

Stellar Science in the Warm Spitzer Era

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- Normal Stars and the “Stellar Background
- Debris disks
- Field Brown Dwarfs – T/Y
- Resolved brown dwarf companions
- Unresolved Brown Dwarf Companions
- White Dwarfs: companions, circumstellar dust, atmospheres
- Cataclysmic variables: companions and dust
- AGB stars across the Galaxy

Observing modes:

- Wide-angle survey – what's optimum for stars?
- Pointed surveys
- Serendipity from Spitzer Point Source Catalogue

Wright et al. : A distributed survey and WISE followup

Jura: A Spitzer extended-mission proposal to survey
single white dwarfs (also Ted von Hippel)

Gunn, Miyazaki et al: A strawman HyperSuprimeCam survey

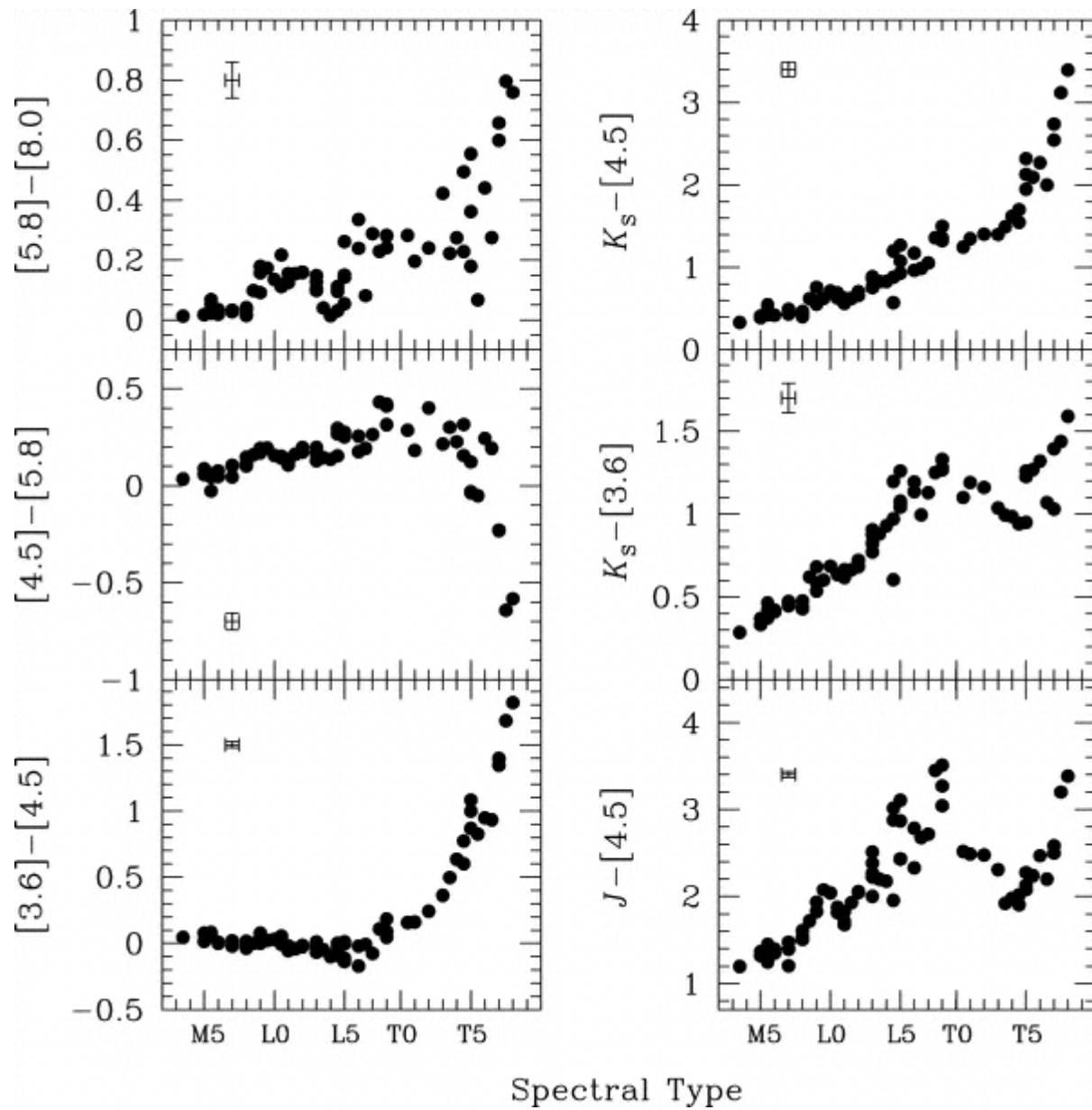
Observing Modes:

