

The UKIDSS-2MASS Proper Motion Survey

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Purpose of survey

- To provide proper motion information without multi-epoch UKIDSS data
- To identify a clean sample of ultracool dwarfs
- To test the completeness of current 2MASS based luminosity functions
- To identify wide, cool common proper motion companions

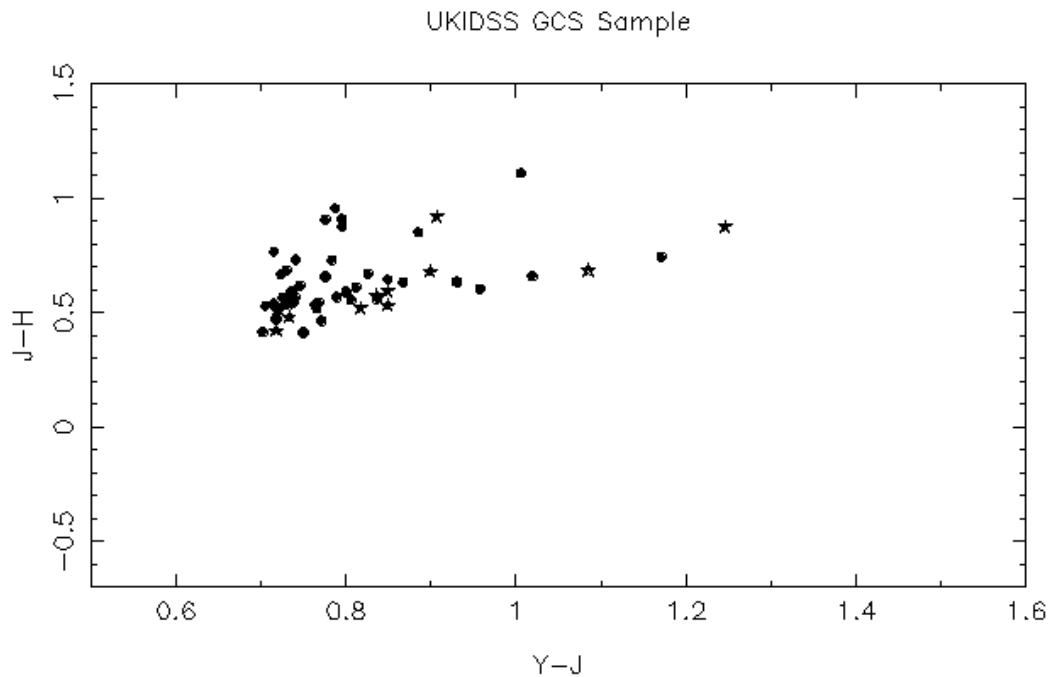
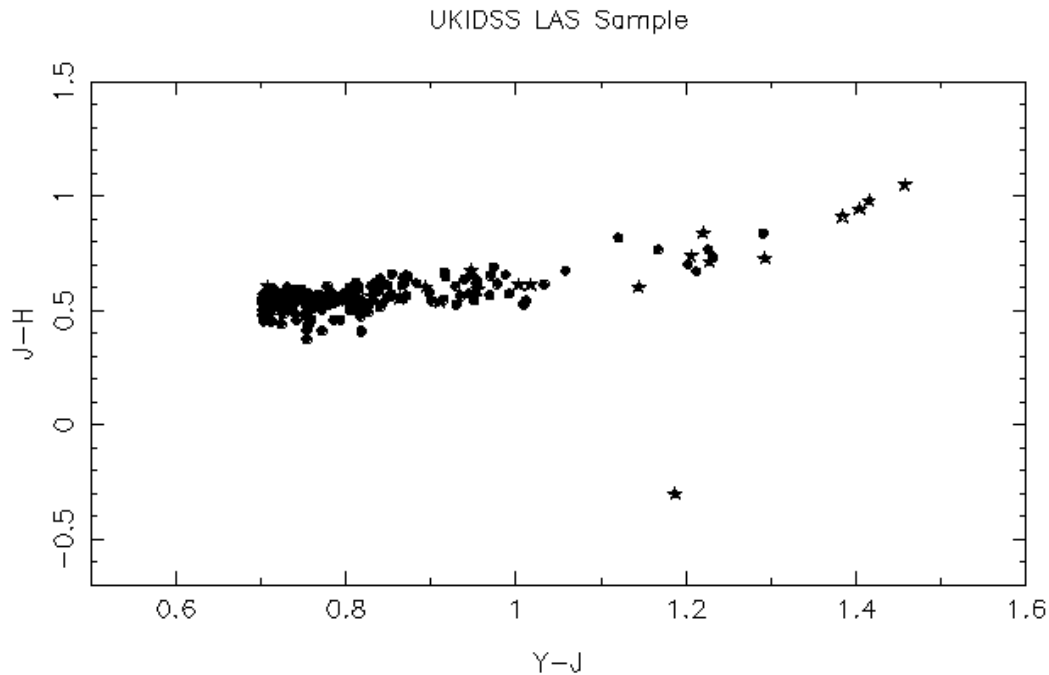
Survey Mechanics

