



# Milky Way and Local Group Sessions WFIRST Workshop: Day 1

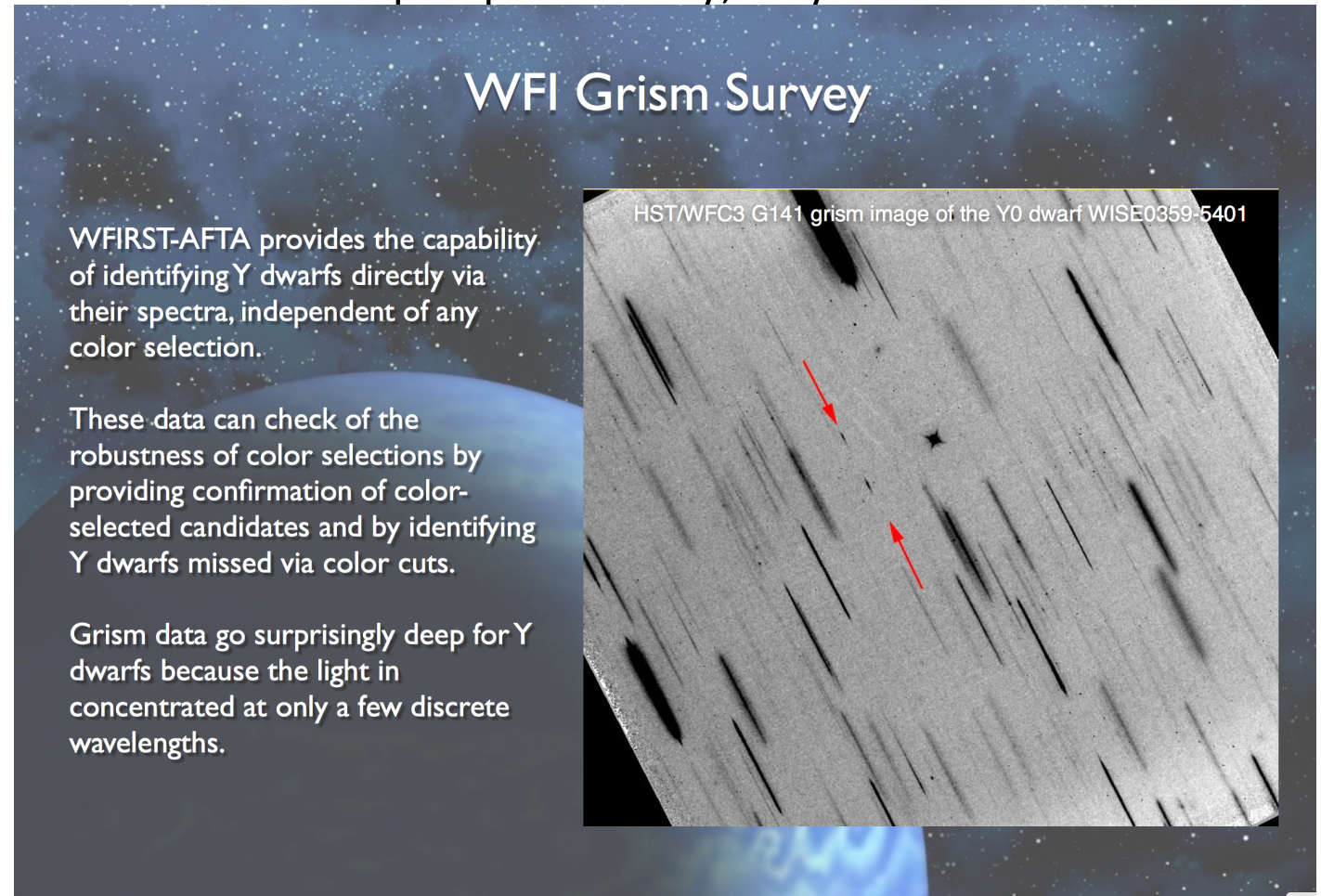
Steven Majewski (UVa) & David Soderblom (STScI)

# G&LG parallel talks, Day 1

- C. Johnson: Bulge populations
  - Can detect micro-lensed Bulge stars
    - Need rapid notification to get spectra
  - Both deep- and shallow WFIRST exposures useful
  - Need proper motions to separate populations
- R. Benjamin (U. Wisc.): Other  $\frac{1}{2}$  of MW
  - PMs reveal stars on far side of center
  - Need Ks to see through center
  - Plan for opportunity: Late-mission repeats of early fields for PMs
- M. Meixner (STScI): IR surveys of Magellanic Clouds
  - Need Ks for extinction studies
  - LMC bar is key calibration field