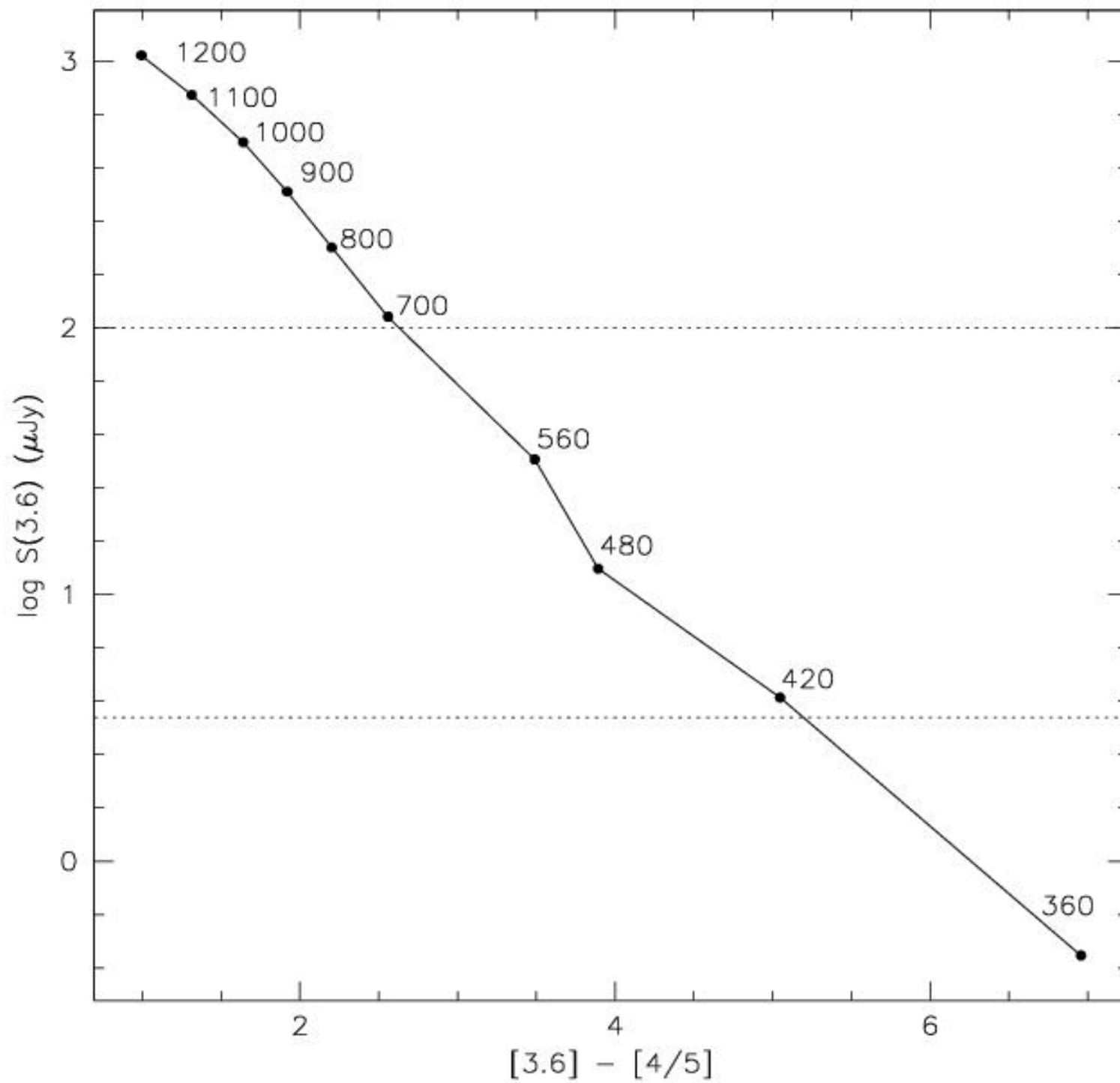
- Wide-angle surveys – what's best for stars?
- Pointed Observations/ Surveys of Rare Objects
- Serendipity – what can we get out of the accumulated Spitzer Surveys?

Surveys: latitude coverage, data at other wavelengths, multiple passes to build up sensitivity (and exploit variability)

All data: excellent photometric calibration, both internal and external

cten et al.
06





How many T and Y Dwarfs?

