DCT Astrometry of Very Low-Mass Stars

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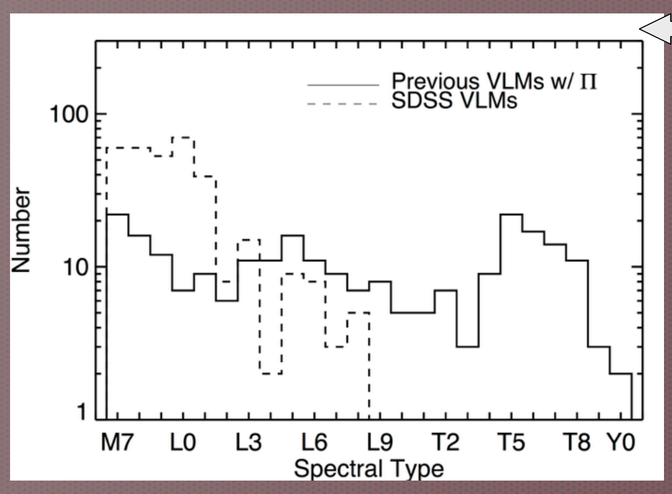
The Need for Precise Distances and Kinematics

-Census of nearby very low-mass stars (late M and early L) is incomplete.

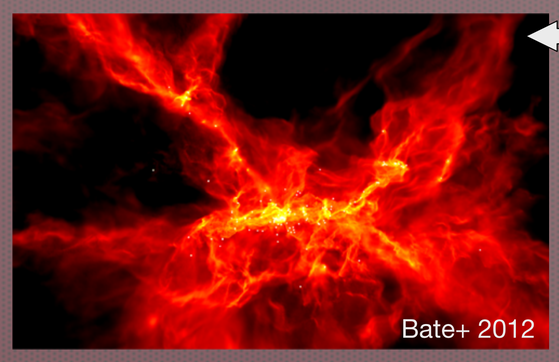
-Precise parallax distances allow us to build high quality mass and luminosity functions.

-Coupled with the binarity fraction, we can constrain formation mechanisms for very low-mass stars.



Spectral type distribution of ultracool dwarfs with parallax measurements (solid line).
Parallaxes of SDSS VLMs (dashed line) will contribute to the completeness of the nearby census of VLMs.

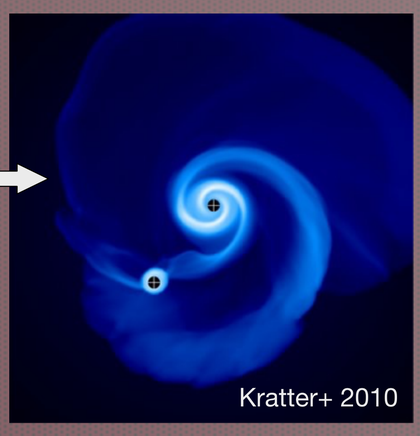
Smallest Extremes of Star Formation



Do VLMs form via **cloud fragmentation**?

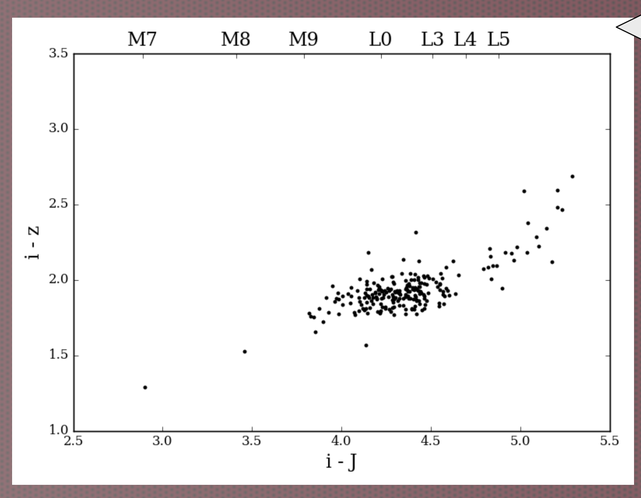
Are they **ejected** from their nascent star-forming cloud?

Are VLMs formed in the disks of higher mass stars (**disk fragmentation**)?



We need better empirical constraints on the space density and mass function to differentiate between star formation theories for VLMs.