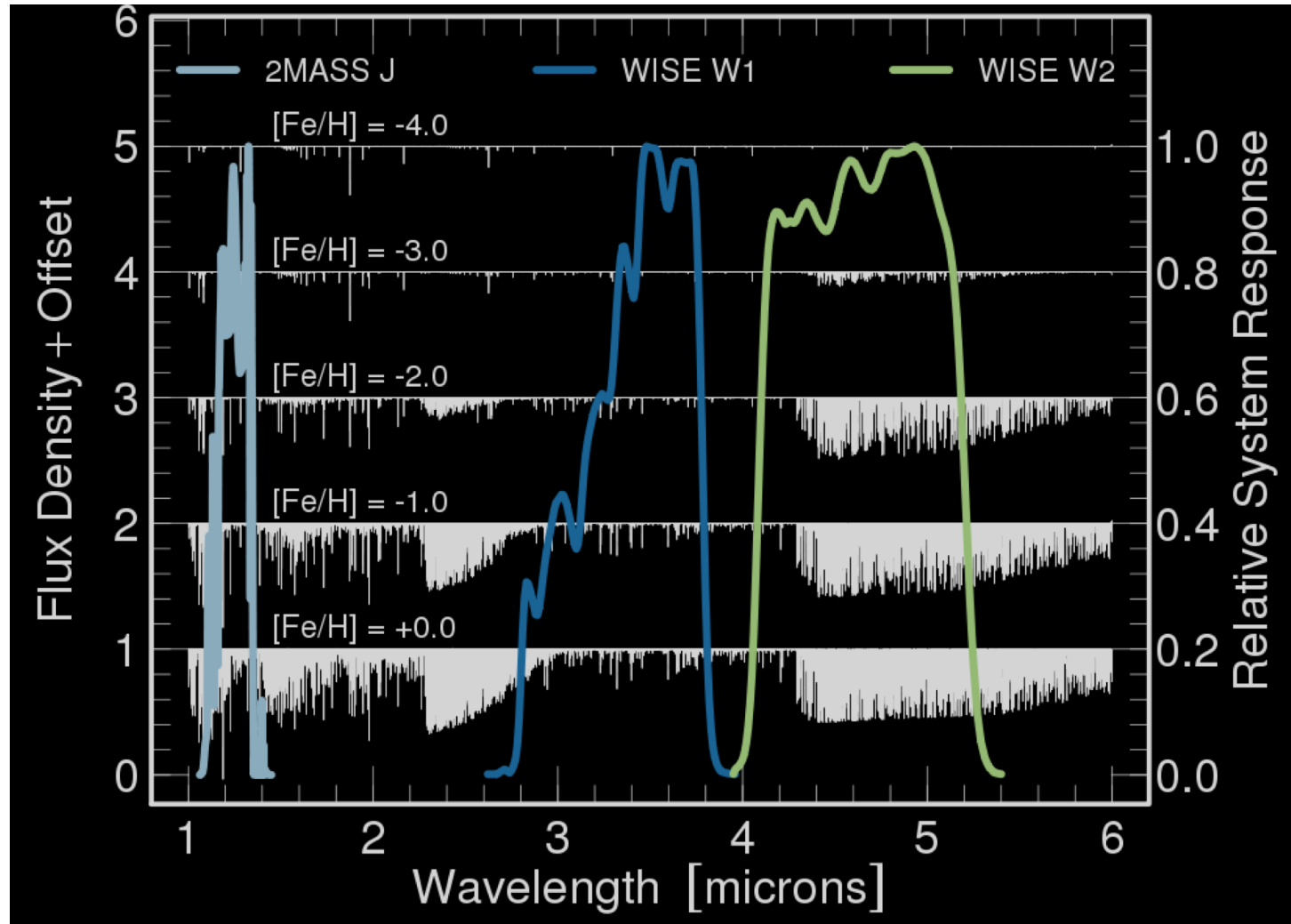
# G&LG parallel talks, Day 1

- D. Kirkpatrick (IPAC): Brown dwarfs
  - WFIRST good for detecting very-low-mass objects (BDs)
  - These are akin to free-floating planets
  - GRISM data as useful and deep as photometry; maybe better



# G&LG parallel talks, Day 1

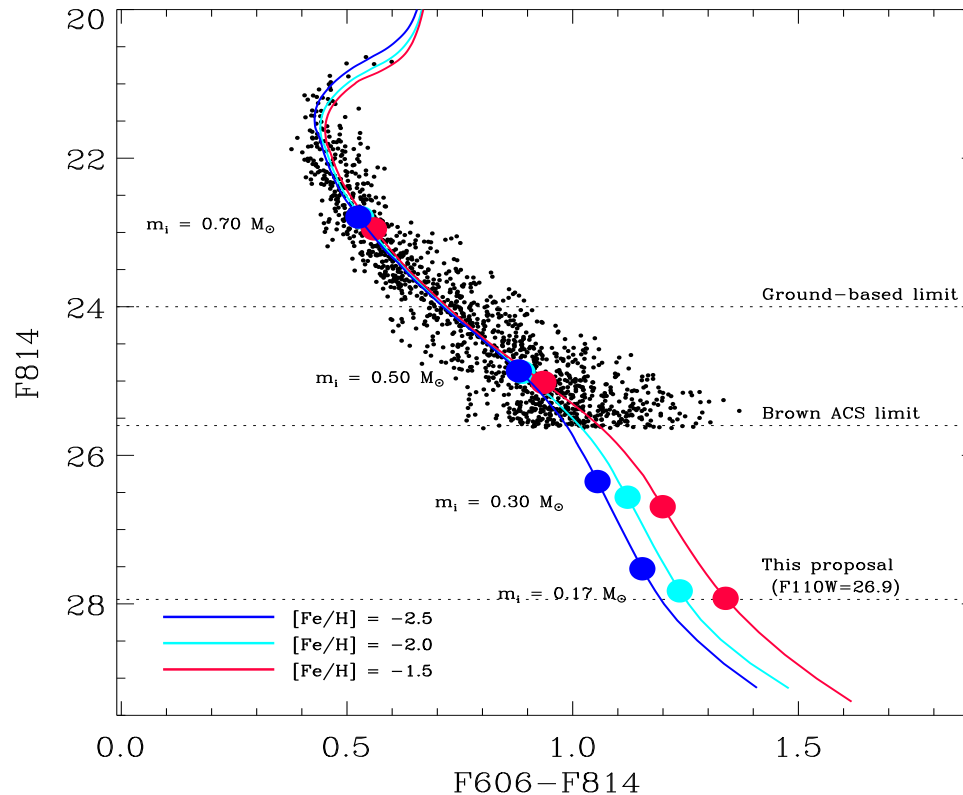
- K. Schlaufman (MIT): First stars in the IR





