WISE survey of novae

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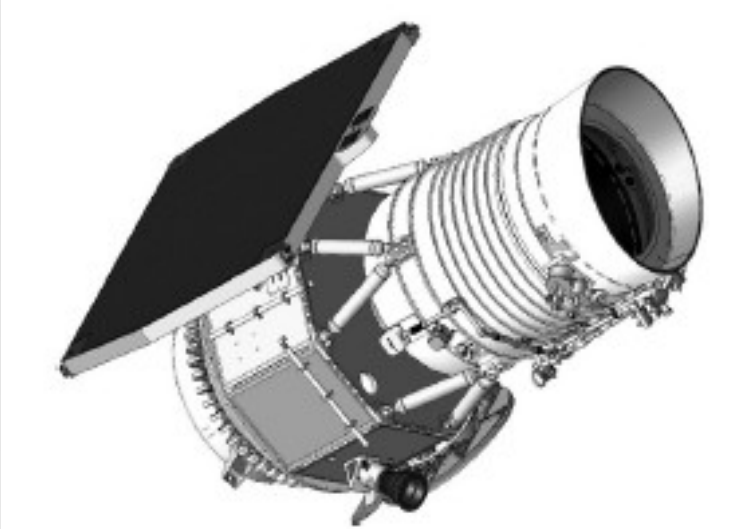
WISE survey of novae

- Widefield Infrared Survey Explorer (WISE)
- All Sky Survey
- 3.4, 4.6, 12, 22 microns
- 2010 January 14 – 2010 November
- 0.08, 0.11, 1, 6 mJy sensitivity (5sigma)
- WISE PSFs: 6.1” (Band 1), 6.4” (2), 6.5” (3) 12” (4)
- Astrometric precision for high S:N sources <0.15”

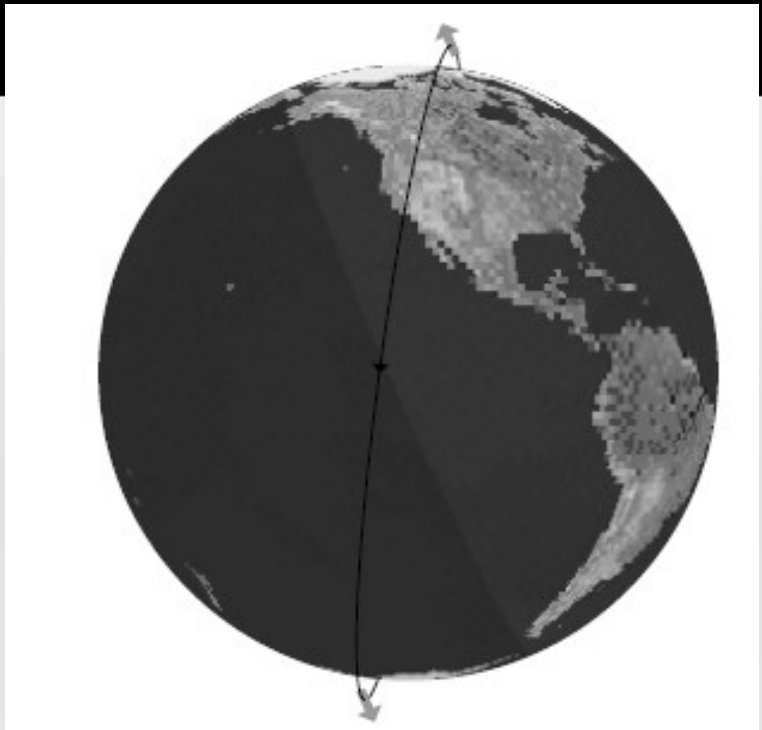
See Wright et al., 2010, AJ, 140, 1868 for details of WISE mission

WISE survey of novae



- 0.4m telescope, solid H cooled
- Solar elongation @ 90degrees
- Scan N ecliptic pole – S ecliptic pole