The Sample and Project Status



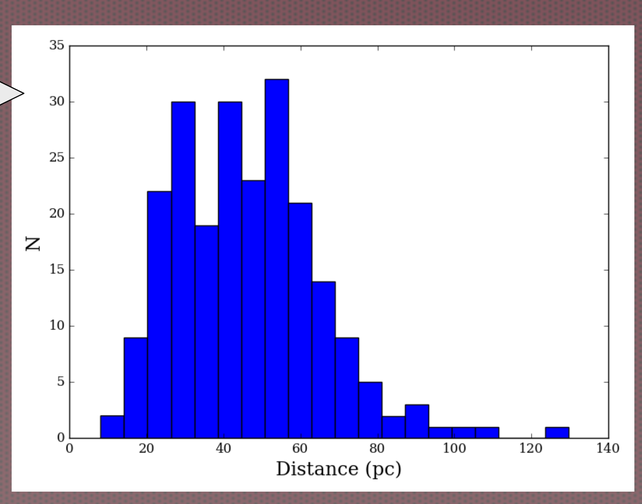
Color-color diagram of Parallax Sample

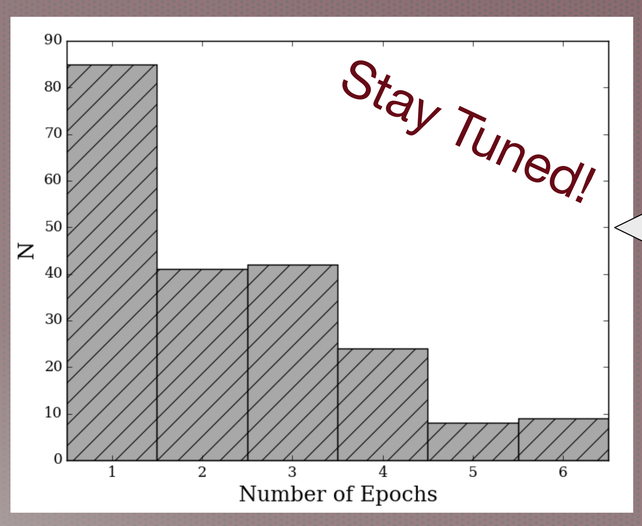
-From SDSS VLM sample from Schmidt+ (2010)

-Focused primarily on obtaining parallaxes and proper motions of L0-L4 spectral types

Photometric Distances to SDSS VLMs

-Primarily targeting objects predicted to be within 33 pc





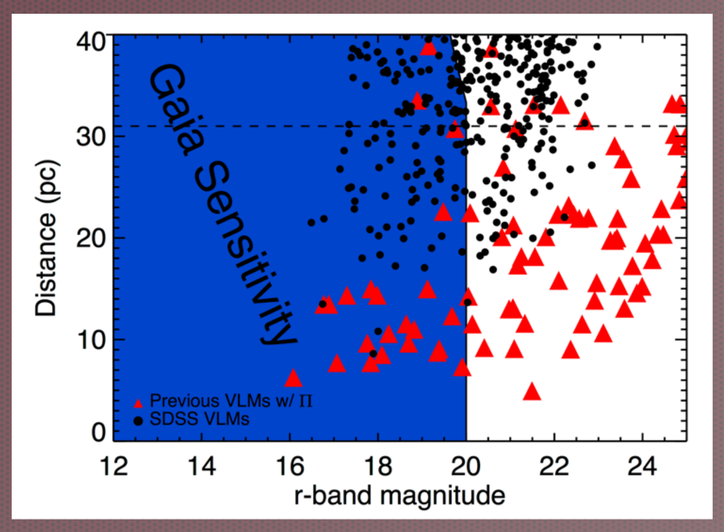
Project Status

-Observations ~2 nights per quarter

-Proper motions out this year! Parallaxes to follow.

Will Gaia Measure these Distances?

SDSS VLMs (black dots) and VLMs with parallax measurements (red triangles) are shown with the predicted Gaia sensitivity (blue shaded region).



Discovery Channel Telescope

-4.3m Telescope in Happy Jack, AZ

-Fully Operational in January 2015

-BU partnership with Lowell —> guaranteed time ~50 nights/year

-Large Monolithic Imager:

(PI: P. Massey)

Large FoV - 12.5’ x 12.5’

Small pixels - 0.12”/pixel

References:
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Schmidt, S. et al. AJ, 139, 1808 (2010)
Kratter, K.M. et al. ApJ, 708, 1585 (2010)
Schmidt, S. et al, in prep (2016)
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