

Dynamical Analysis of Nearby Comets



COMPLEMENT GAIA

Sensitivity: GAIA complete up to $V \sim 20$ mag

= $\sim 25 M_{\text{Jup}}$ at 1 Myr and 100 pc

Mass Function goes down to $3 \sim 4 M_{\text{Jup}}$

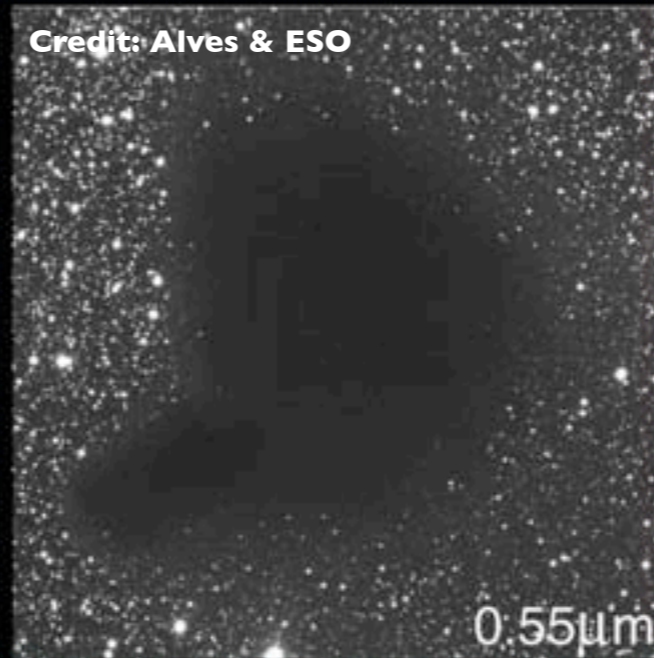
Extinction: GAIA worst enemy: extinction

COMPLEMENT GAIA

MI 6



Barnard 68



Travolta's Cloud



VISIBLE

NEAR-IR

S

Dance

Main Objectives

Derive high precision astrometry over entire associations down to the substellar and planetary mass regimes

Scientific goals

- 1. Detailed census of an association (identifying co-moving members and rejecting contaminants)**
- 2. Study of internal dynamics and dynamical evolution as a function of mass, age, environment. Compare with numerical simulation**

Requirements

- 1. astrometric accuracy better than 1 km/s for comparison with numerical simulations**
- 2. cover large areas of the sky including entire associations**

Dance

Challenge

$$1 \text{ km/s at } 200 \text{ pc} = 1 \text{ mas/yr}$$

Strategy

Wide field surveys performed in the late 90's early 2000

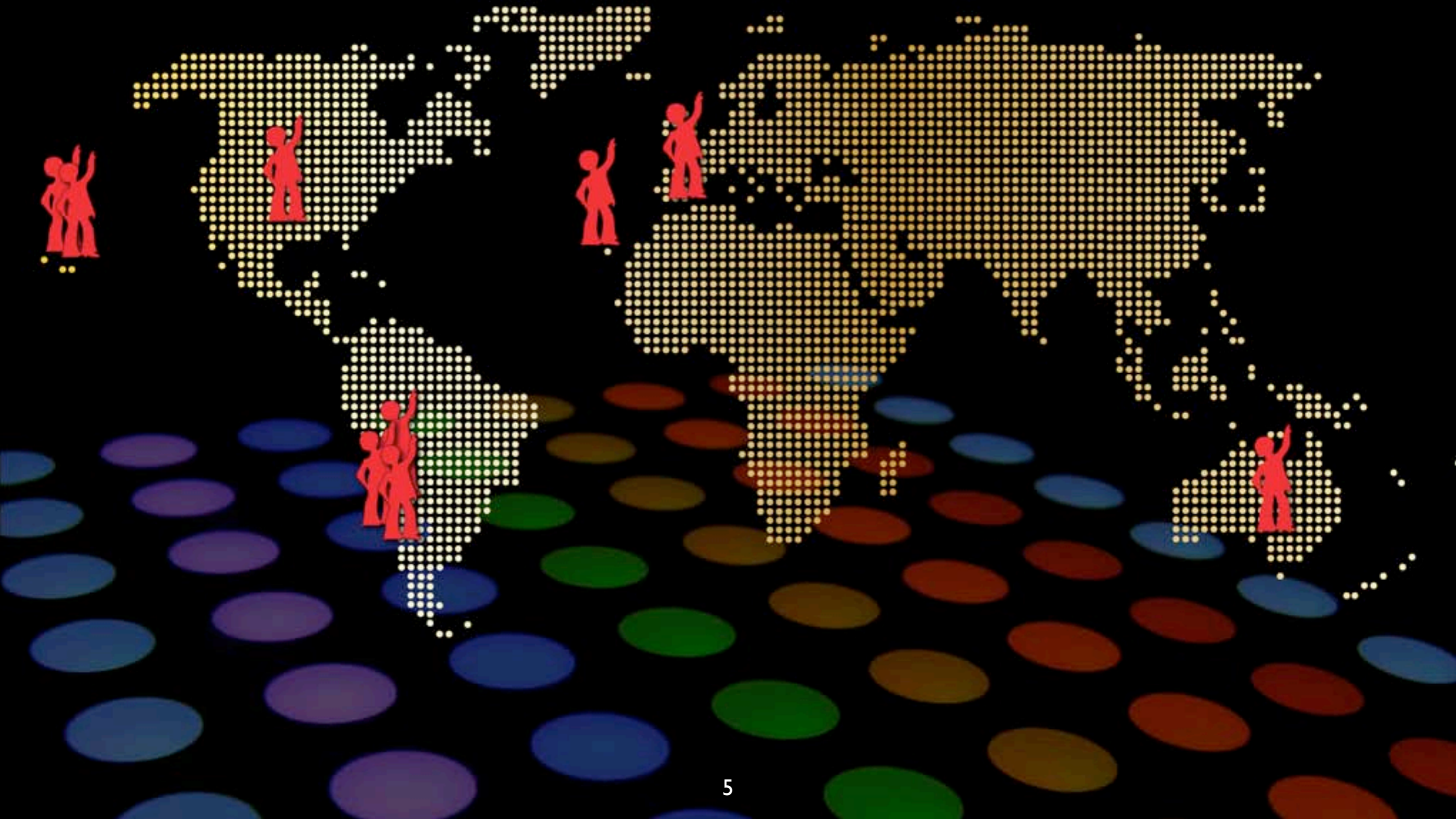
+

New observations

We have developed:

- 1. Advanced pipeline for automatic processing of vast amount of data**
- 2. Advanced algorithms to derive accurate astrometry and proper motions from vast multi-epoch, multi-instrument, multi-wavelength datasets**