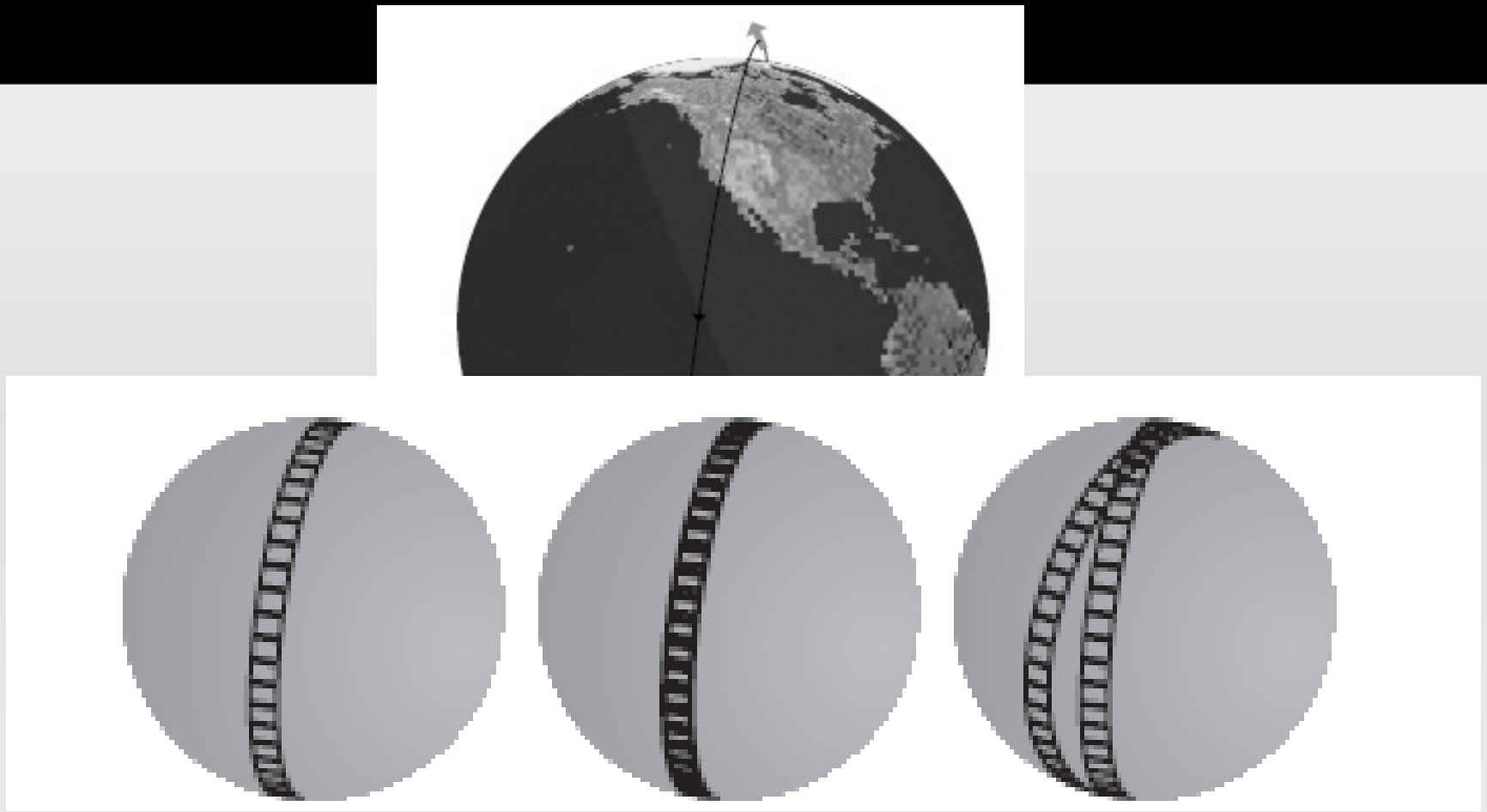
WISE survey of novae



WISE pointing and orbit at June solstice

WISE points perpendicular to Earth-Sun line

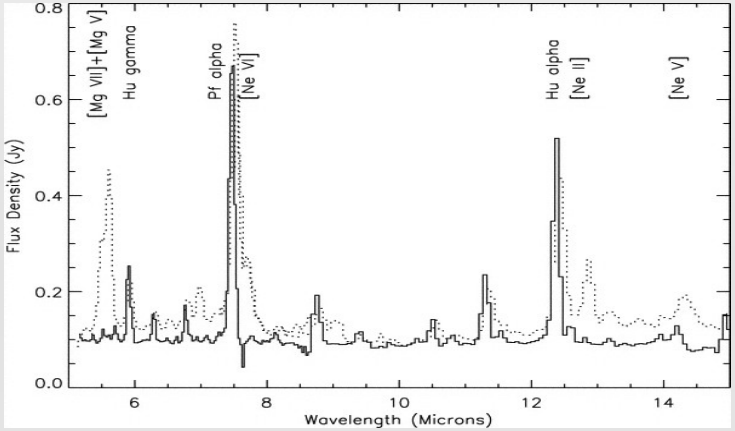
WISE survey of novae



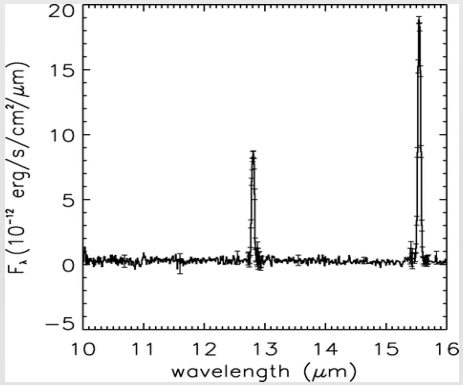
Survey coverage for 1 orbit, 2 successive orbits, two orbits separated by 20 days

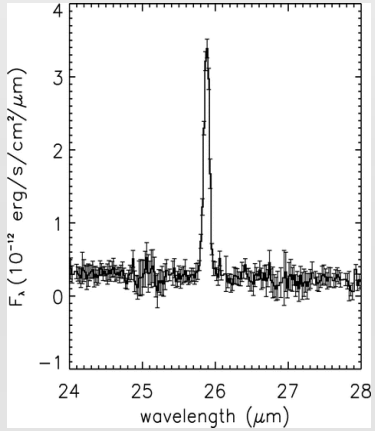
WISE survey of novae

Spitzer spectra of dusty and emission line novae

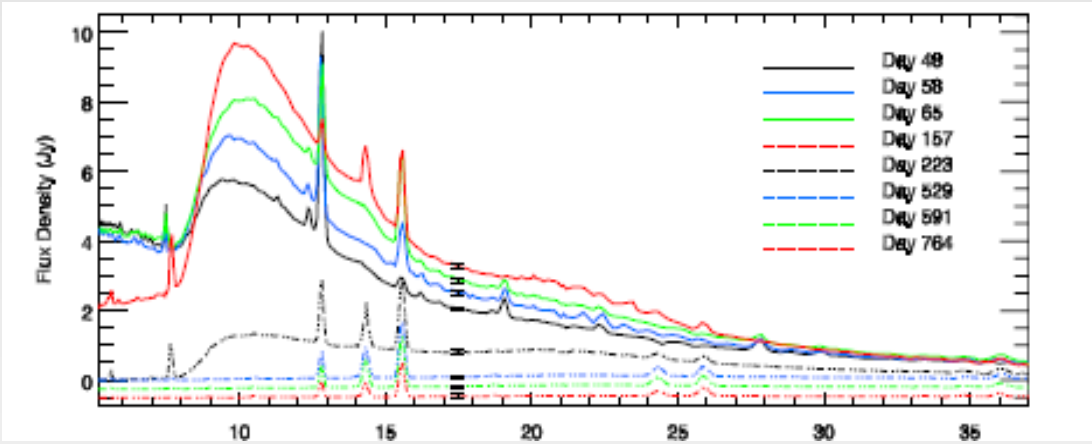


V1186/7 Sco (Schwarz et al. 2007)