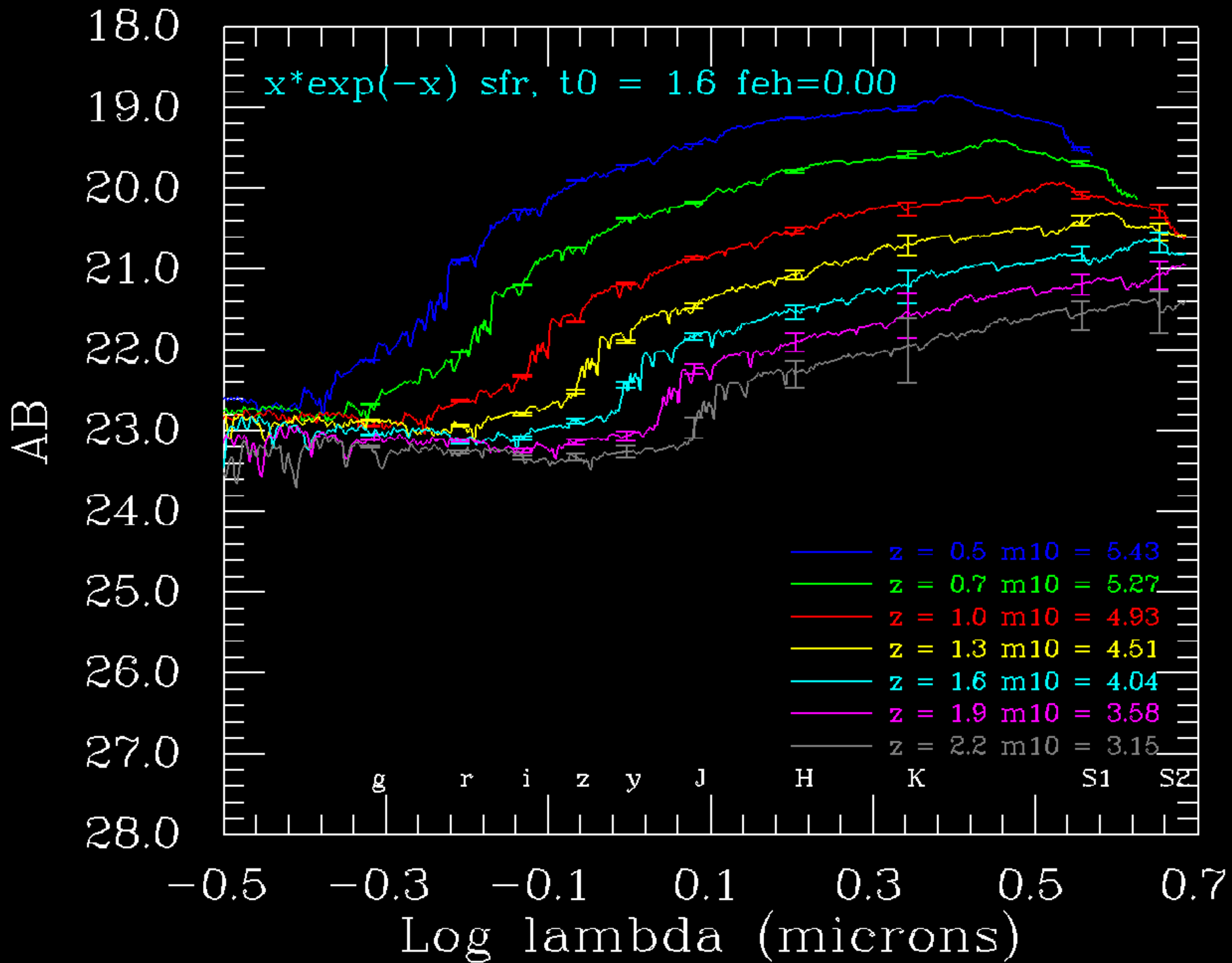
Coollest known T dwarf is 700 K

Some 100 T dwarfs known at present

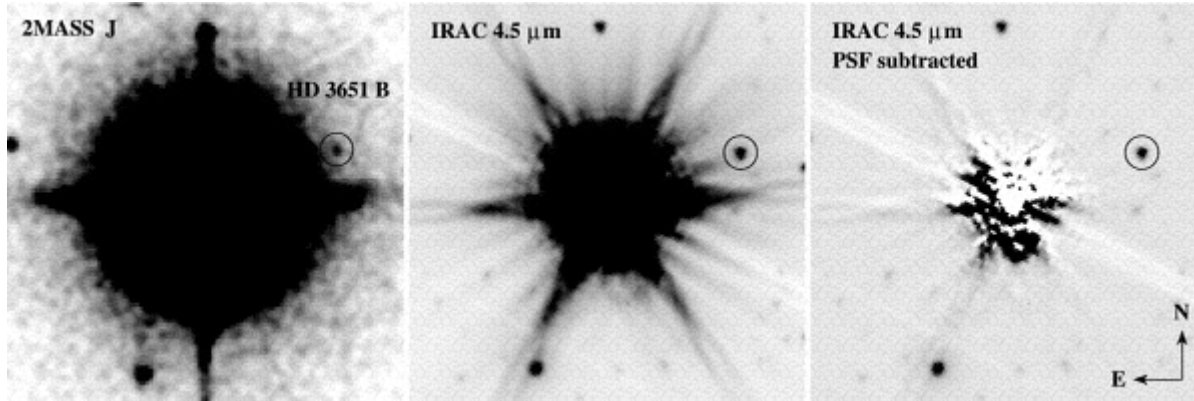
L and T dwarfs probe about the same mass range