- Selected good, single objects with ultracool dwarf-like photometry and no 2MASS pair within 0.6''
- Search area around for similar 2MASS objects
- Check paired 2MASS objects do not have UKIDSS pair within 0.6''
- Calculate full astrometric solutions

Results

- We cover the full DR4 areas of the LAS (993 sq.deg.) and GCS (148 sq.deg.)
- Detect objects with proper motions between $0.08''/\text{yr}$ up to $1.55''/\text{yr}$ (maximum detectable $20''/\text{yr}$)
- A total of 267 objects (56 previously known) between the LAS and GCS including 8 unknown L dwarf-like objects
- 11 new common proper motion binaries

- We can detect (993 stars)
- Detected between detected
- A total known included
- 11 new



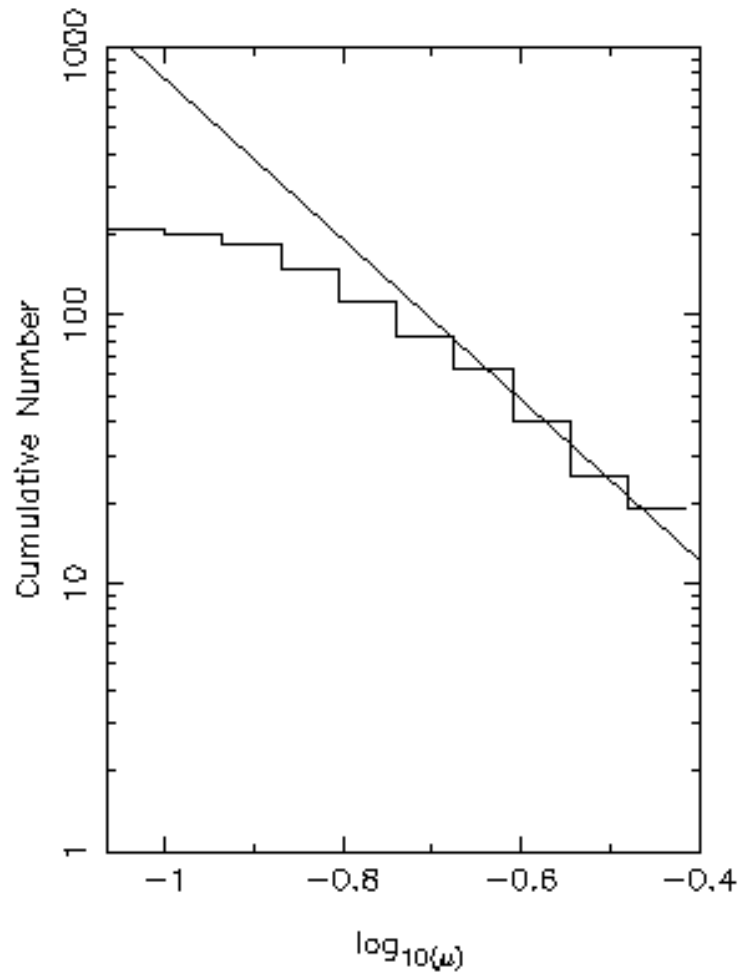
PHYSICS
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 LAS
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Completeness