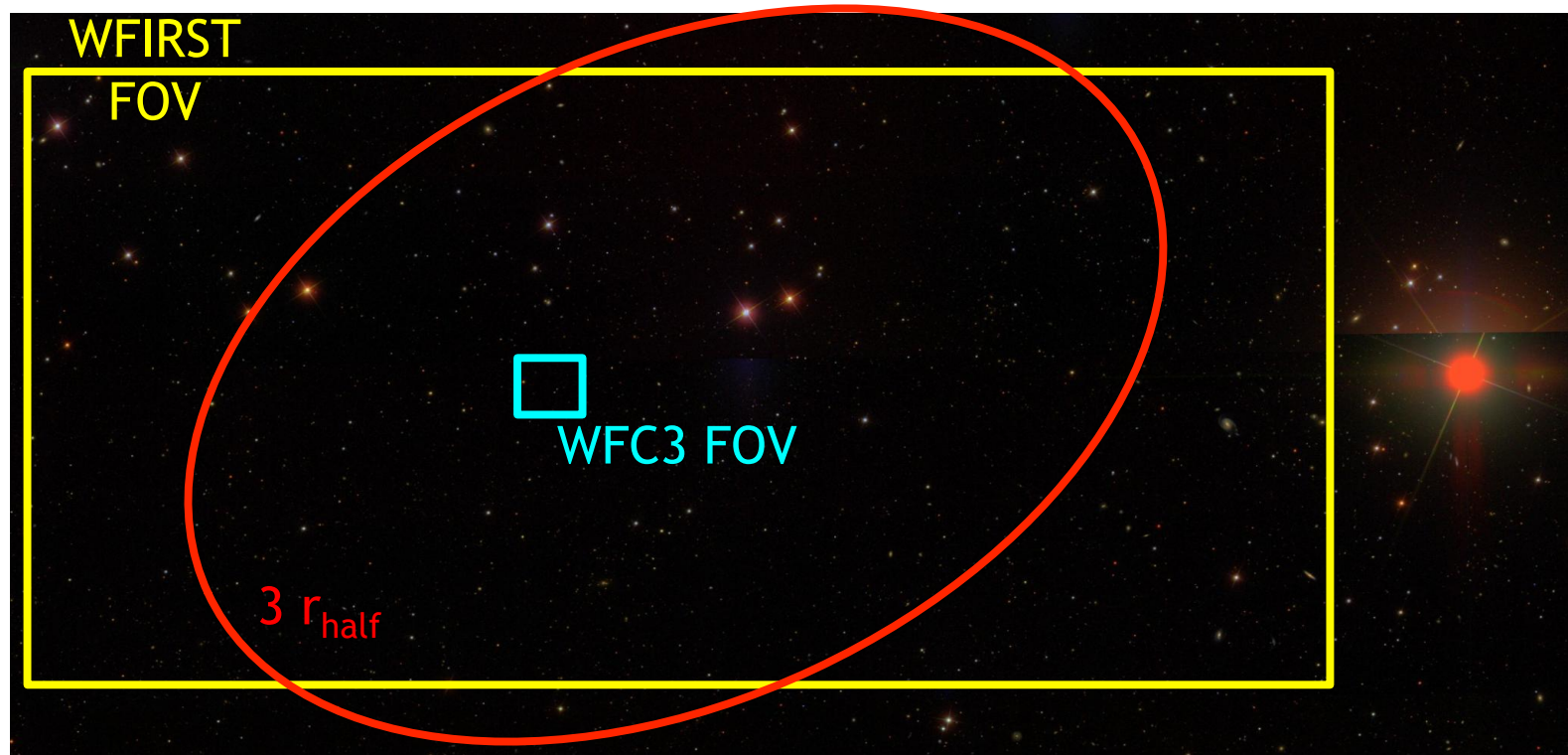
# G&LG parallel talks, Day 1

- J. Simon (Carnegie): MW satellite galaxies
  - Studying IMF  $\sim 10\times$  better than HST in NIR, plus huge FOV



# G&LG parallel talks, Day 1

- R. Indebetouw (UVA): Extinction and dust
  - Ks critical for extinction
  - Need to keep bands from broadening to reduce ambiguity



# G&LG parallel talks, Day 1

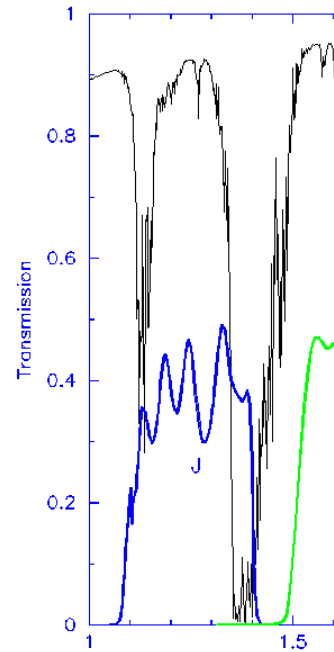
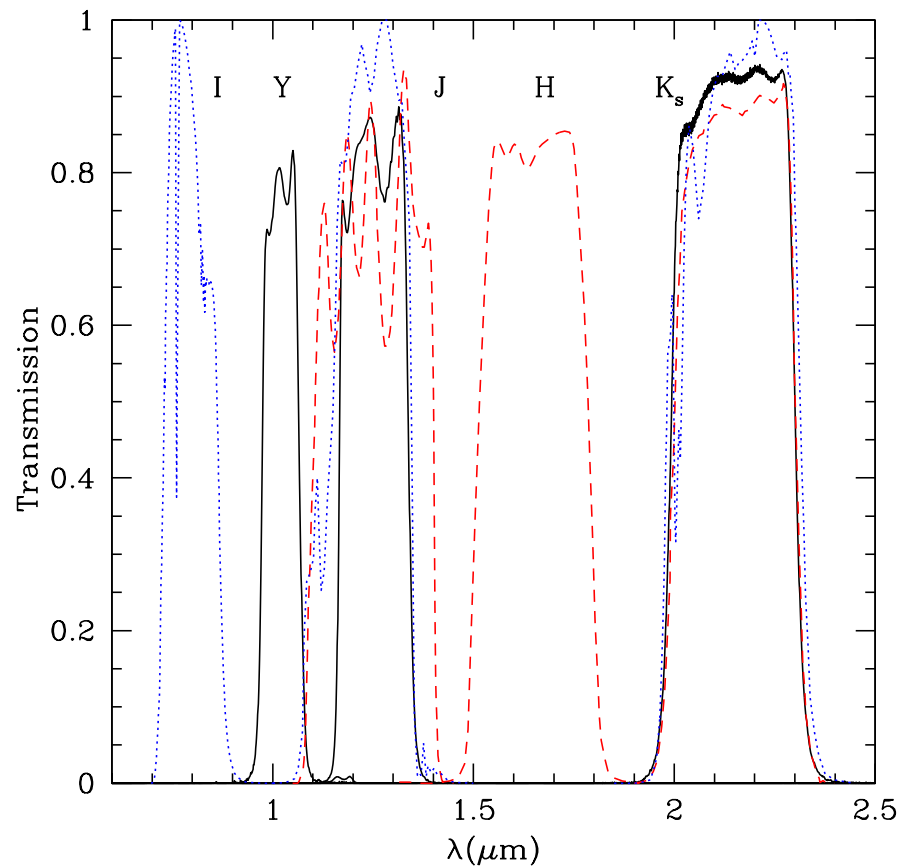
- K. Kinemuchi (APO): Variable stars
  - Cadencing can show RR Lyrs and Cepheids to large distances
- R. Beaton (Carnegie): Galactic haloes in the LG
  - Reveals all phases of star formation
  - WFIRST well suited due to large FOV and depth
- J. Schnittman (GSFC): Microlensing of neutron stars & BHs
  - Can probe high end of IMF
  - Find BHs in planetary graveyards
  - Binary evolution