“Wide” survey (225 sq deg) should find 100 Ts
and 1-5 Ys

T and Y dwarfs are isotropically distributed



Resolved Companions--

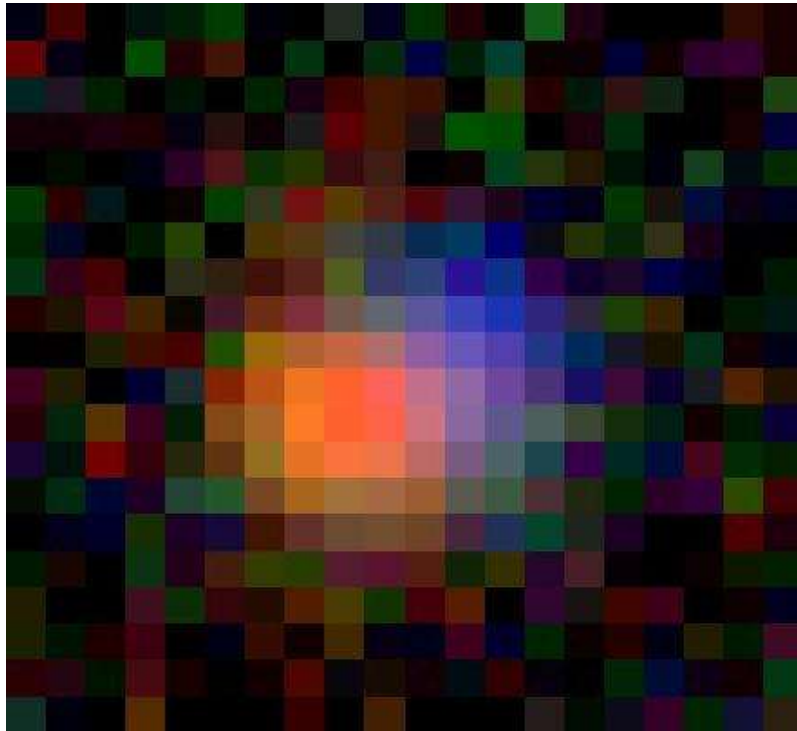


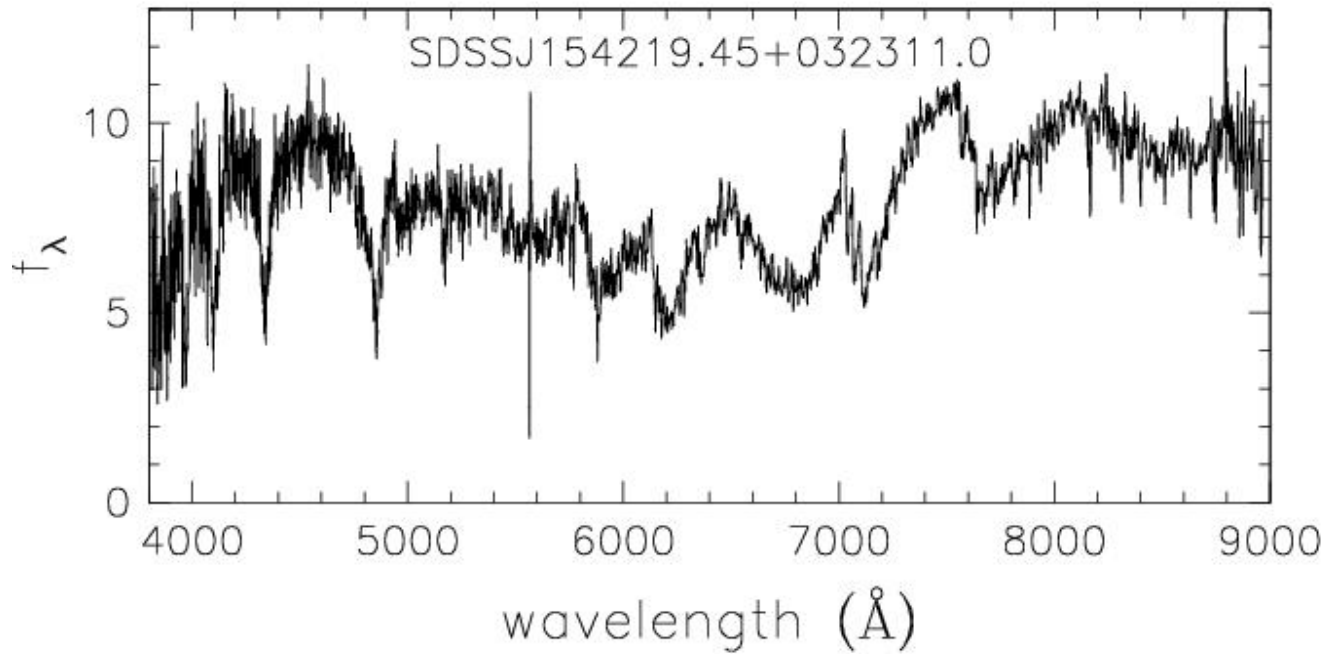
HD 3651B T7.5

400 K object can be detected in 1 hour