The Challenge



The Challenge

NTT/SofI **AAT/IRIS2**

CFHT/MegaCam

Subaru/SuprimeCam

SDSS

INT/WFC

UKIRT/WFCAM **CFHT/CFHT12K**

ESO2.2/WFI

CFHT/UH8K

CFHT/WIRCAM

CAHA/O2000 **AAT/WFI**

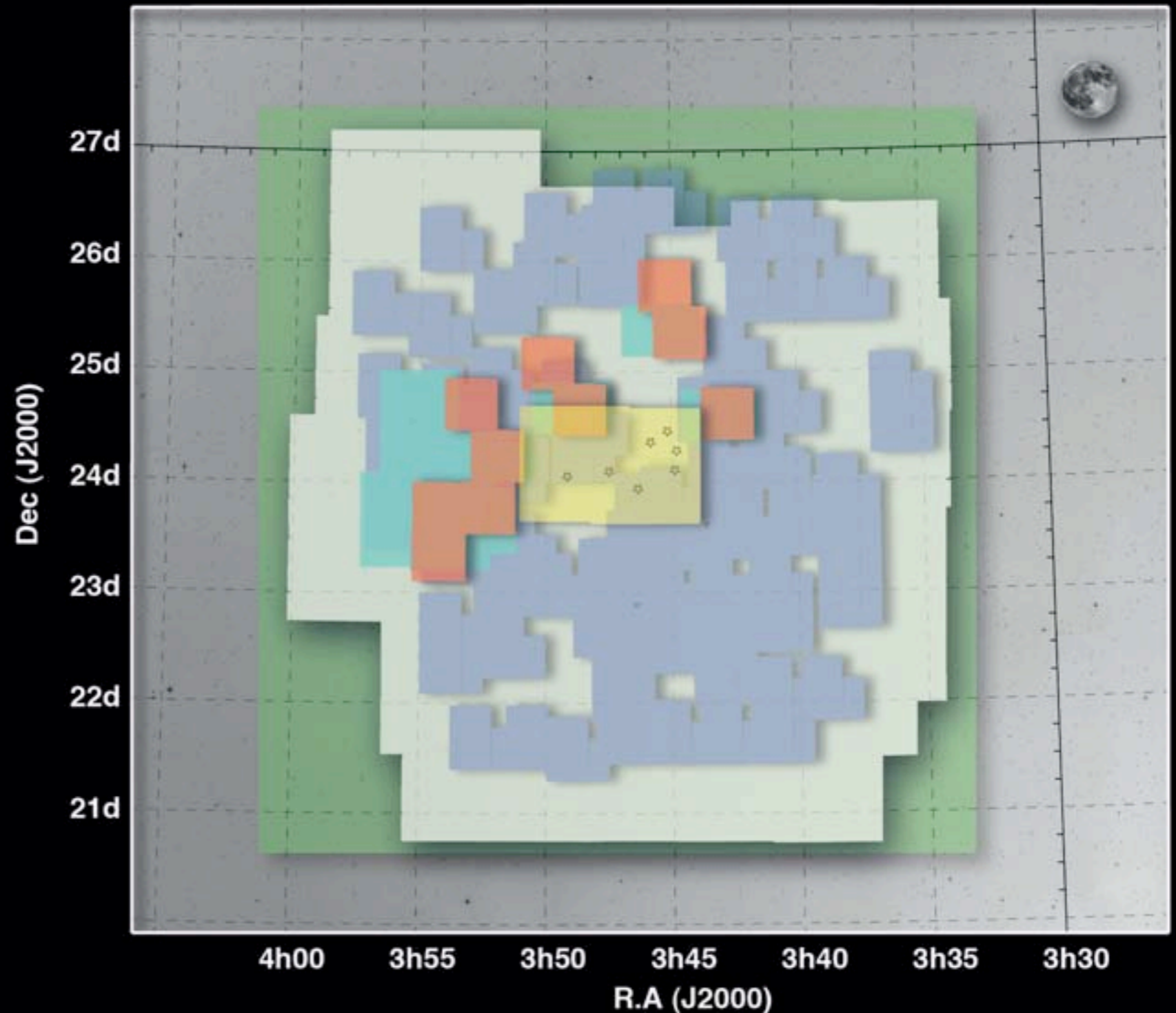
NOAO/MOSAIC

VLT/VIMOS **VLT/HAWKI** **VLT/ISAAC**

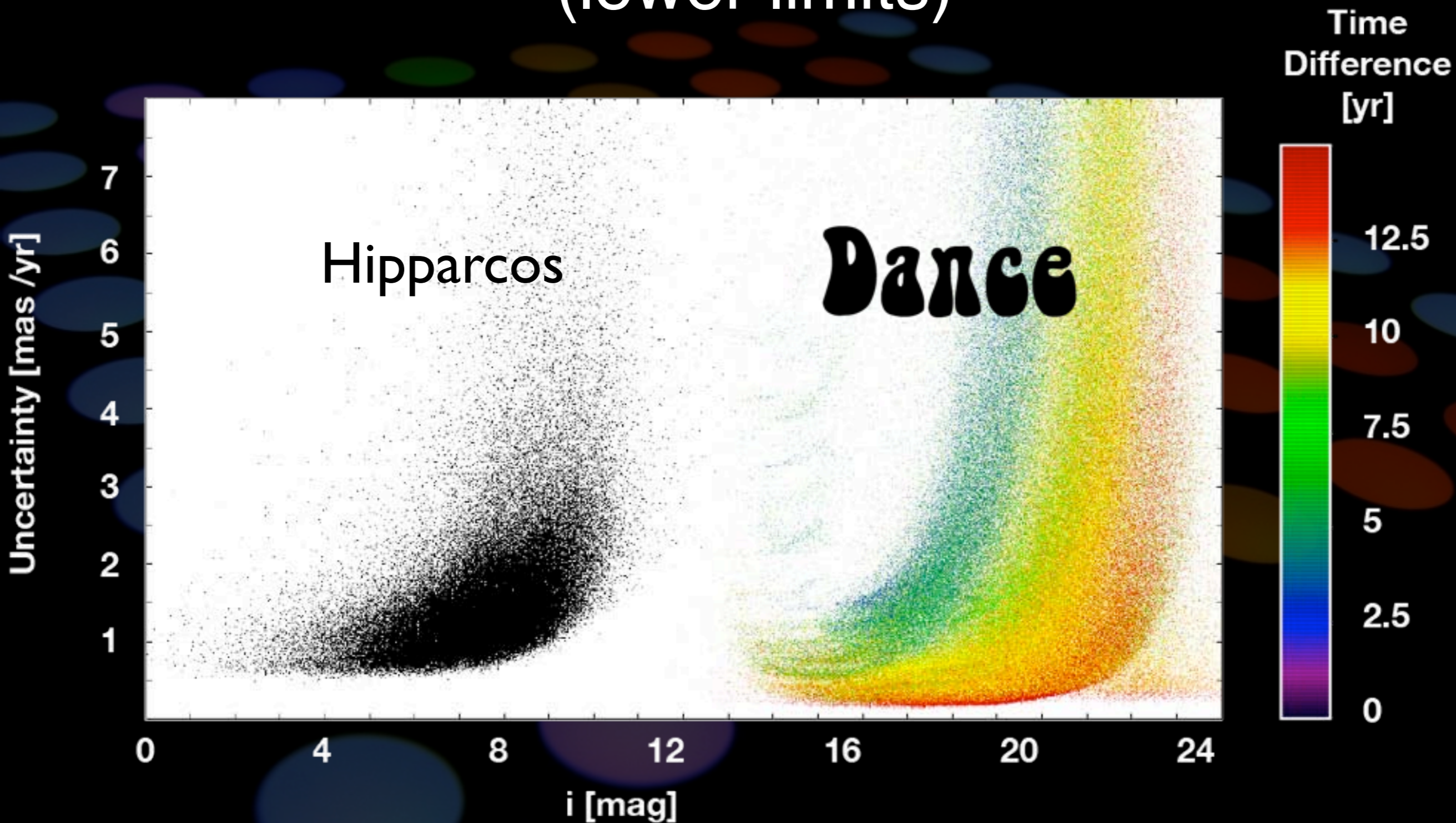
Dancefloor: The Pleiades

UKIDSS 2006-2009 Z,J,H,Ks	INT WFC 1998-2006 g,r,i,l,z	CFHT UH8K 1996 R,I	CFHT CFHT12K 1999, 2000 i,z	CFHT MegaCam 2004, 2009, 2010 g,r,i	Subaru Suprime-Cam 2004 i
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5469 images
 2×10^{11} pixels
1.1 Tb