- Missing from our topics:
  - Asteroseismology (but hear A. Gould)
  - Star formation (putting the “I” in IMF)



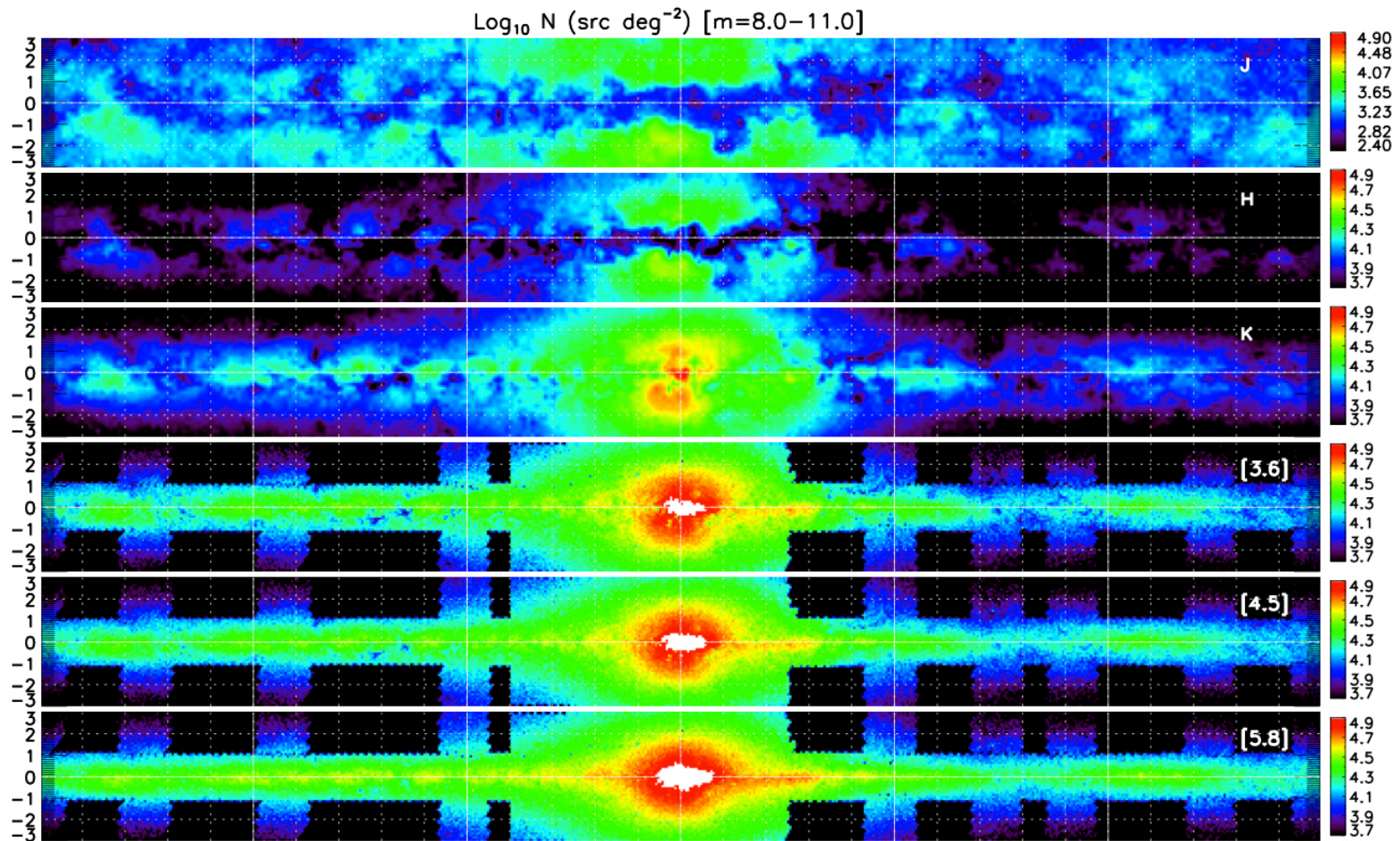
# Summary Wishlist

1. Longer  $\lambda$  desired (e.g.,  $K_s$ ), w/no  $\Delta\lambda$  broadening



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  - Punch through extinction – e.g., bulge science