-pointed surveys of 1000 stars and brown dwarfs within 20 pc

Unresolved companions – White Dwarfs and CVs



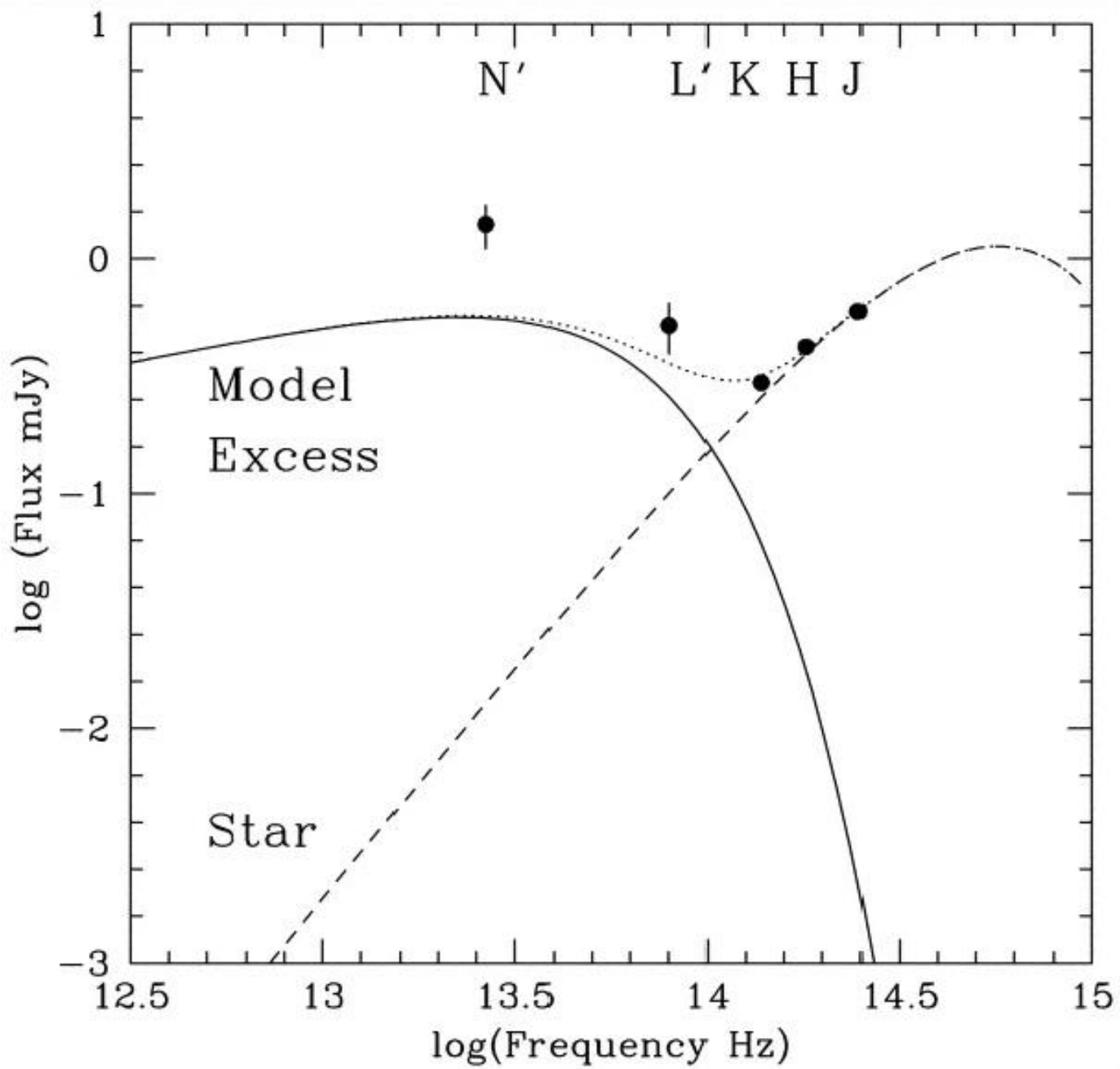


Photometry of 1000 WD and CV:

-very cool companions (and bottom of main sequence)