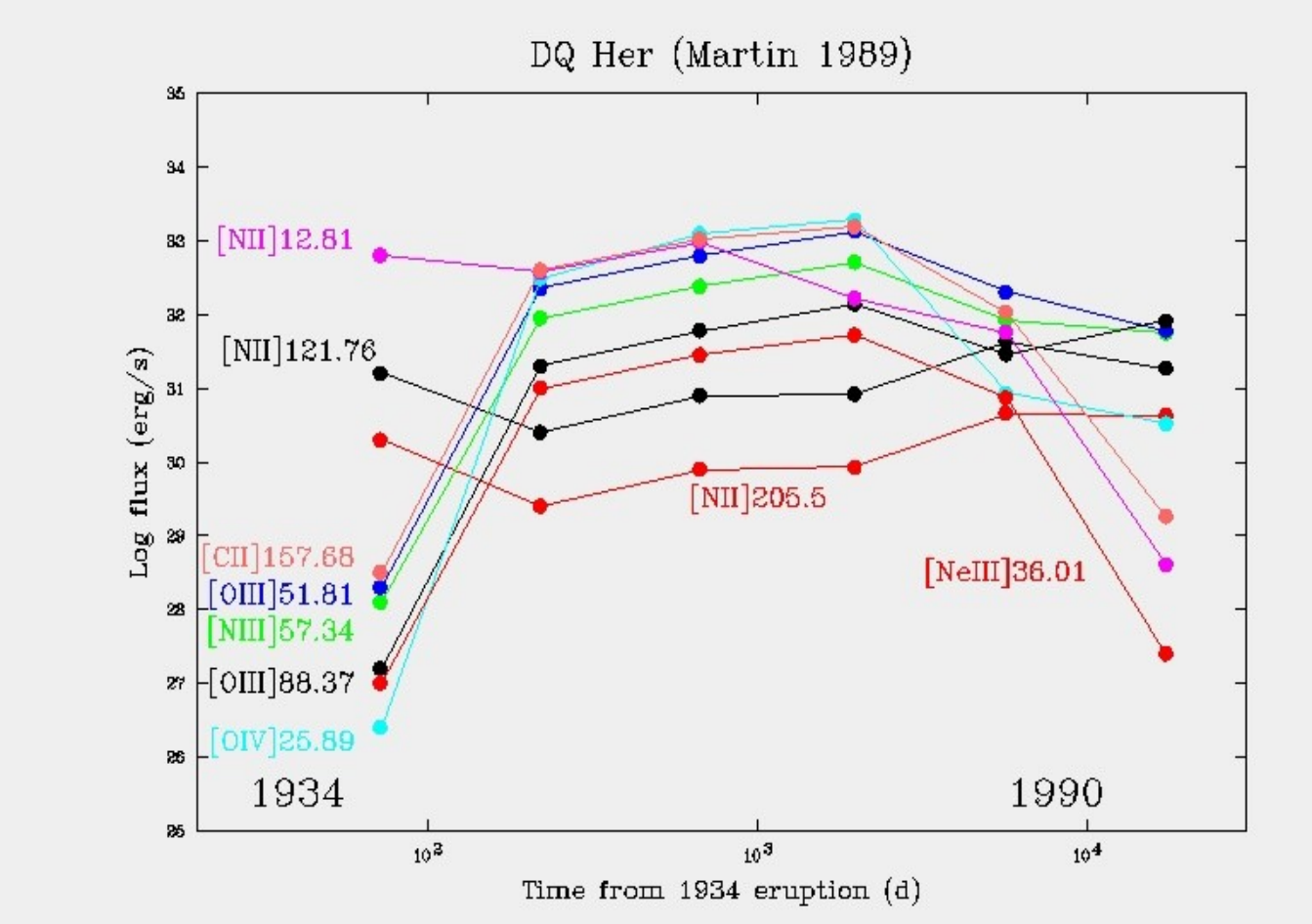


QU Vul – a "neon nova" (Gehrz et al. 2008)



Dusty V1065 Cen (2007)
(Helton et al., 2010, AJ, 140, 1347)

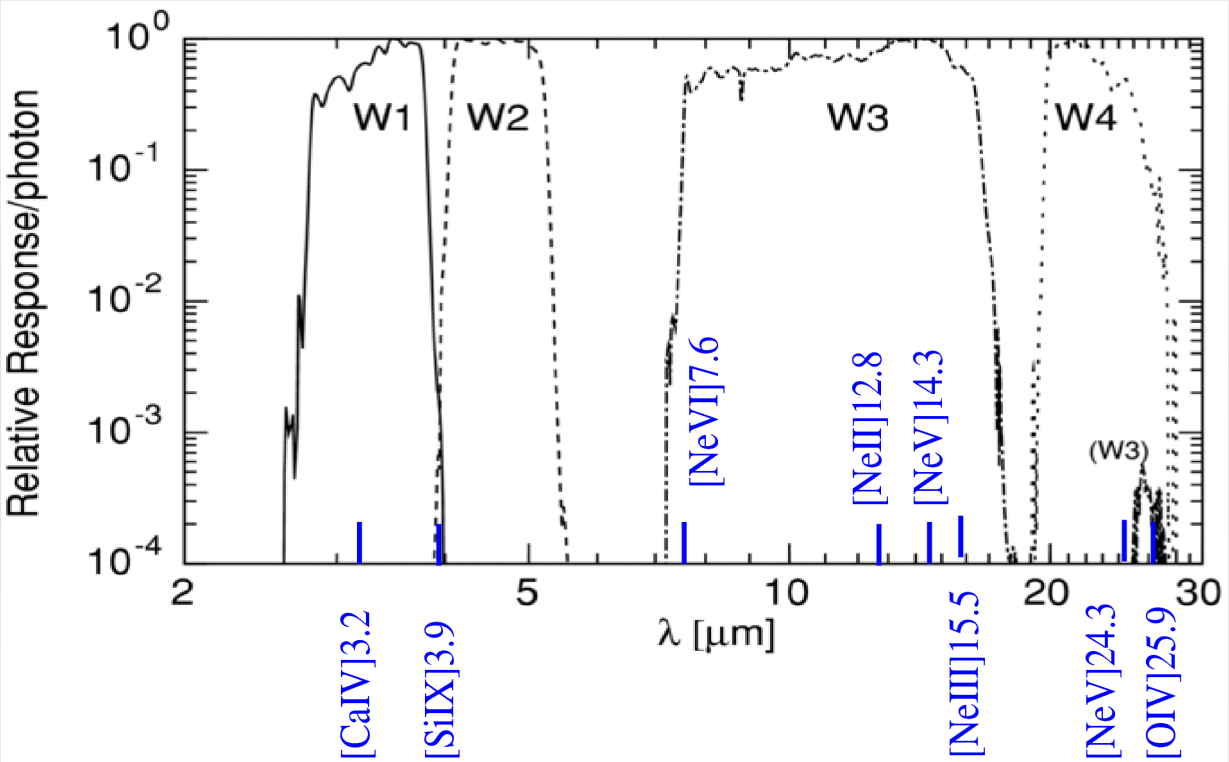
WISE survey of novae



Schematic of long-term variation of emission line fluxes.

Based on CLOUDY modelling of DQ Her by Martin (CNI 1989)