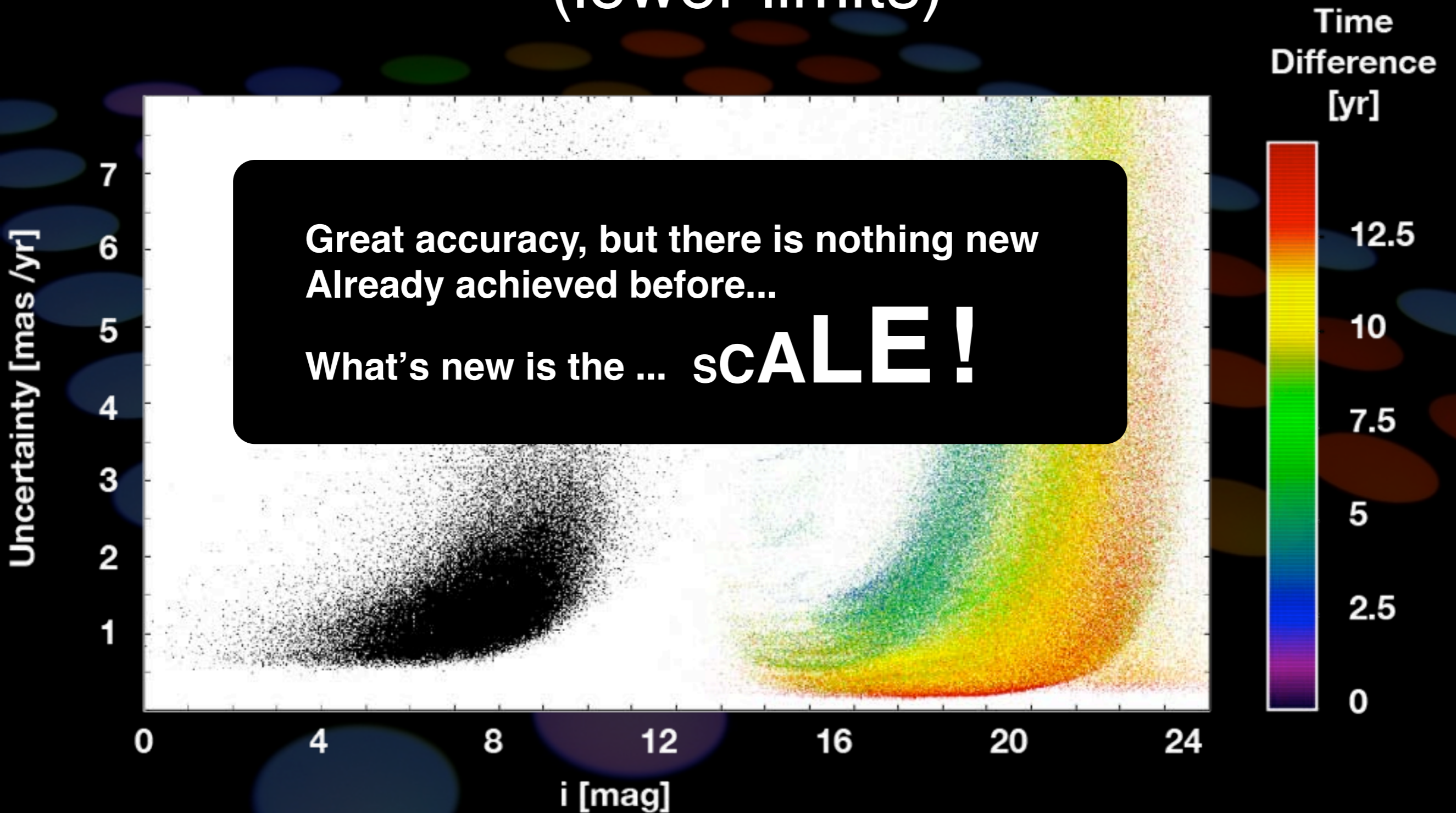
Preliminary Results (lower limits)



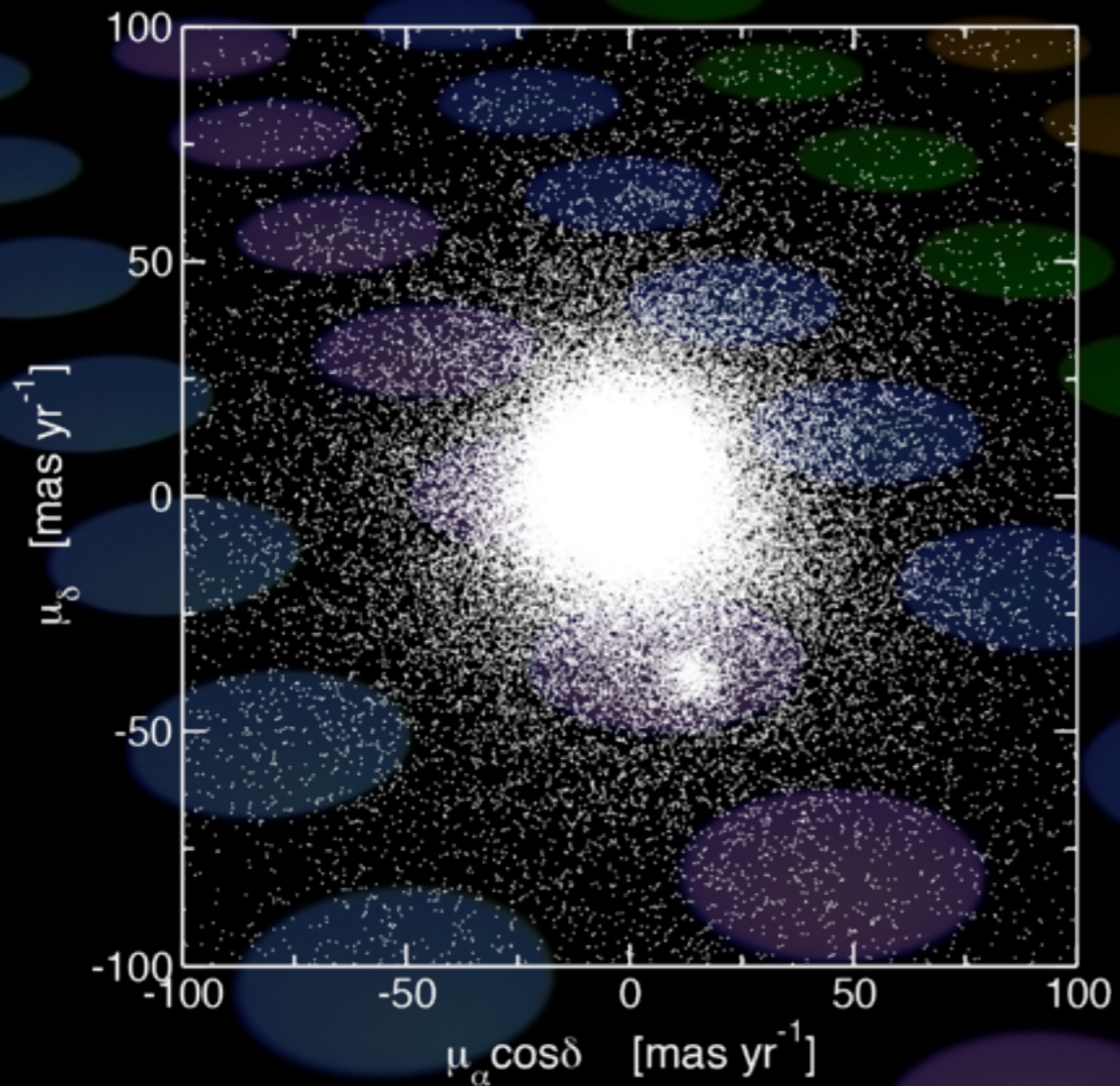
Preliminary Results (lower limits)