-circumstellar dust

-Broad-band SEDs and model atmospheres



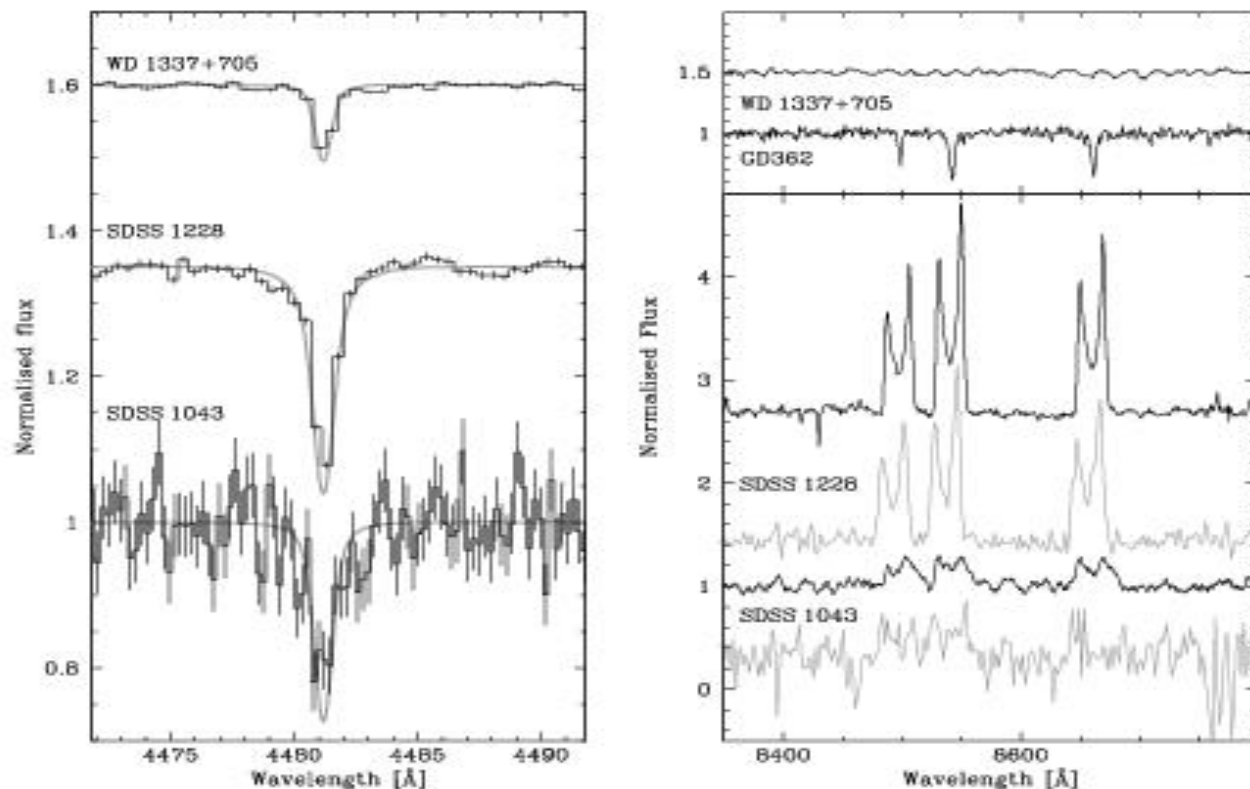
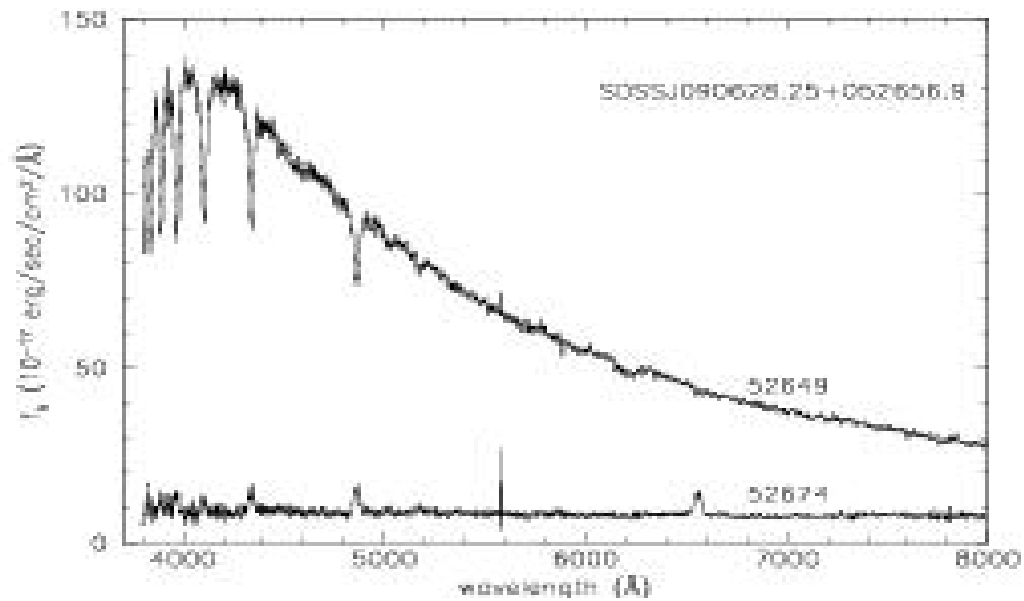


