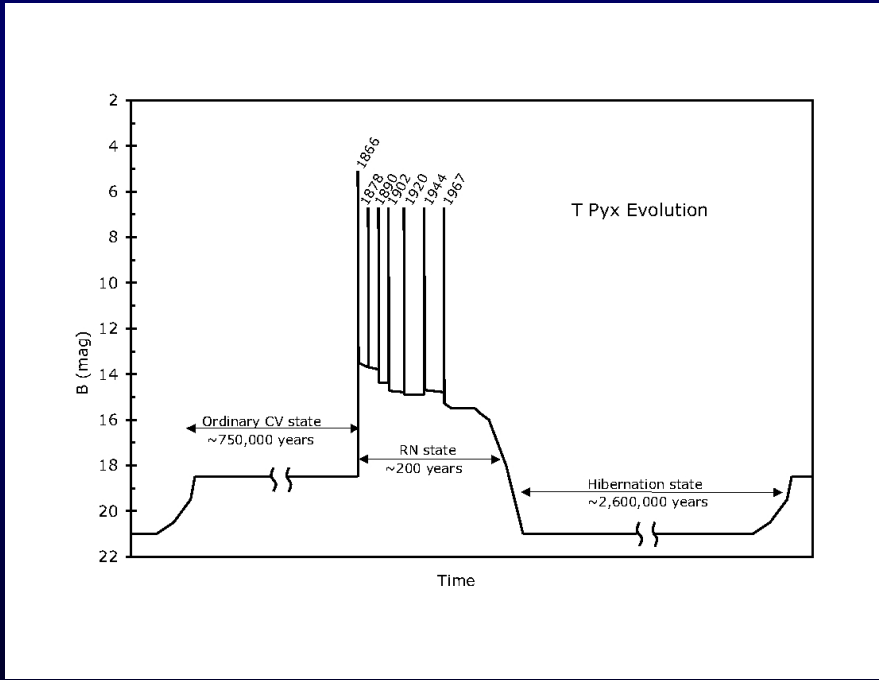


Figure: The "super–cycle" of T Pyx from Schaefer et al. (2009)

Classical Novae: the Remnants

Nobody knows if the WD, after a CN-explosion, increases, decreases or keeps its mass constant! (again, see Schaefer et al. 2009).

Few remnants are well studied, most of the novae are just abandoned.

Most importantly: it is not obvious that the remnant has a lot in common with the CN-progenitor.

Old Nova Recovery Project – The questions

- how does the population of old novae look like?
- how does the population of old novae compares to CVs?
- do short-period old novae exist in a significant number?
- what is the role of magnetic fields on the CN-outburst?