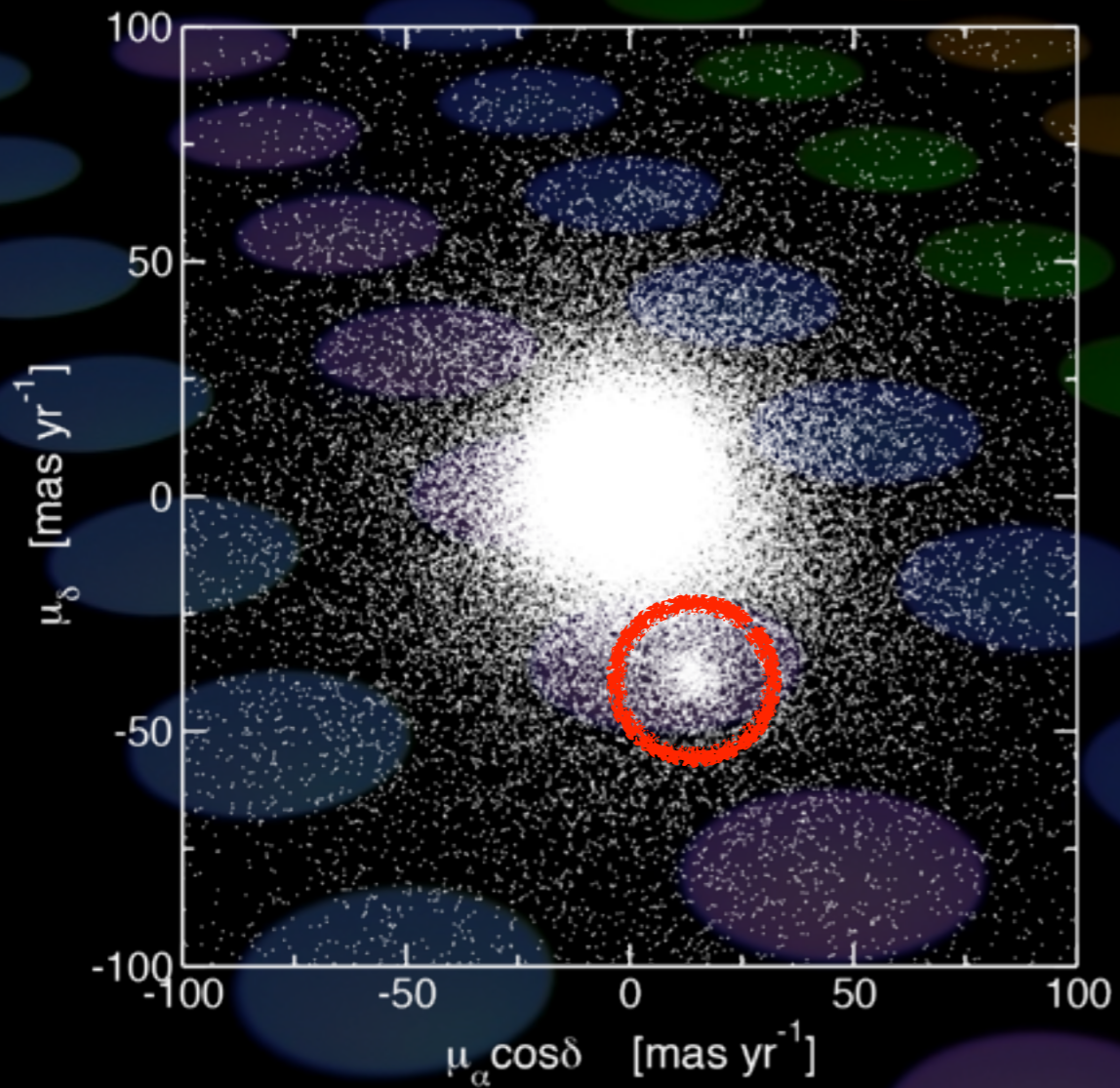
Preliminary Results (lower limits)