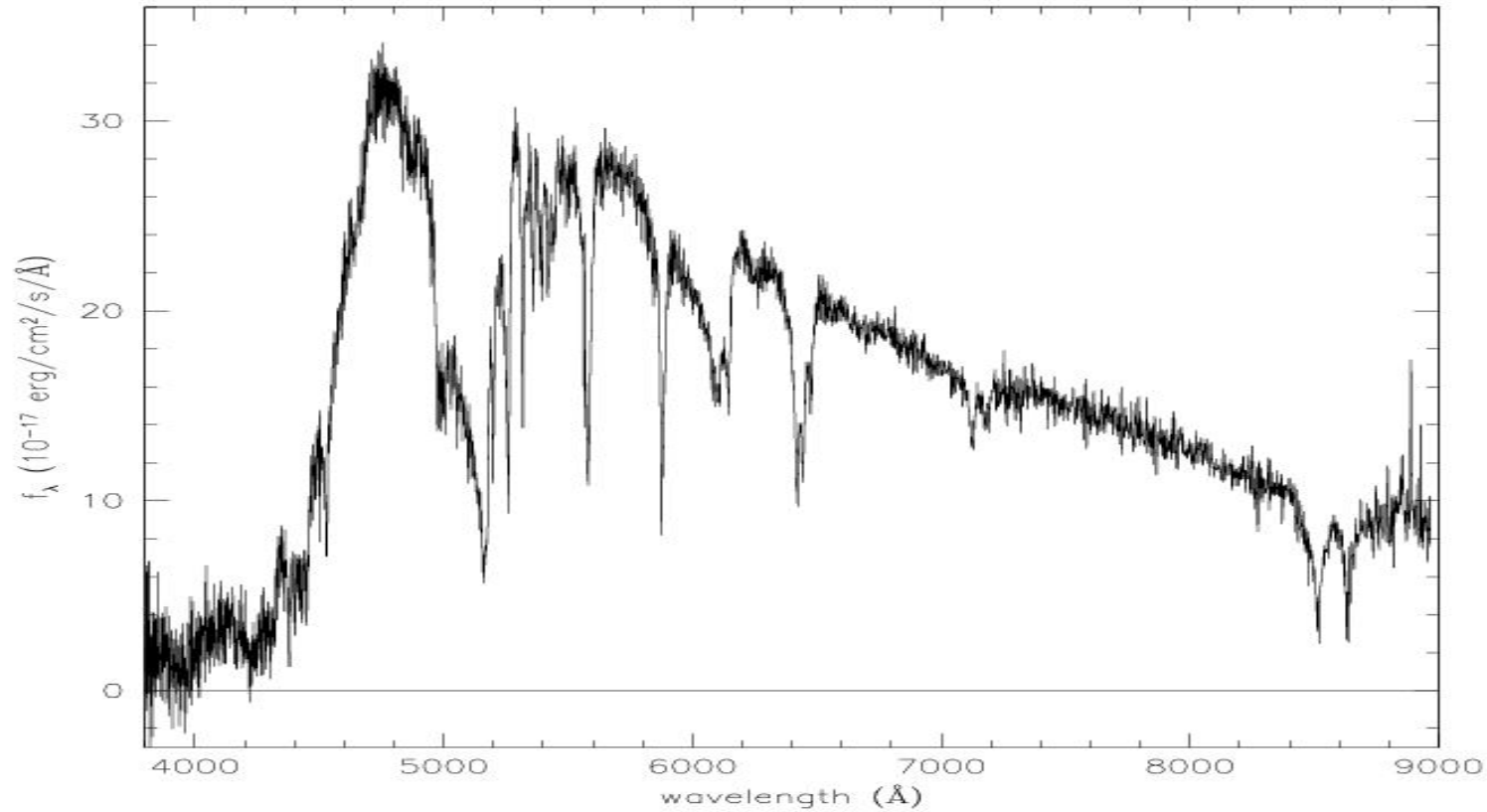
Figure 1. Left panel: photospheric Mg II $\lambda 4481$ absorption lines in the WHT spectra of WD 1337+705, SDSS 1228+1040, and SDSS 1043+0855 (black lines). Overplotted in gray are the best-fit white dwarf models, the corresponding Mg abundances are given in Table 1. Right panel: WHT (black lines) and SDSS (gray lines) spectra of SDSS 1043+0855, SDSS 1228+1040, WD 1337+705 and GD362. All spectra are normalised to a continuum flux of one, and offset by suitable amounts. The top panel shows the WHT spectra of WD 1337+705 and GD362 on a different flux scale.