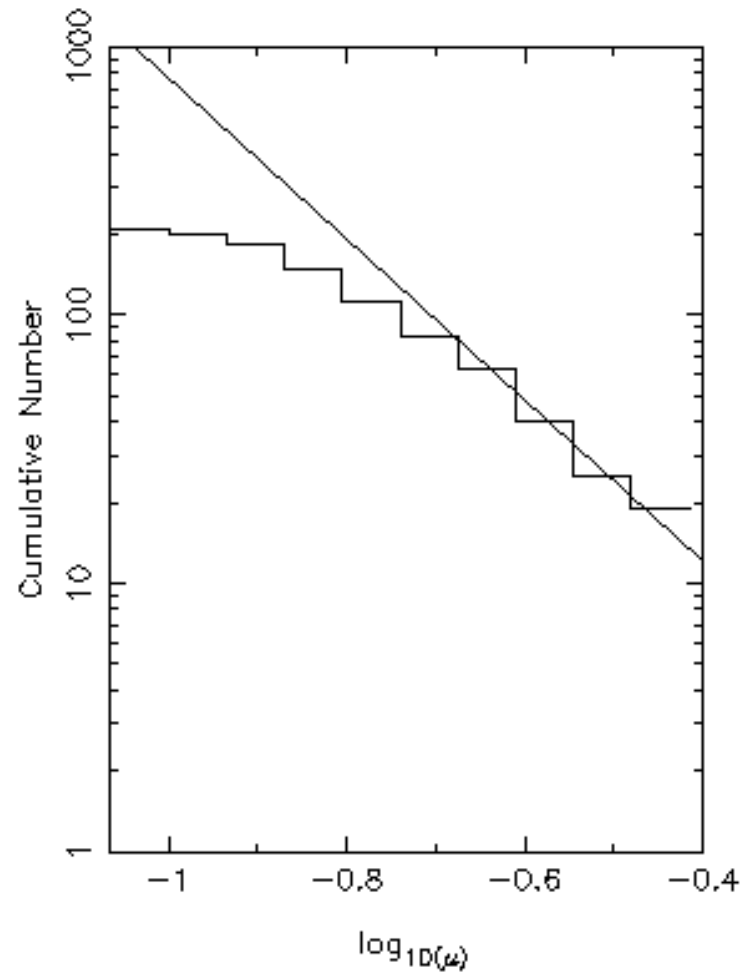
- 11 detectable, previously known single L and T dwarfs in DR4 LAS footprint
- We detect all of them
- Additional incompleteness due to varying epoch difference
- Incompleteness starts to set in below $0.2''/\text{yr}$

Completeness

UKIDSS LAS Sample



UKIDSS GCS Sample



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Discussion

- Cross referenced with Lepine & Shara, LAS proper motions agree well, GCS not so well
- Used literature data* to derive photometric distance relations (accurate to 20%)
- Two unknown mid-M dwarfs at 25-30pc
- No evidence found that 20pc L dwarf luminosity function (Reid, 2008, Cruz 2006) is incomplete

* Tinney (1996), Dahn (2002), Vrba (2004), Golimowski (2004), Hewett (2006)

Summary

- Completed a proper motion survey down to the 2MASS limit ($J=15.8$) of the LAS and GCS in DR4
- Found 267 objects including 8 possible new L dwarfs
- Complete down to $0.2''/\text{yr}$, also picking up all known L and T dwarfs we would expect to
- Suggests incompleteness in 2MASS sample of L dwarfs
- No suggestion in these data of incompleteness in 20pc sample
- Found 11 common proper motion binaries (one probably isn't a binary)
- Calculated UKIDSS photometric distance relations with 20% accuracy
- Deacon et al. (2009) astro-ph/0812.0163