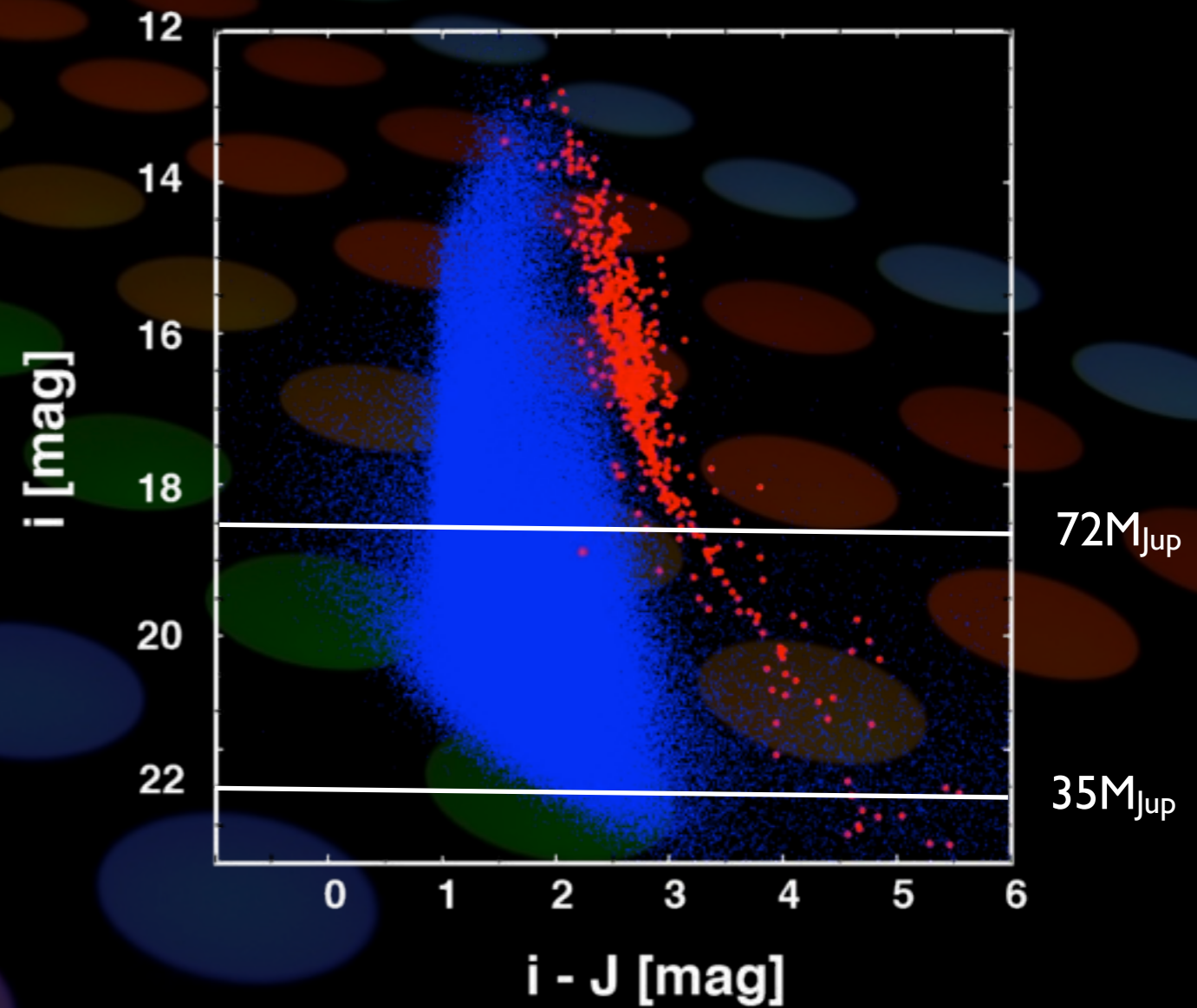
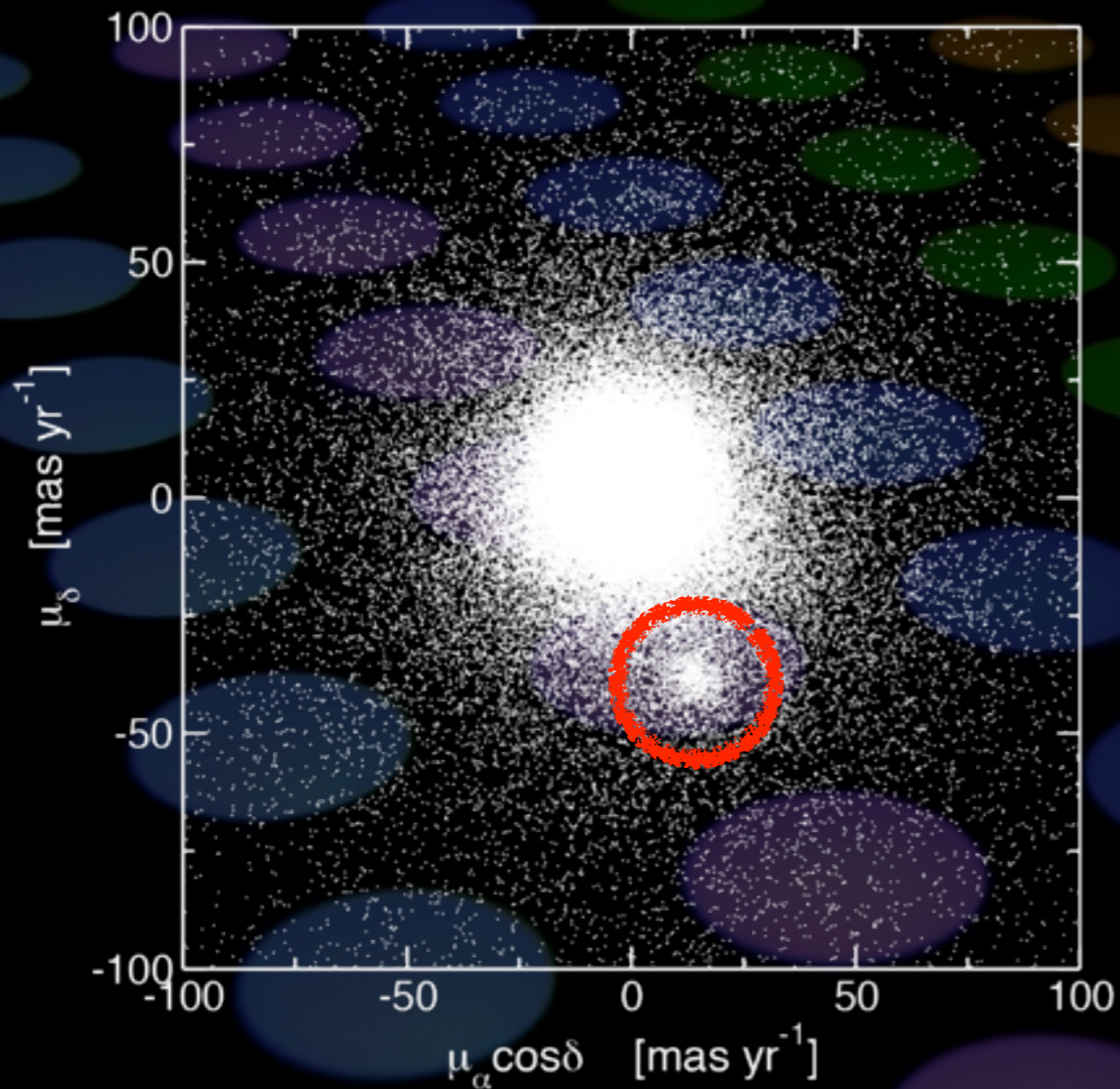
Preliminary Results