WISE survey of novae

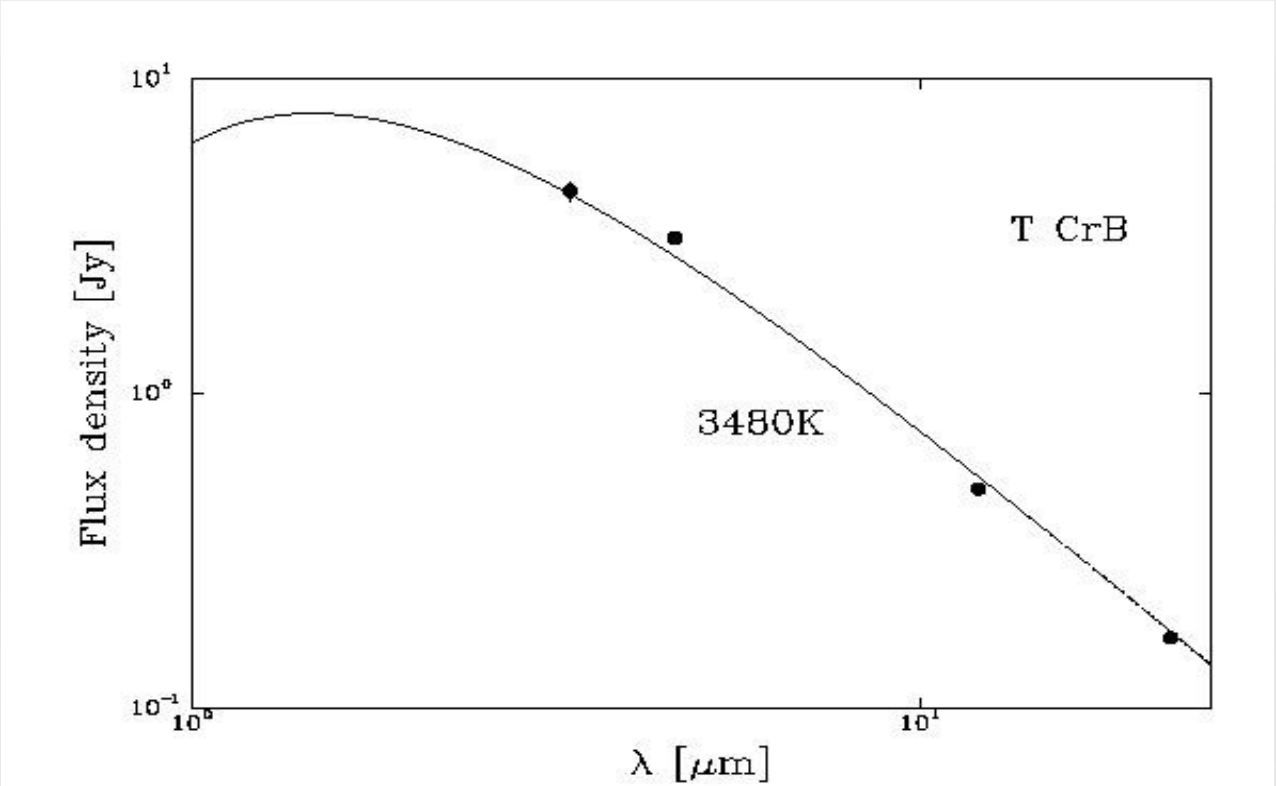


WISE filter responses
Wavelengths of prominent nova lines indicated

WISE survey of novae

- WISE catalogue searched [so far] for 64 CNe and RNe
- 22 non-detections/spatial blends
- 38 with >~ 4 sigma detections in at least one band
- 14 with >~ 4 sigma detections in all 4 bands
- 17 post-WISE CNe/RNe (so we see progenitors) -
  - 4 with detections in at least one band
  - 3 with detections in all 4 bands