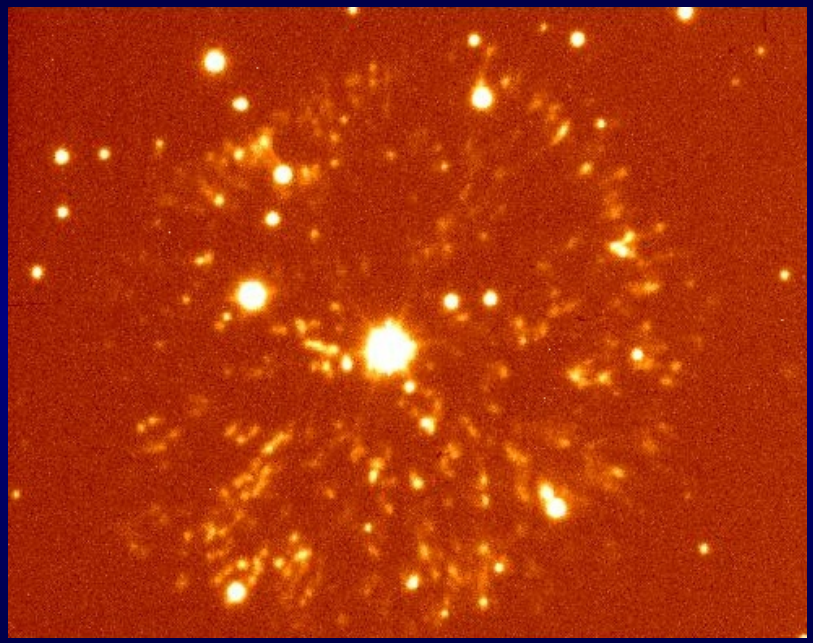


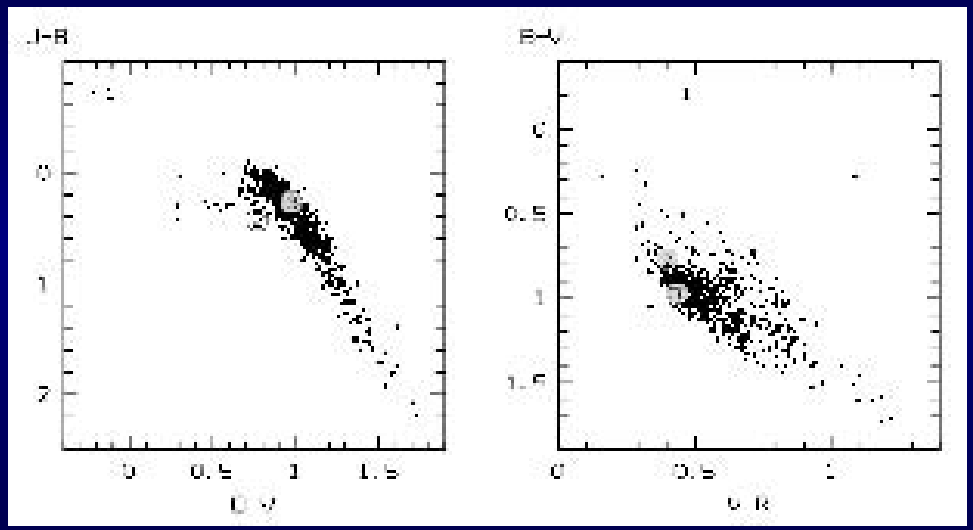
Figure: Hα image of GK Per obtained during the commissioning of GranTeCan/OSIRIS

Old Nova Recovery Project

Main source: Downes et al. (2005) catalog.
204 novae exploded before 1980. Most novae are actually "nova candidates".
Period known for 36 targets!

	N ($\delta > -20$)	S ($\delta < +20$)
known P_{orb}	28	34
confirmed without P_{orb}	31	9
no post-nova spectrum	32	15
no identification	86	36

Old Nova Recovery Project



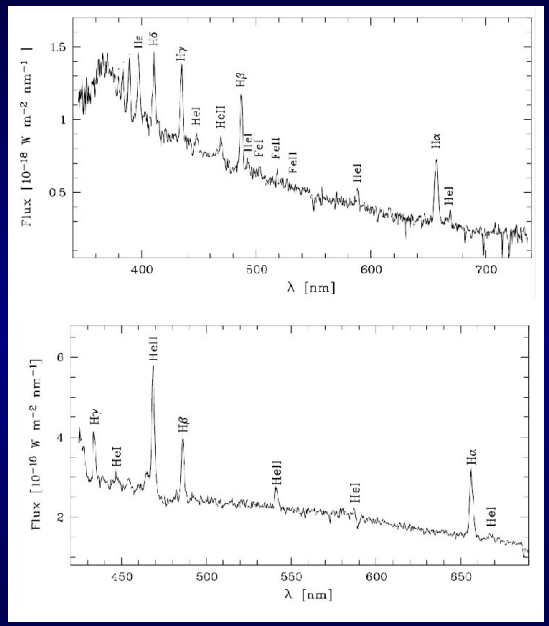


Figure: $U-B/B-V$ and $B-V/V-R$ diagram for the field of the nova V840 Oph. From Schmidtobreick et al. (2003, A&A, 410, 903 Spectroscopy of the two old novae XX Tau (top) and V630 Sgr (bottom). From Schmidtobreick et al. (2003, A&A, 410, 903).