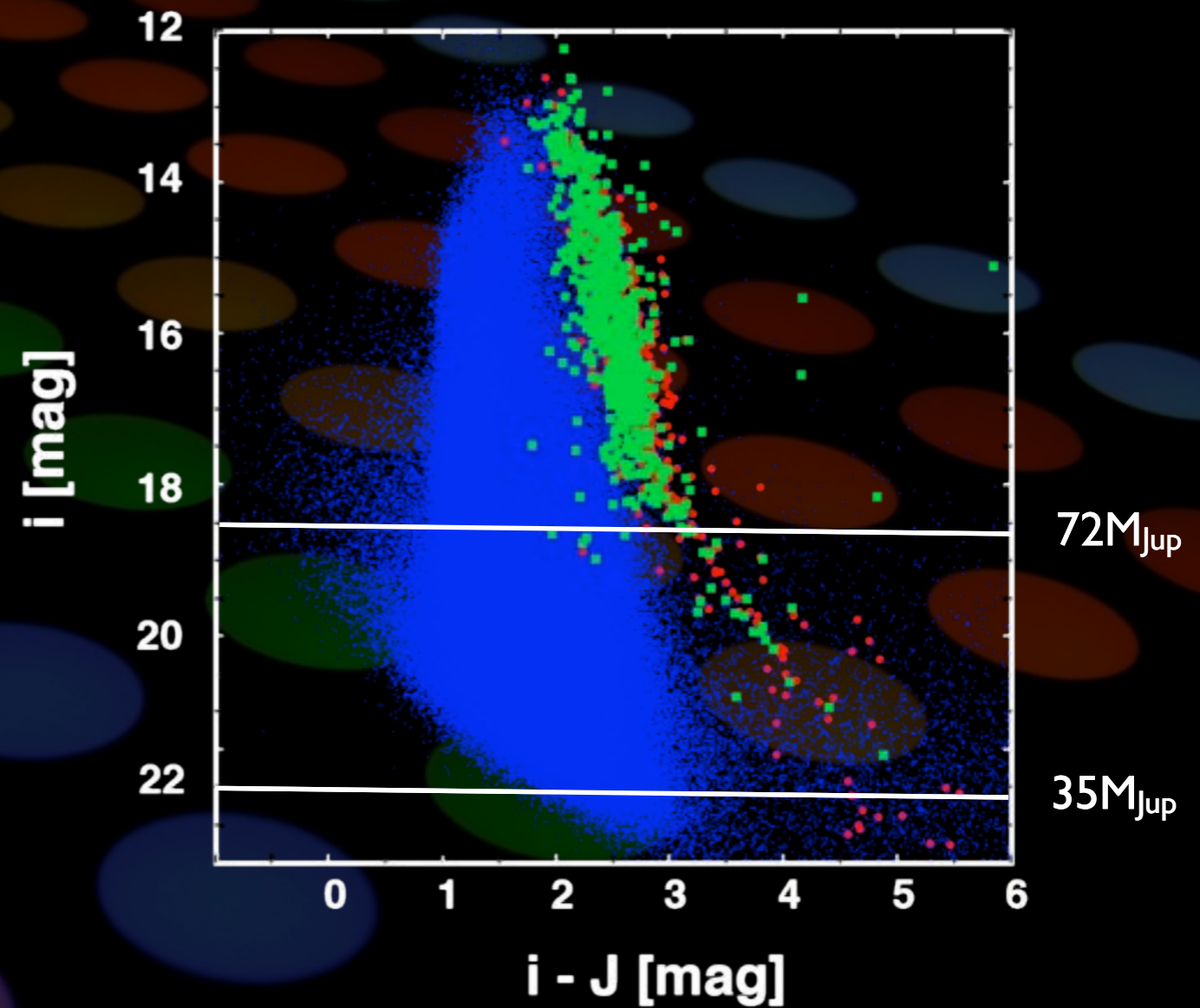
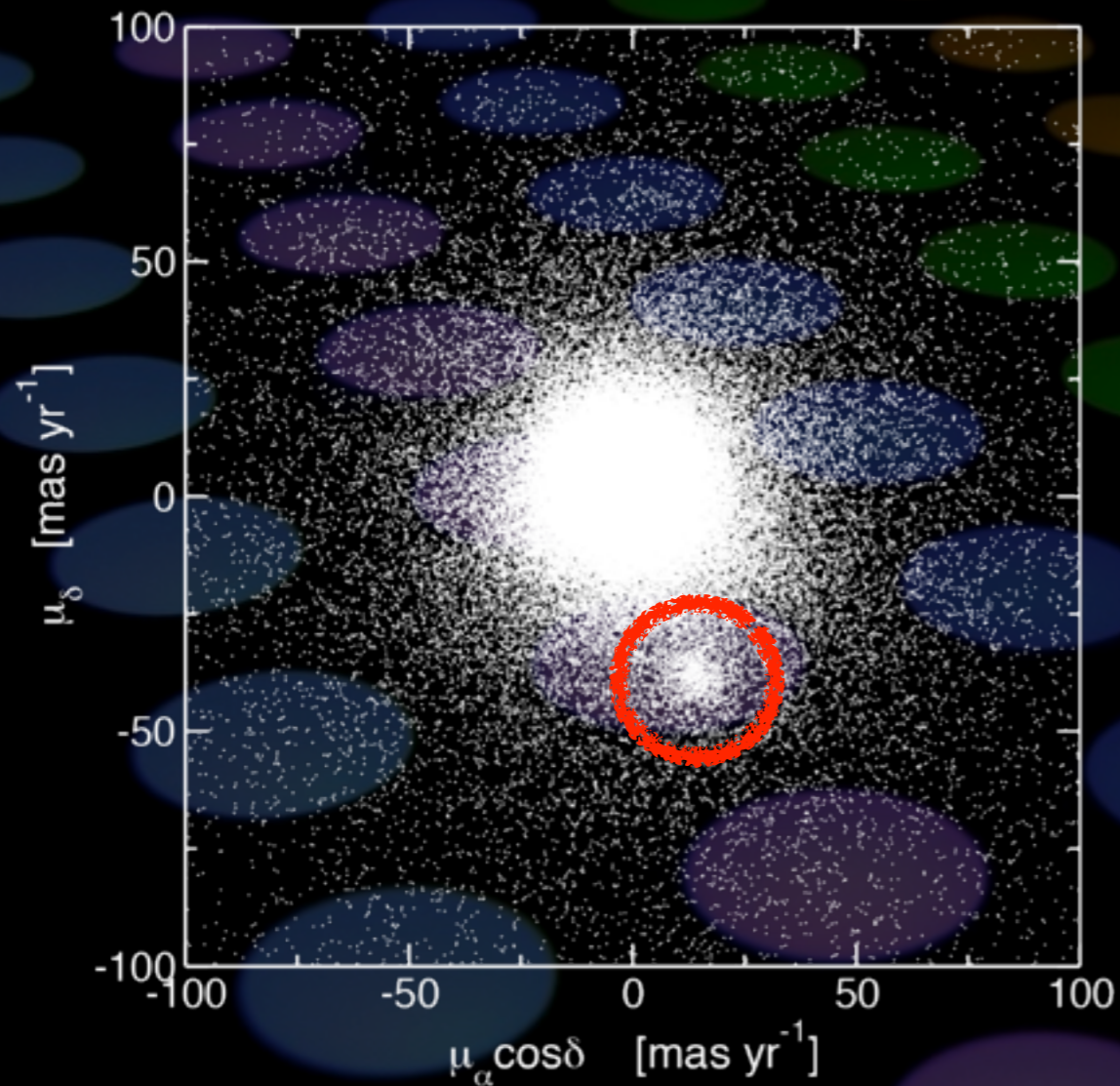
Preliminary Results