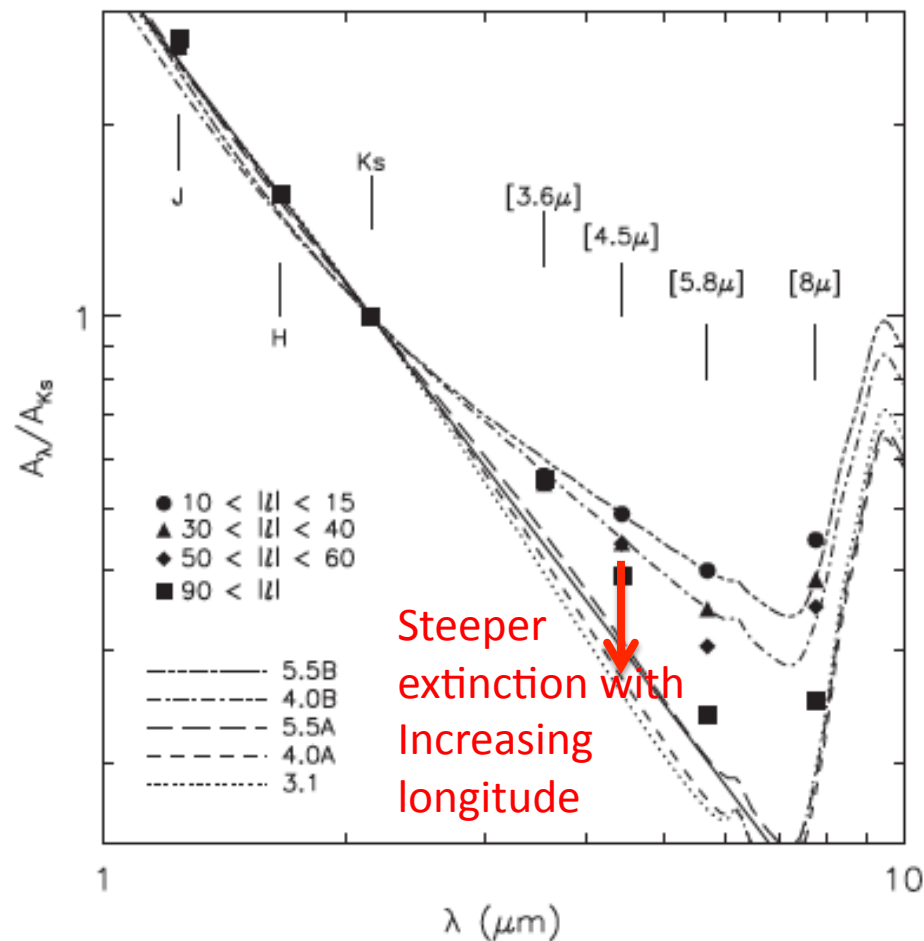


Infrared star-count map as a function of wavelength (2MASS + GLIMPSE)

(Benjamin)

# Summary Wishlist

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  - Punch through extinction – e.g., bulge science
  - Increased sensitivity to dust properties



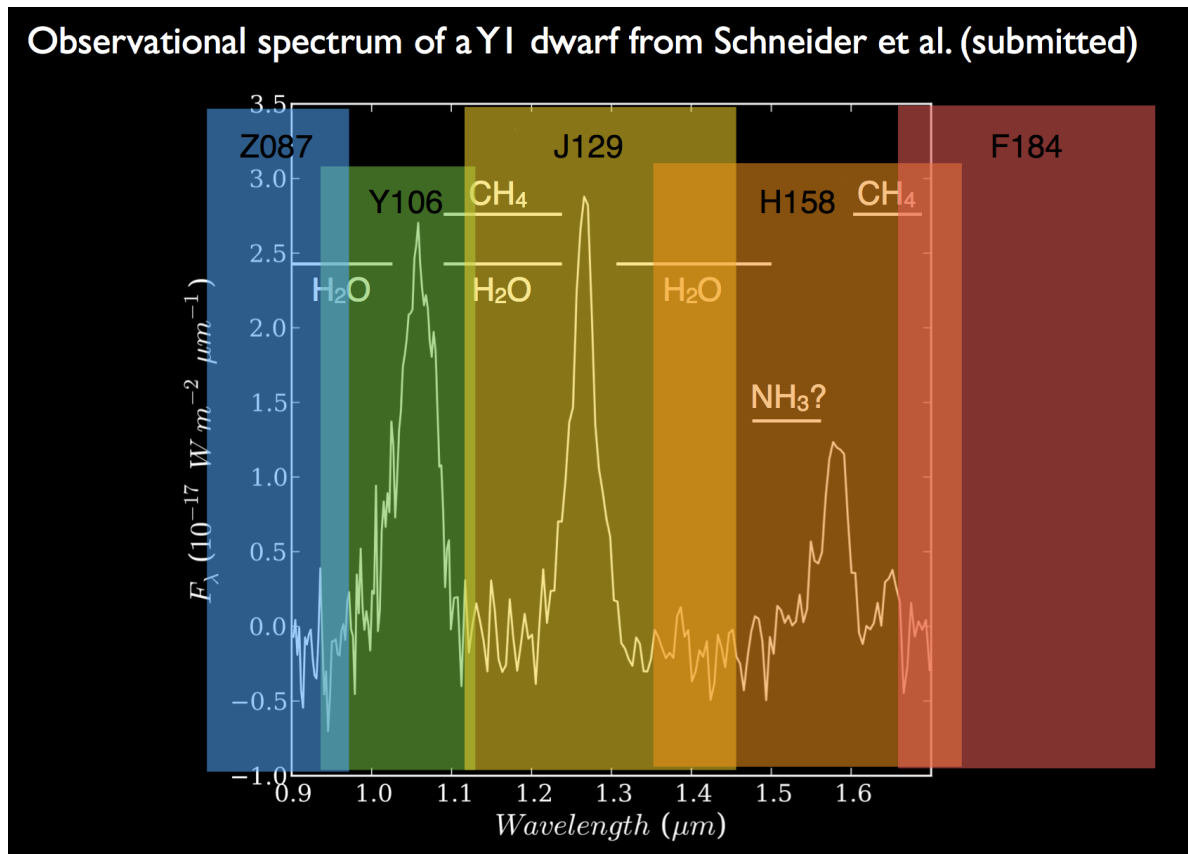
Broader filters make it hard to determine extinction relation

Zasowski++ 2009

(Indebetouw)

# Summary Wishlist

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  - Punch through extinction – e.g., bulge science
  - Increased sensitivity to dust properties
  - Detect cooler brown dwarfs



Note BDs  
easy to  
detect in  
grism mode

(Kirkpatrick)