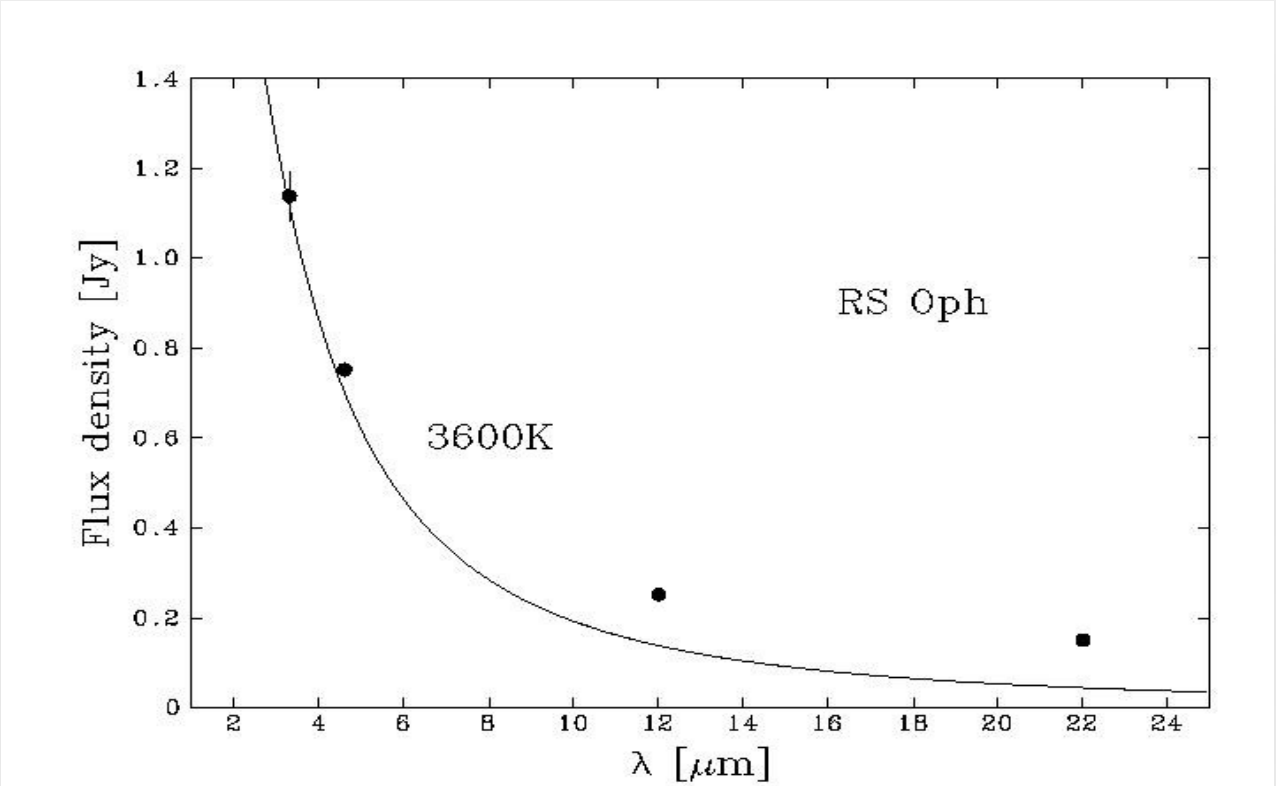
WISE survey of novae



SEDs of RNe

T CrB – showing RG only

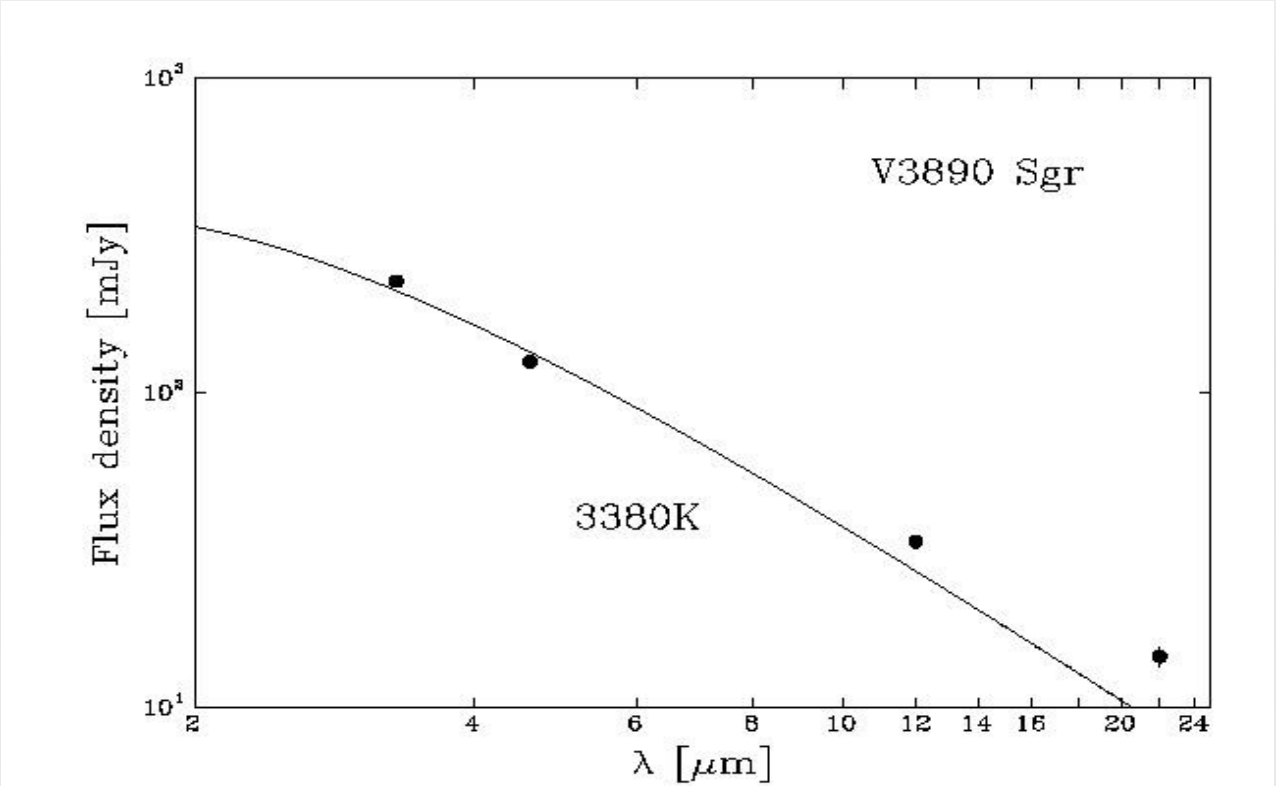
WISE survey of novae



SEDs of RNe

RS Oph – showing evidence of dust (Evans et al. ApJ, 671, L157, Rushton et al., MNRAS, 401, 99)