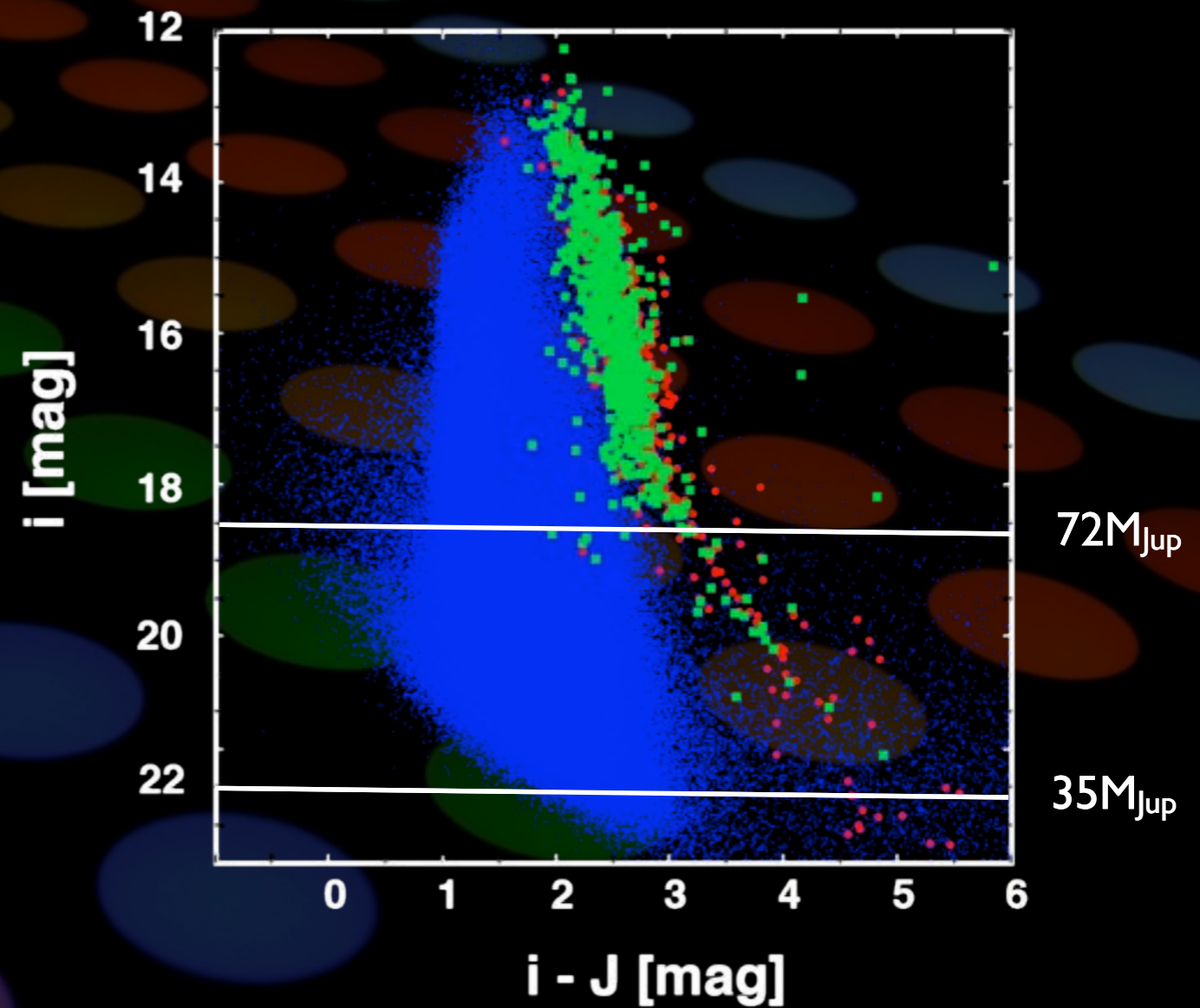
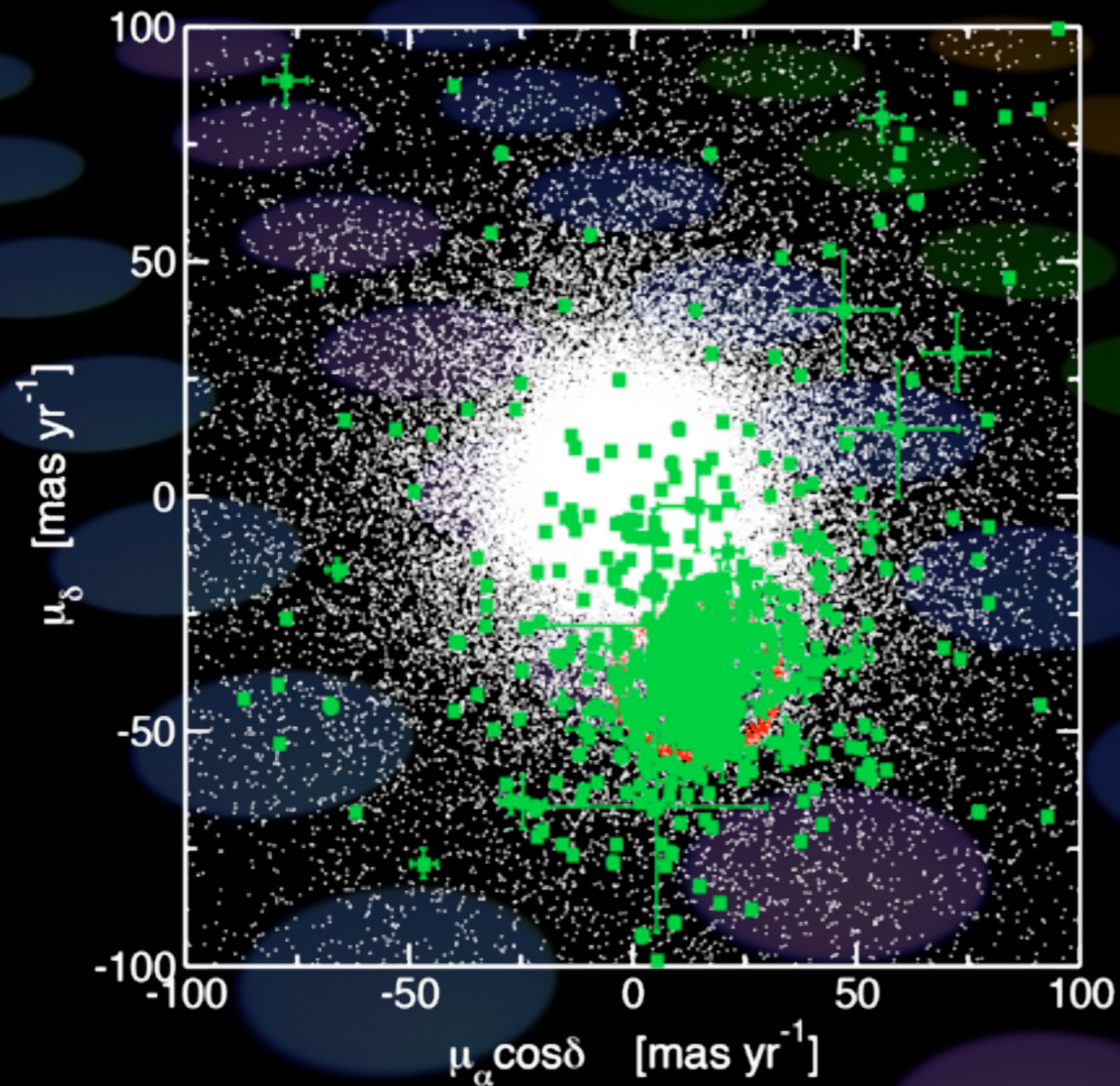
Preliminary Results