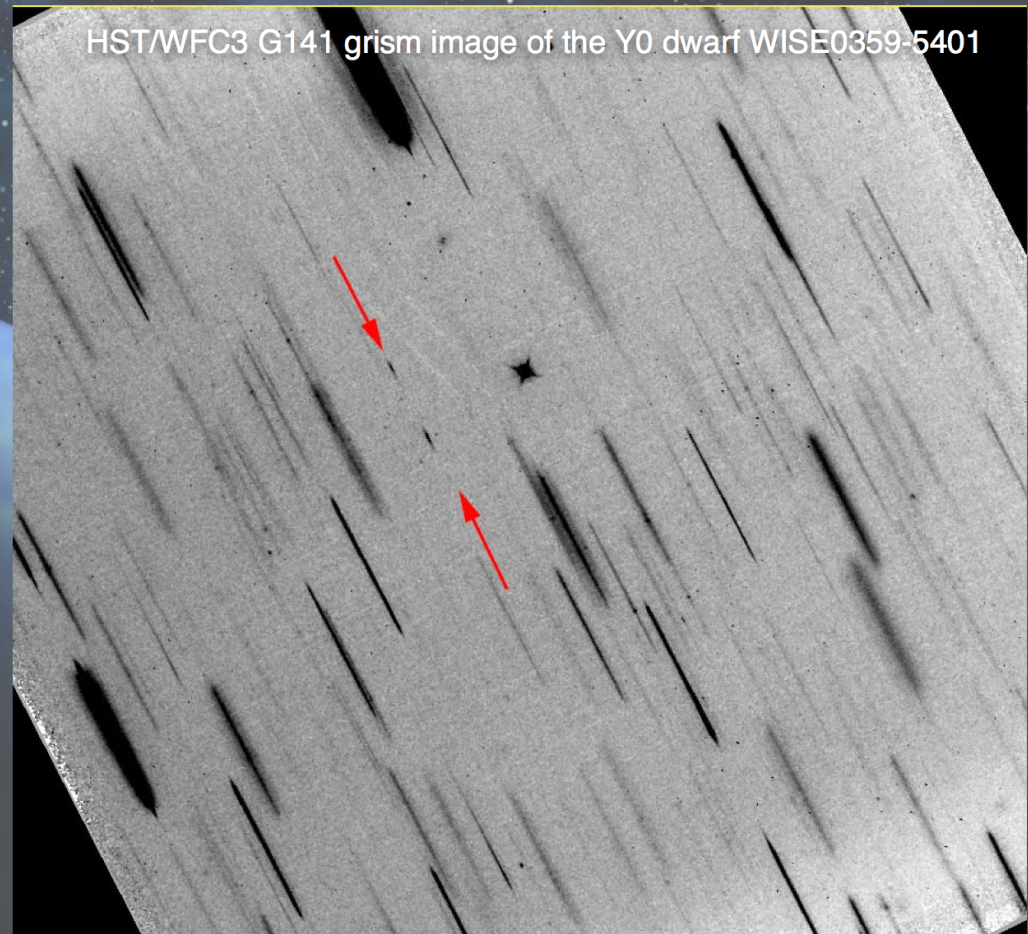


# WFI Grism Survey

WFIRST-AFTA provides the capability of identifying Y dwarfs directly via their spectra, independent of any color selection.

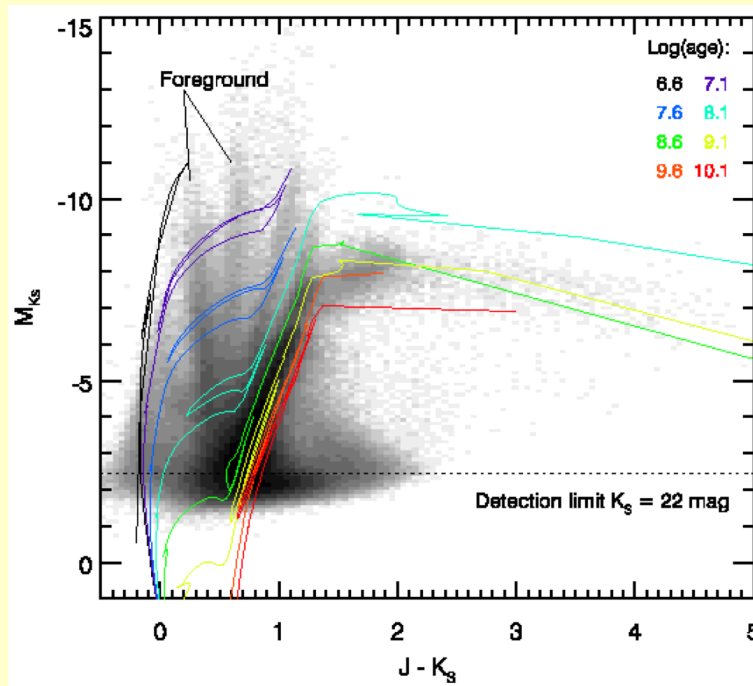
These data can check of the robustness of color selections by providing confirmation of color-selected candidates and by identifying Y dwarfs missed via color cuts.

Grism data go surprisingly deep for Y dwarfs because the light is concentrated at only a few discrete wavelengths.

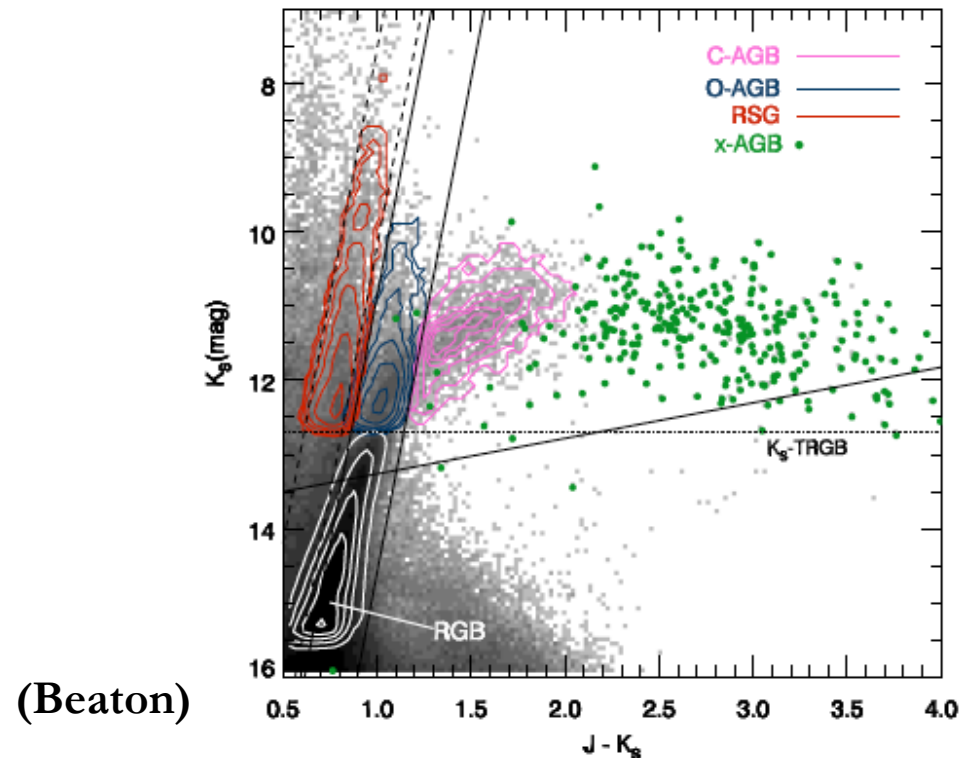


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  - Increased later type brown dwarf sensitivity
  - Sensitivity to AGB stars – intermediate ages



AGB stars nicely by age (mass) in NIR CMDs.