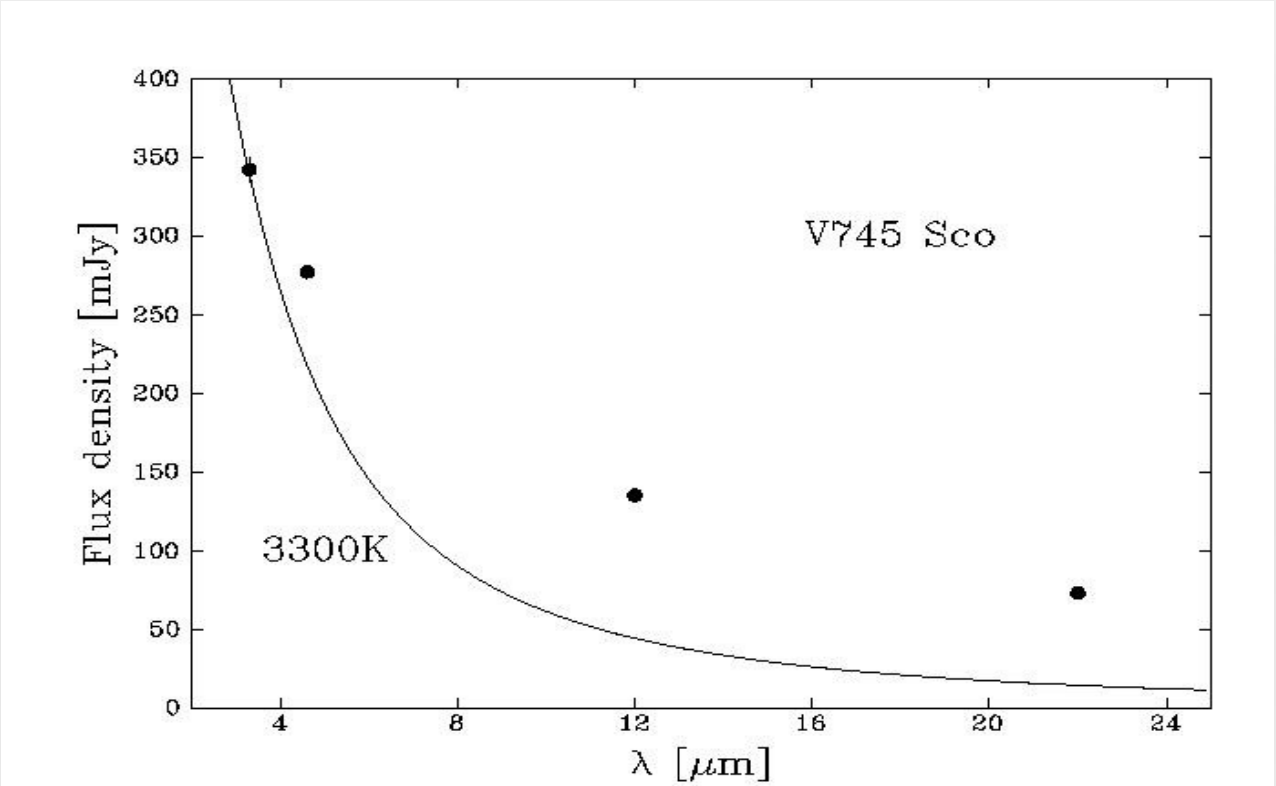
WISE survey of novae



SEDs of RNe

V3890 Sgr – showing evidence of an excess at 12 and 22 microns

WISE survey of novae

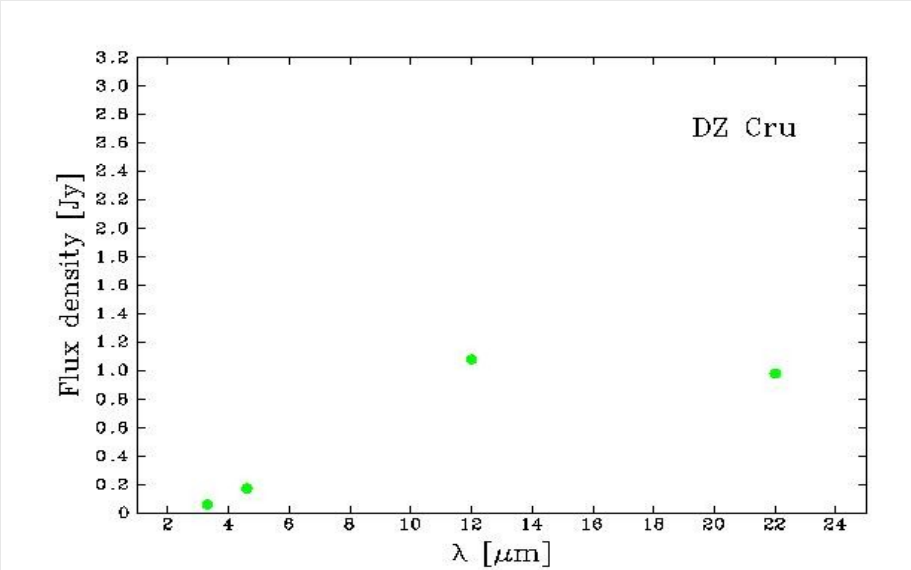


SEDs of RNe

V745 Sco – showing evidence for an excess at 4.6, 12 and 22 microns

WISE survey of novae

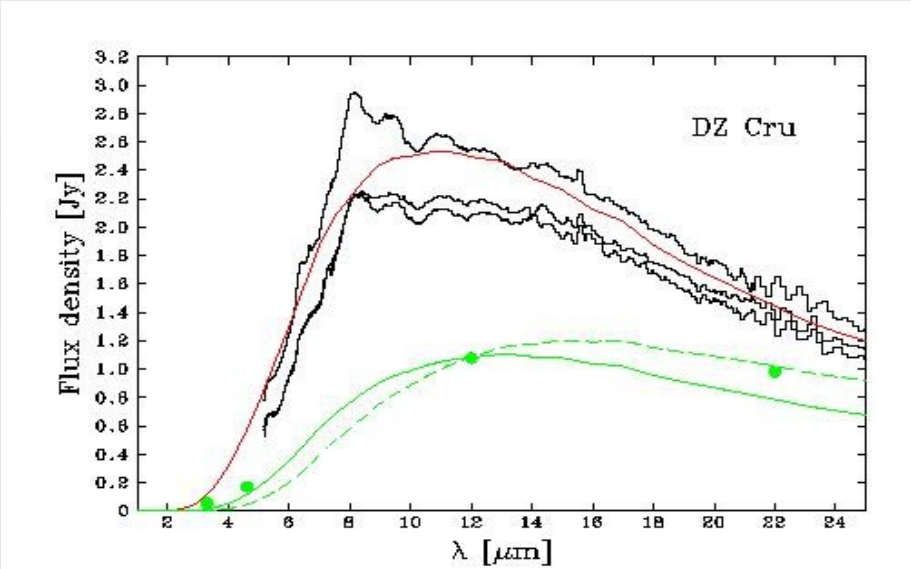
- **Dust SEDs**



WISE SED of DZ Cru

WISE survey of novae

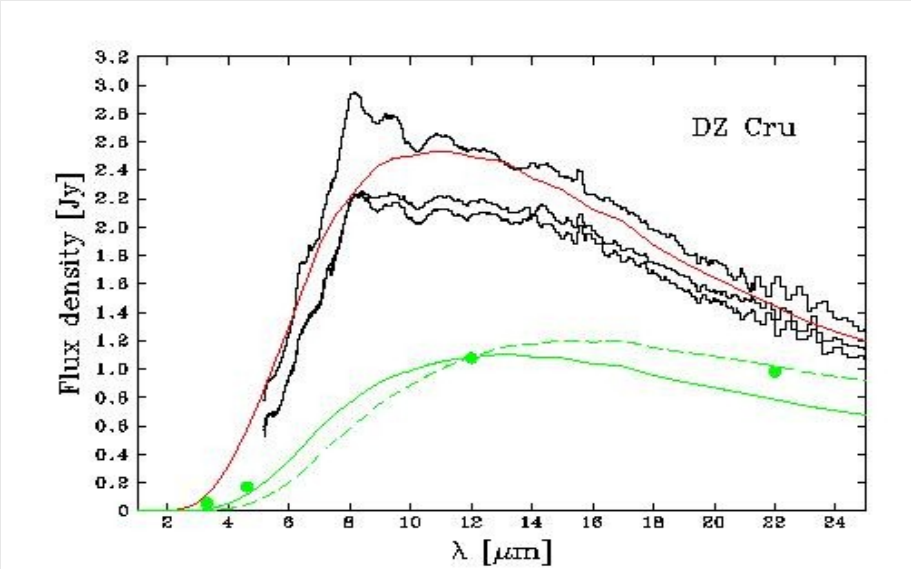
Dust SEDs

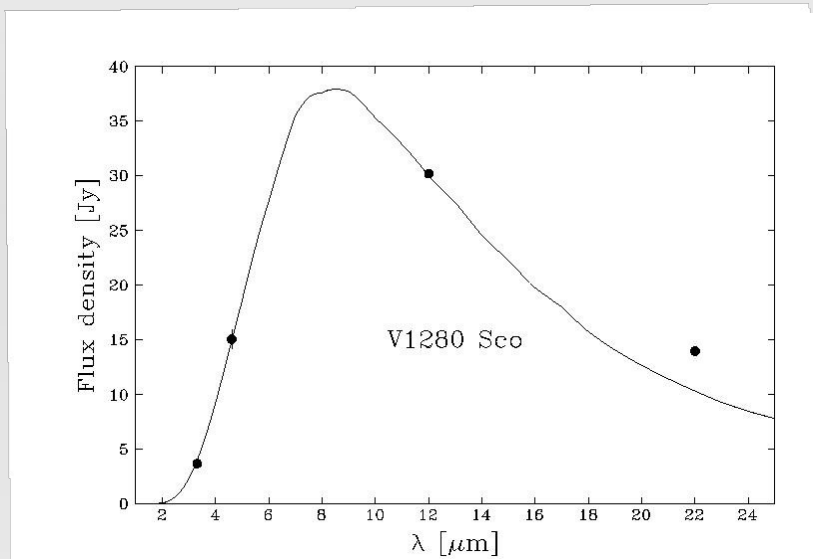


WISE SED compared with *Spitzer*
(Evans et al., MNRAS, 406, L85)