Old Nova Recovery Project

- 3 hours in service mode on INT/WFC (11th July 2008)
- 3 hours in service mode on NOT/ALFOSC (during Summer 2009)
- 6 nights in visitor mode on NTT/EFOSC2 (19th to 25th May 2009)
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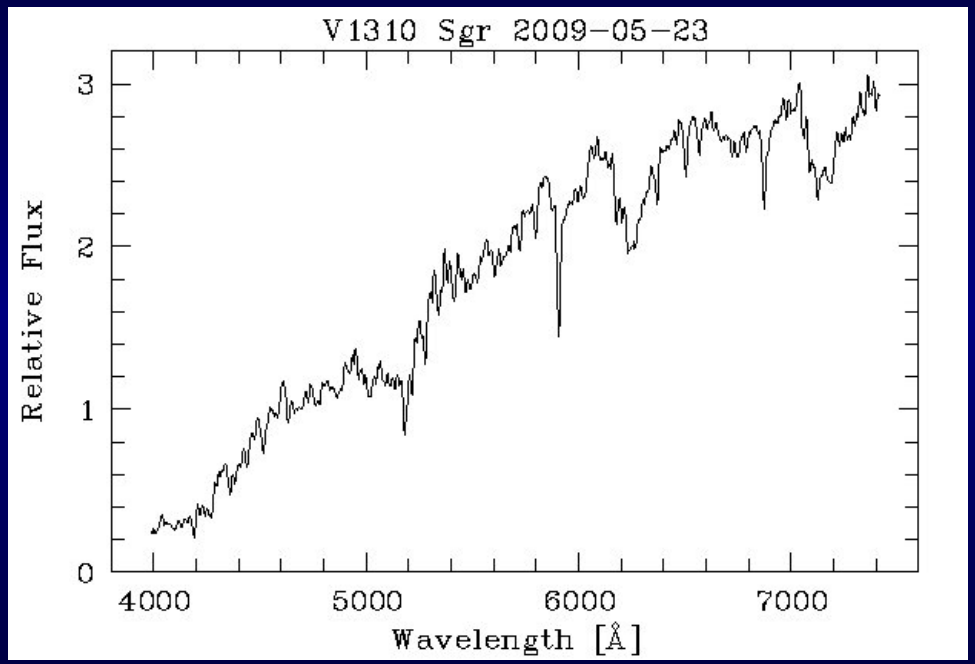
ESO runs had a 30 – 50% success.

Old Nova Recovery Project – Preliminary Results

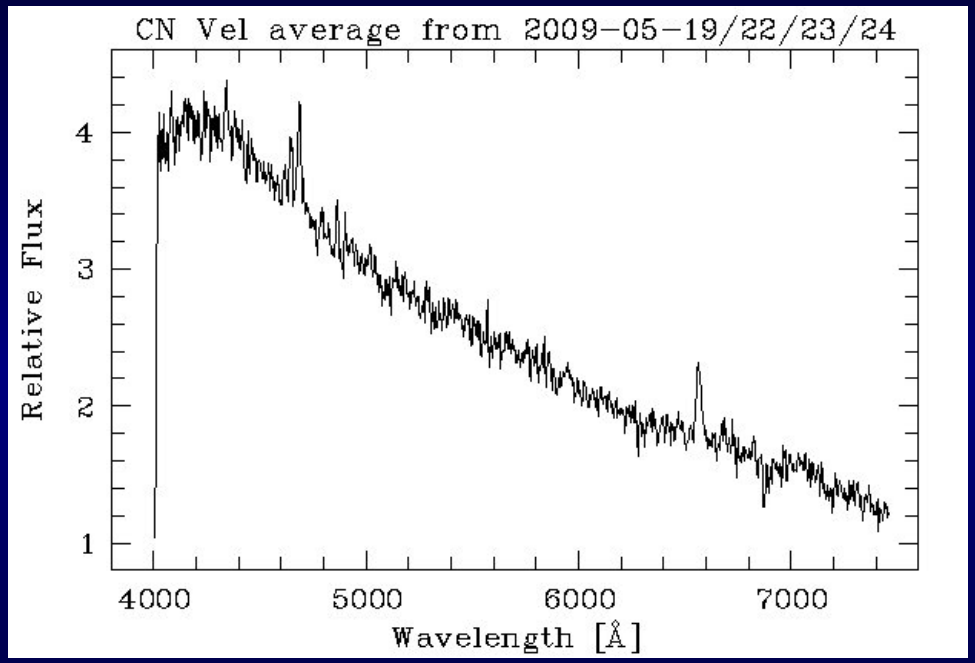
- 2 Mira stars
- 6 spectroscopically confirmed objects
- 18 candidates