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If  $\lambda$  continuity is required for other science, are split filters an option?

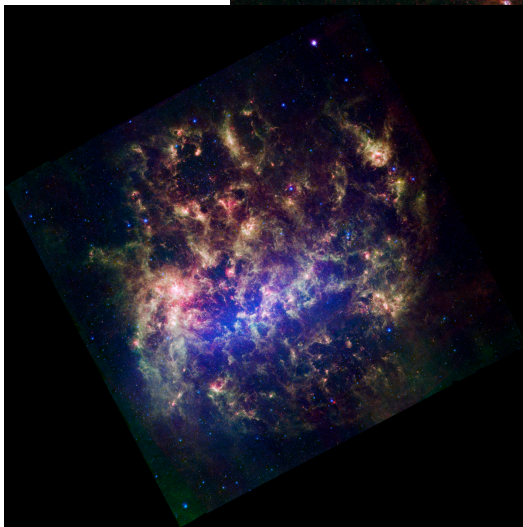
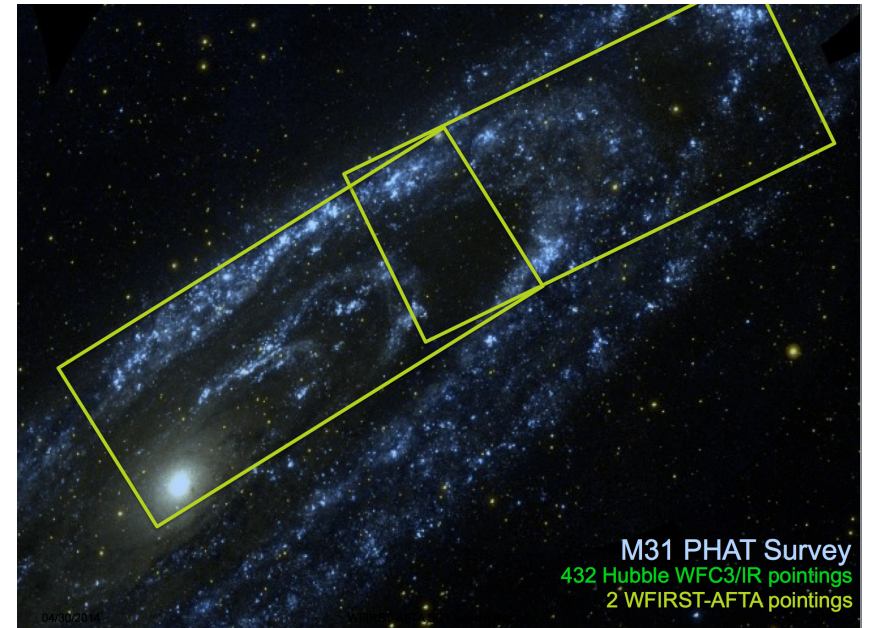
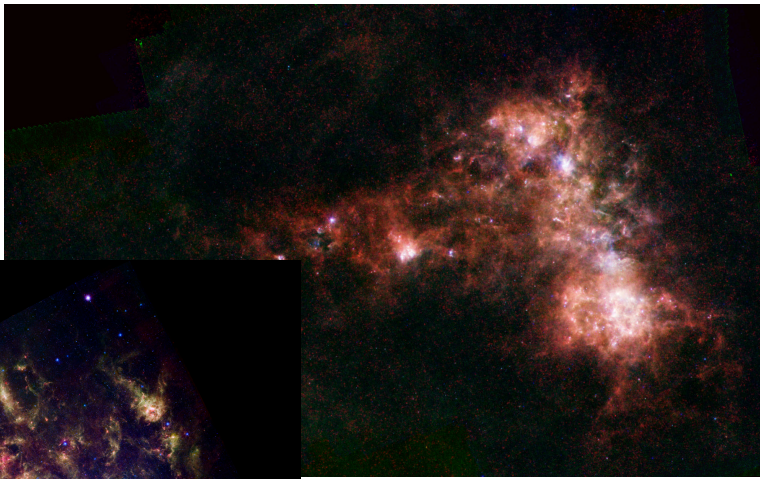




# Summary Wishlist

## 2. Possibility of “treasury survey programs”

- targets of broad interest to MW & LG science:
  - Magellanic Clouds
  - Central Milky Way
  - M31