Preliminary Results

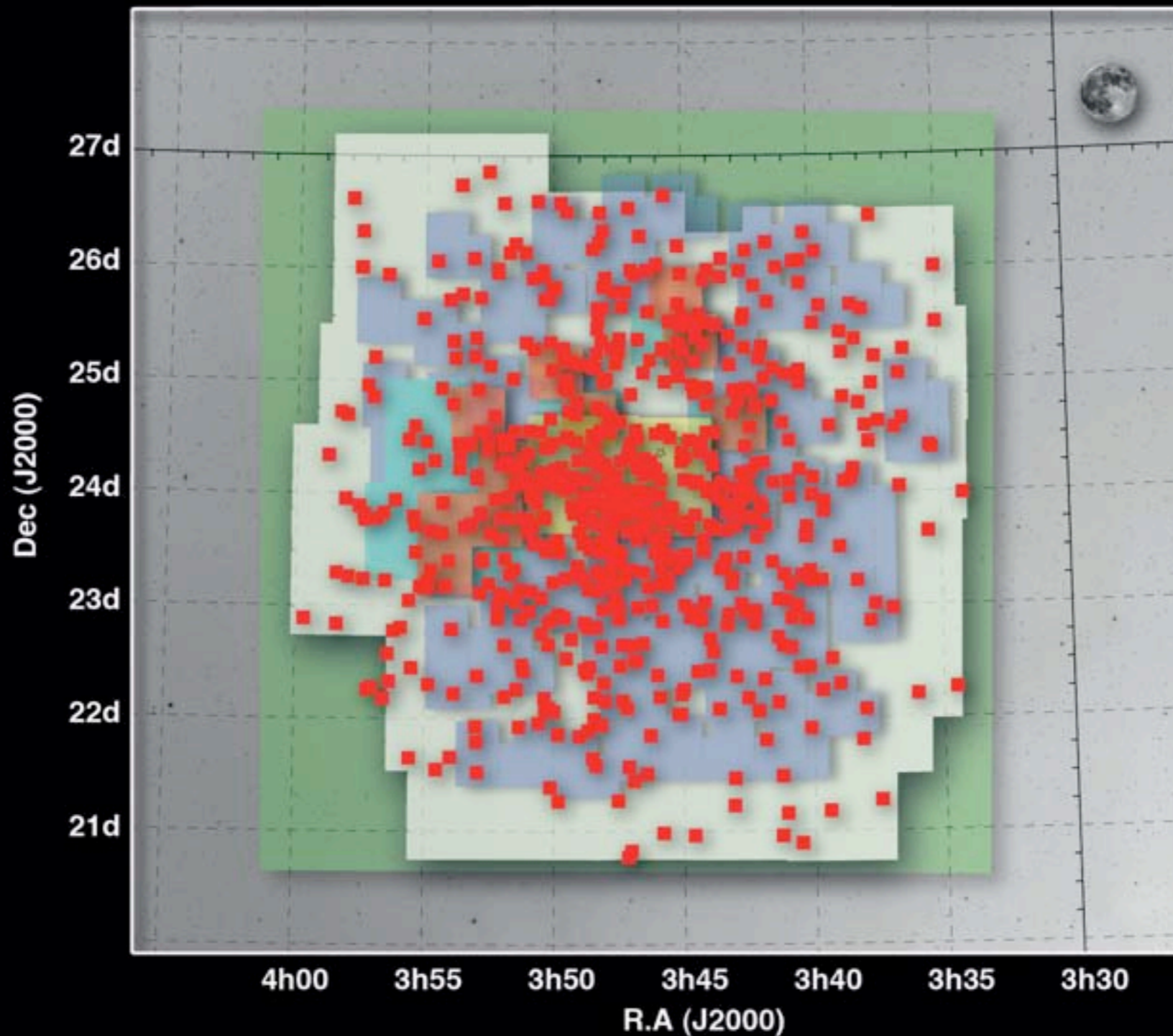


Preliminary Results



Preliminary Results

UKIDSS 2006-2009 Z,J,H,Ks	INT WFC 1998-2006 g,r,i,l,z	CFHT UH8K 1996 R,I	CFHT CFHT12K 1999, 2000 i,z	CFHT MegaCam 2004, 2009, 2010 g,r,i	Subaru Suprime-Cam 2004 i
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Perspectives / Plans

Association	Age [Myr]	Distance [pc]	μ RA [mas/yr]	μ Dec [mas/yr]
Pleiades	120	120	-35	-15
CrA	1	130	-35	51
η Cha	9	100	-30	28
Upper Sco	5	125	-9	-24
α Per	50	180	24	-26
IC2391	55	155	-25	23
IC2602	50	145	-22	10
Lupus	3	140	-17	-27
IC348	3	350	7	-9
NGC1333	1	350	7	-9
Serpens	3	450	?	?
Praesepe	650	180	-36	-13
Ophiuchus	1	145	-10	-25
Taurus	3	140	-8	-25
Blanco I	100	210	19	4
Hyades	625	40	\sim 100	
Orion	1-10	400		

Problems and Limitations

Very inhomogeneous datasets:

- very difference depth
- resolution
- ambient conditions...

making it sometimes difficult to interpret the results

So far limited to proper motion:

- need Vrad for 3D
- need parallax for 6D



but DANCE is very rich nevertheless!

**and much more information can be extracted from our catalogues!
so feel free to contact us if you have a complementary idea or know
a better way to do what we do !**

DANCIN'



DANCE over the INternet

- **Entire photometric and astrometric catalogues** available on the internet in V.O format
- **All the processed individuals images and stacks** available on the internet

A screenshot of a web browser window showing the 'DANCIN - DANCE Form' interface. The browser title is 'DANCIN - DANCE Form - Mozilla Firefox' and the address bar shows 'http://localhost:8080/dancin/jsp/danceform.jsp'. The page features a decorative header with the text 'Dynamical Analysis of Nearby Stars' in a stylized font, accompanied by a silhouette of a person and a star. Below the header is a search form titled 'DANCE: Search Form'. The form includes input fields for 'RA(J2000): 56.8590', 'DEC(J2000): 24.160', and 'Search radius(deg): 0.00555'. There is also a dropdown menu for 'Order by' set to 'X_WORLD'. At the bottom of the form, there are buttons for 'Submit Query' and 'Reset Form'. The footer of the page contains the text 'Version 0.1 - April 2011 © CAB' and navigation links for 'Home', 'DANCIN', and 'Help Desk'. The browser status bar at the bottom shows 'Done'.







DANCIN'



DANCE over the INternet

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The screenshot shows a web browser window titled 'DANCIN - DANCE Results - Mozilla Firefox'. The address bar shows the URL: <http://localhost:8080/dancin/jsp/danceresult.jsp?ra=56.8590&dec=24.160&sr=0.0055!>. The page features a decorative header with the text 'Dynamical Analysis of Nearby Giants' and the SVO logo. Below the header is a table with the following columns: 'Mark', 'Index', 'FITS file', and 'Subimage'.

Mark	Index	FITS file	Subimage
<input checked="" type="checkbox"/>	1	MegaPrime_2004-12-03_r_M45_field_2.fits	 Preview with Aladin (CDS) 
<input checked="" type="checkbox"/>	2	MegaPrime_2004-12-03_g_M45_field_2.fits	 Preview with Aladin (CDS) 
<input checked="" type="checkbox"/>	3	MegaPrime_2010-02-10_i_M45-FLD01.fits	 Preview with Aladin (CDS) 

DANCERS

Observations



Jean Charles
Cuillandre, Jérôme
Bouvier

Software



Emmanuel Bertin
Astromatic.net

Archives
mining /
Data
processing



Hervé Bouy

Numerical
Simulations
(DESC Project)

NBODY-J



P.I.: Estelle Moraux,
Christophe Becker,
Thomas
Maschberger

Database
& V.O



Maria Arevalo,
Enrique Solano,

Dynamical Analysis of Nearby Comets



Thank you..

Hervé BOUY
SF2A 2011