WISE survey of novae

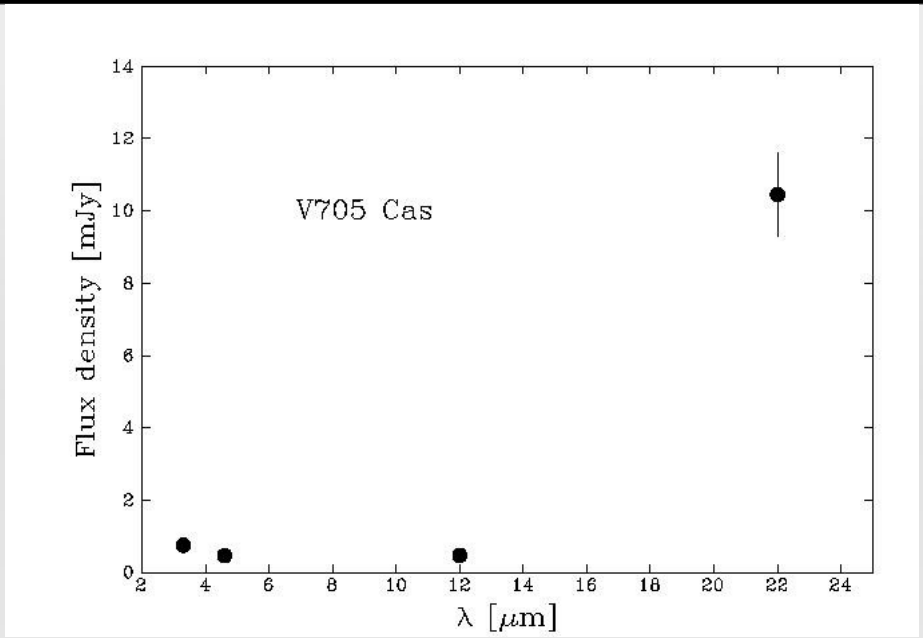
Dust SEDs

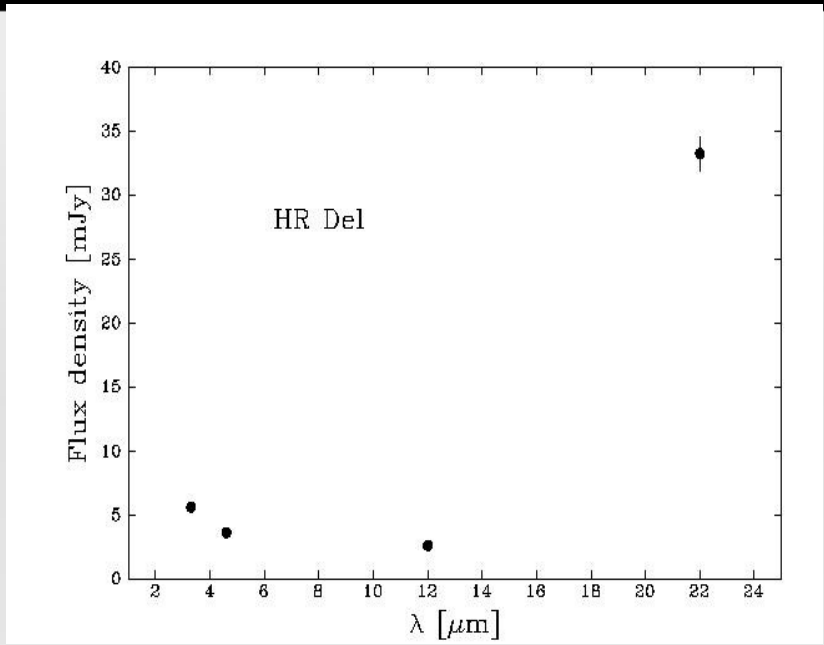




WISE SED of V1280 Sco

WISE survey of novae

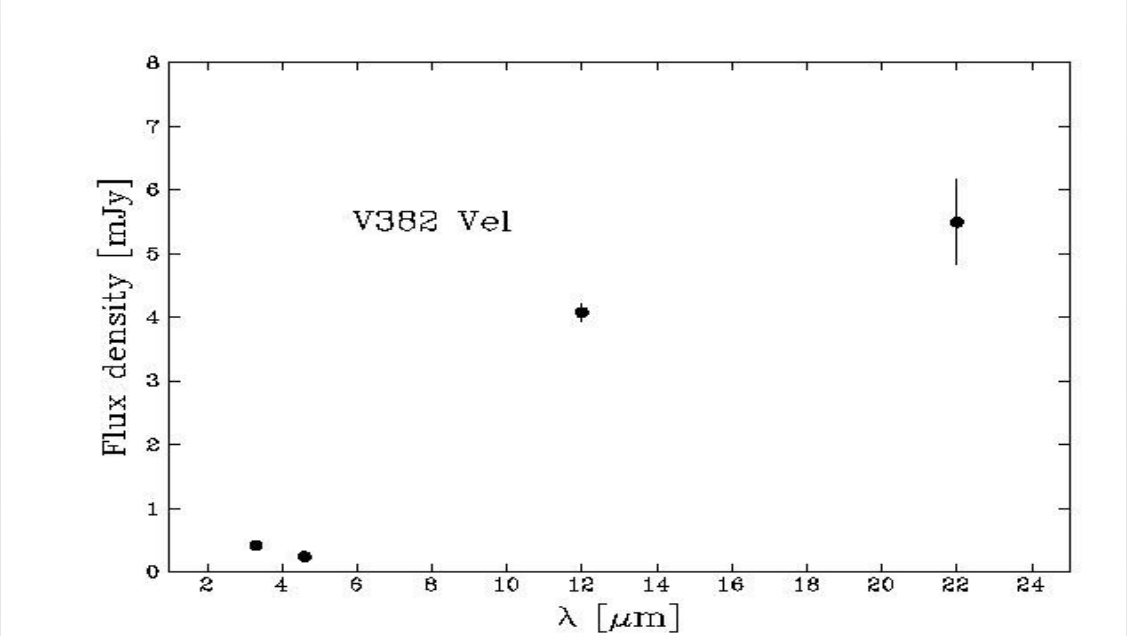




V705 Cas and HR Del – [OIV]25.9 micron emission

“Emission Line” SEDs

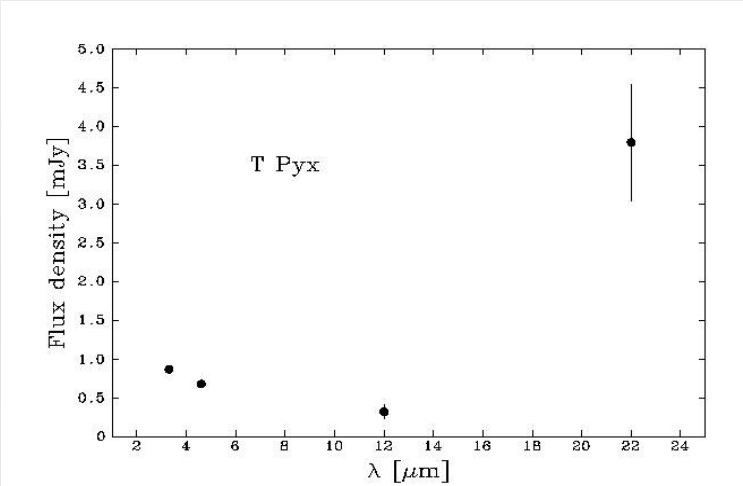
WISE survey of novae

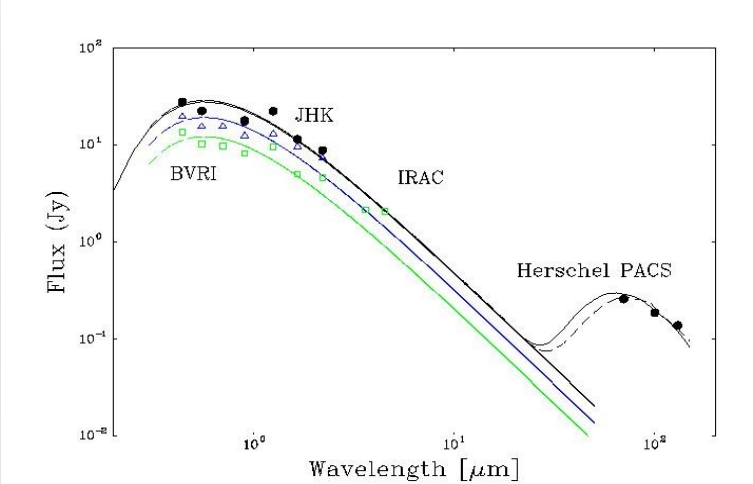


V382 Vel – a neon nova.
Likely [NeII]12.8, [NeIII]15.5, [OIV]25.9

“Emission Line” SEDs

WISE survey of novae

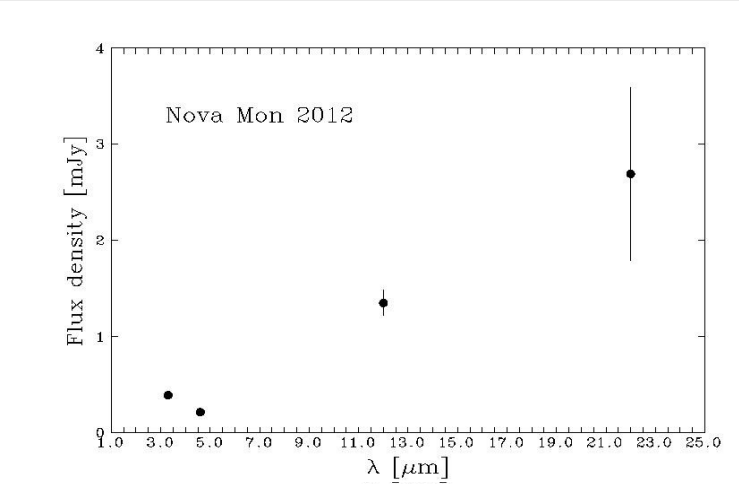


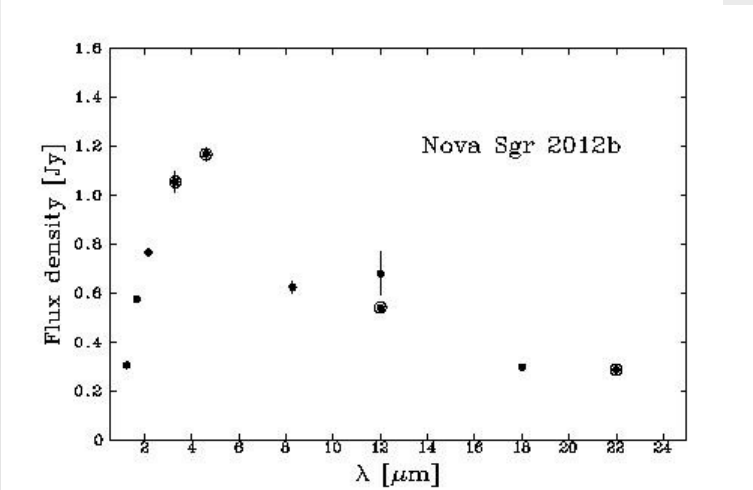


Left: WISE view of T Pyx
Right: SMARTS/MtAbu/Spitzer/Herschel view of the 2011 eruption

Progenitors of post-WISE novae