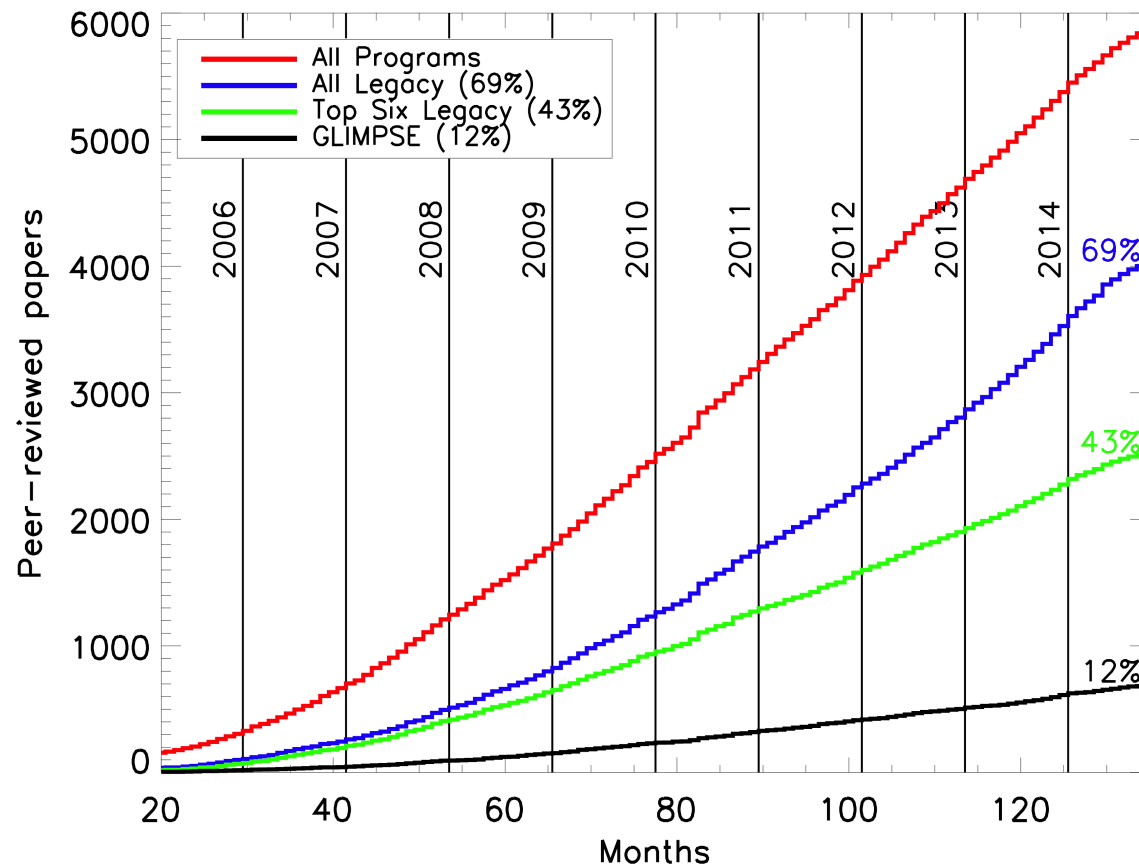




# Summary Wishlist

## 2. Possibility of “treasury survey programs”

- targets of broad interest to MW & LG science:
- legacy programs have high productivity/impact

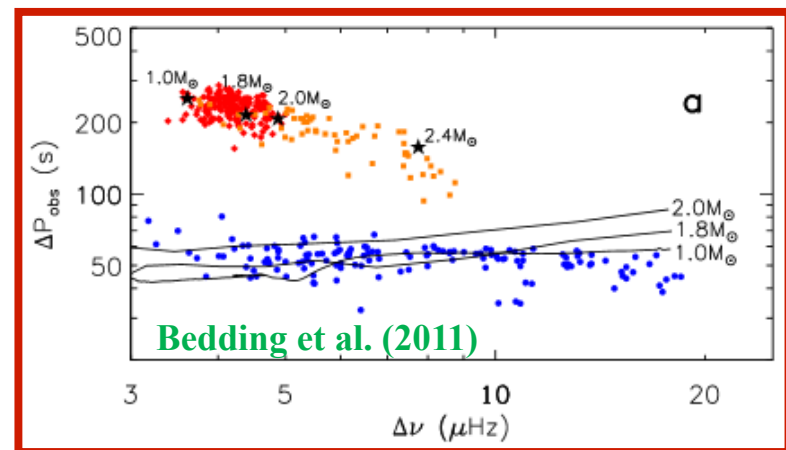
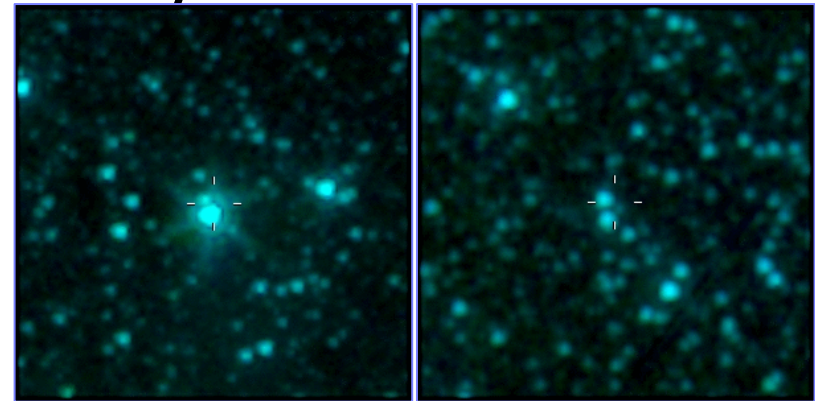
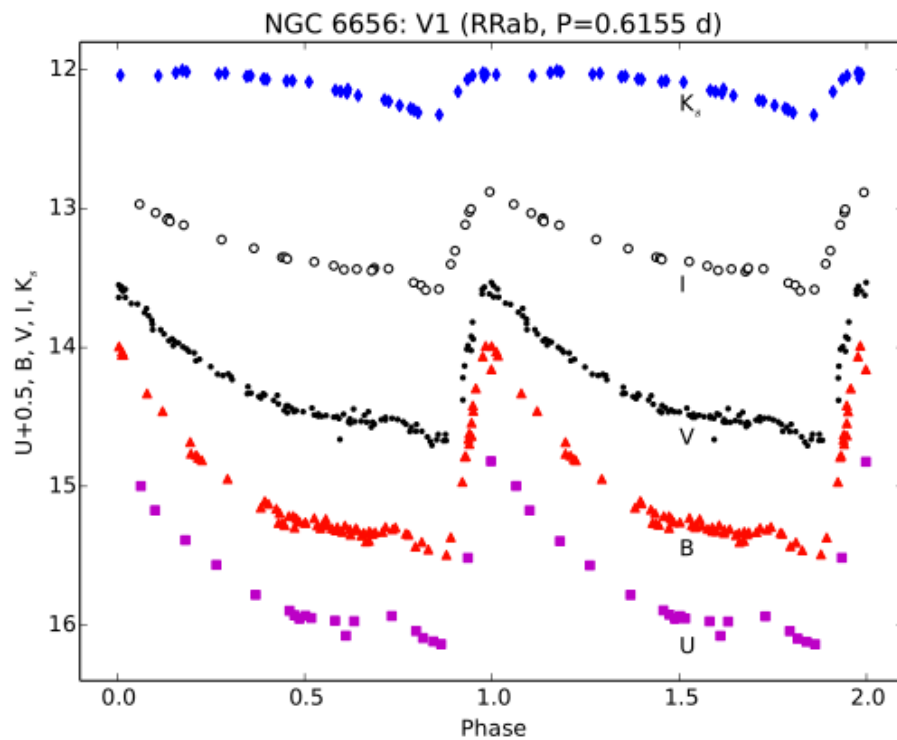


Contribution of  
Legacy programs  
to Spitzer productivity

# Summary Wishlist

## 3. Some regions with controlled cadencing?

- Variable stars
- Asteroseismology
- Long baselines for astrometry



# Tomorrow

- Why astrometry matters