Old Nova Recovery Project – V1310 Sgr



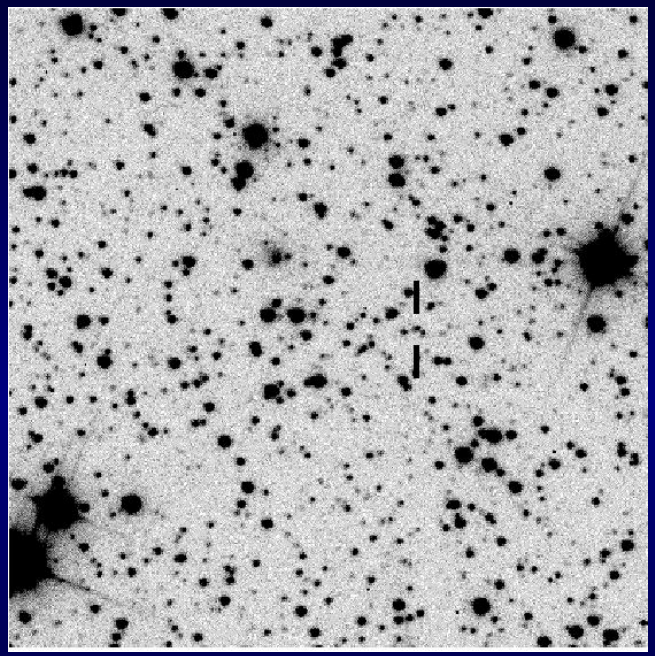
M1I star
very likely a Mira

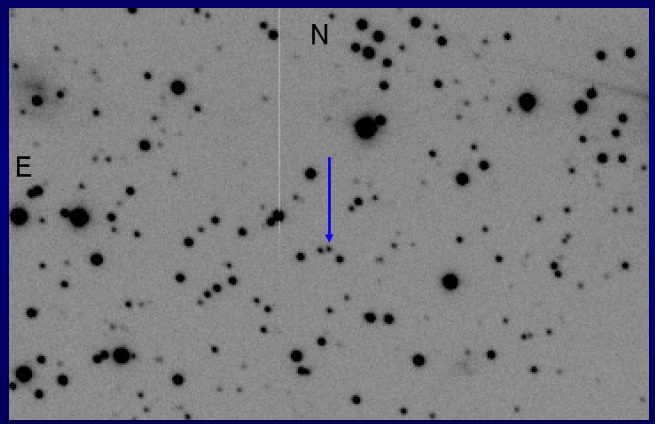
Old Nova Recovery Project – CN Vel



- spectrum shows a blue slope
- unambiguously identified: Hα, Hβ, Hγ, HeII 4686, the Bowen blend

Old Nova Recovery Project – V812 Cen





- faint continuum, strong Hα emission, also Hβ, and several HeI lines, NaID absorption
- on 090523 possibly two objects with emission lines that both look different from the target on 090522

Summary and Conclusions

Future

Coming observations in June/July 2011.

(Few) data from last week to be reduced.

Comparison with other surveys/catalogs.

Going deeper with VLT,

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We know very little about NR.
We should never abandon our friends.

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I offer a pisco sour to whoever comes up with a nice acronym for this project.