WISE survey of novae





Left: Nova Mon 2012
Right: Nova Sgr 2012b 2MASS/MSX/IRAS/WISE

Progenitors of post-WISE novae

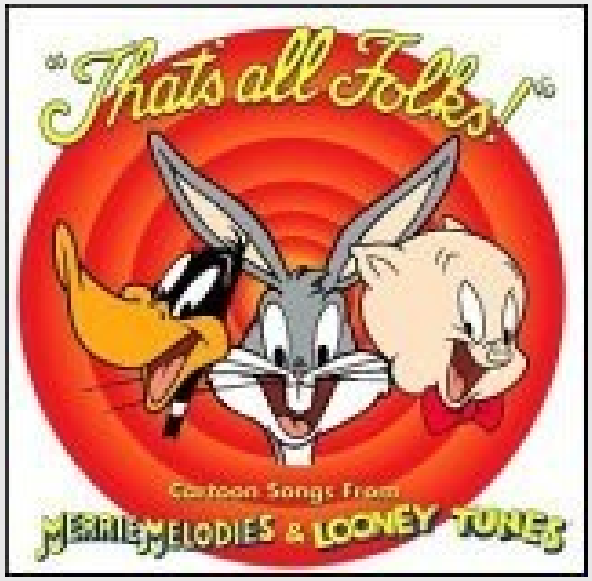
WISE survey of novae

- The WISE survey will (as was the *IRAS* survey 30 years ago – see Harrison & Gehrz, AJ, 96, 1001; 101, 587, 103, 243, 108, 1899) be a valuable resource for investigating the circumstellar environments of mature novae

- WISE does not have the long wavelength coverage of IRAS but clearly beats *IRAS* for sensitivity and spatial resolution

- It has the potential to provide unprecedented information about nova *progenitors*

WISE survey of novae



With thanks to Alex d'Angelo for doing an early trawl