CATAclysmic VARIABLES--



-measure masses, radii of companion brown dwarfs

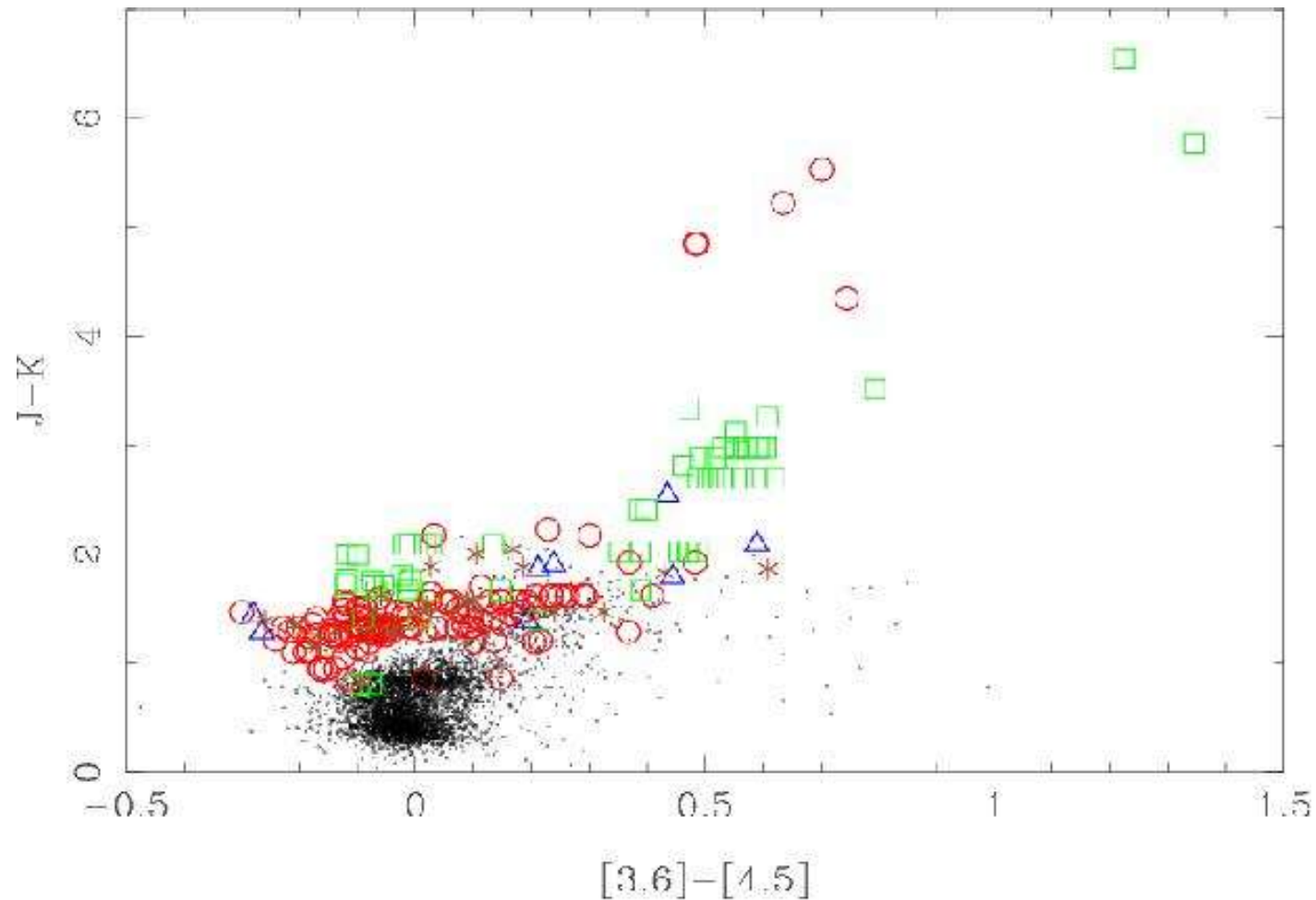
White dwarfs--



- more than 20,000 known
- many new nearby
- more than 10,000 spectra
- 150 DZ, 200 DQ known
- M companions can be eliminated by 2MASS/SDSS

AGB stars:

- can be seen across the Galaxy
- easily distinguished from extragalactic objects
- colors depend on dust composition



Variability: periods 1-3 years

-trace structure at low latitudes

-trace Galactic potential and structure formation
at high latitudes

-1 per 2 or 3 square degrees at high latitude

Normal stars – the stellar background

- extend photometry to 4.5 microns

- 12-band photometry from 0.16 to 4.5 microns
(GALEX – SDSS – 2MASS – Spitzer)

- need big effort on calibration between surveys

- effective temperatures, metallicities, alpha elements,
low metallicity, carbon enhancements--

5000 stars/sq degree at high latitudes

Requires source extraction from all Spitzer imaging:
the Spitzer PSC and ESC, limits, tools for optimal
access to reduced images-- the NVO

Summary:

- Discovery of T and Y dwarfs in wide_angle surveys
- Tens of resolved ultracool companions to nearby stars and brown dwarfs
- Pointed survey of 1000 WD and CV stars: L/T/Y(?) companions and the bottom of the main sequence; circumstellar dust and the remains of planetary systems; WD atmospheres and cooling; radii and masses for companions
- AGB stars across the Galaxy
- Calibration of photometric probes of temperature, metallicity etc for cool stars
- Chemical probes of the stellar population
- Calibration!!