Dynamical Analysis of Nearby Clusters

CENTRO DE ASTROBIOLOGÍA
ASOCIADO AL NASA ASTROBIOLOGY INSTITUTE

GOBIERNO DE ESPAÑA · CSIC · Instituto Nacional de Técnica Aeroespacial

Hervé BOUY

SF2A 2011

COMPLEMENT GAIA

Sensitivity: GAIA complete up to V~20mag

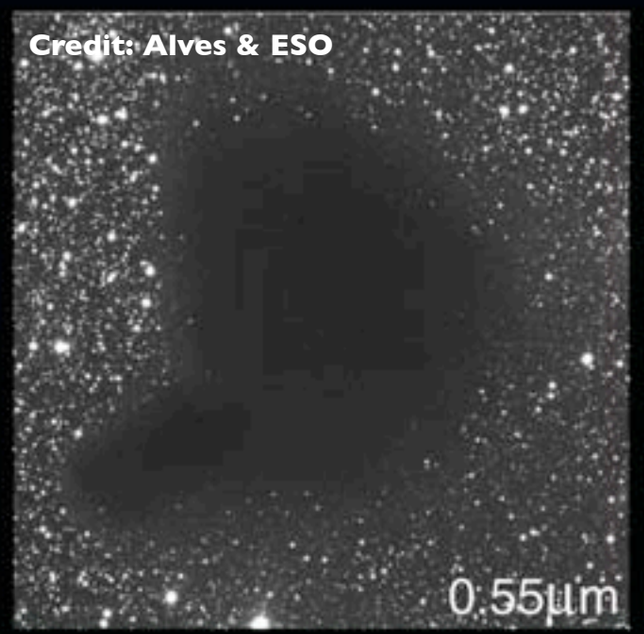
= ~25 M_{Jup} at 1Myr and 100 pc

Mass Function goes down to 3~4M_{Jup}

Extinction: GAIA worst enemy: extinction

COMPLEMENT GAIA

S

	M16	Barnard 68	Travolta's Cloud
VISIBLE			
NEAR-IR			

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 km/s at 200 pc = 1 mas/yr

Strategy

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

+

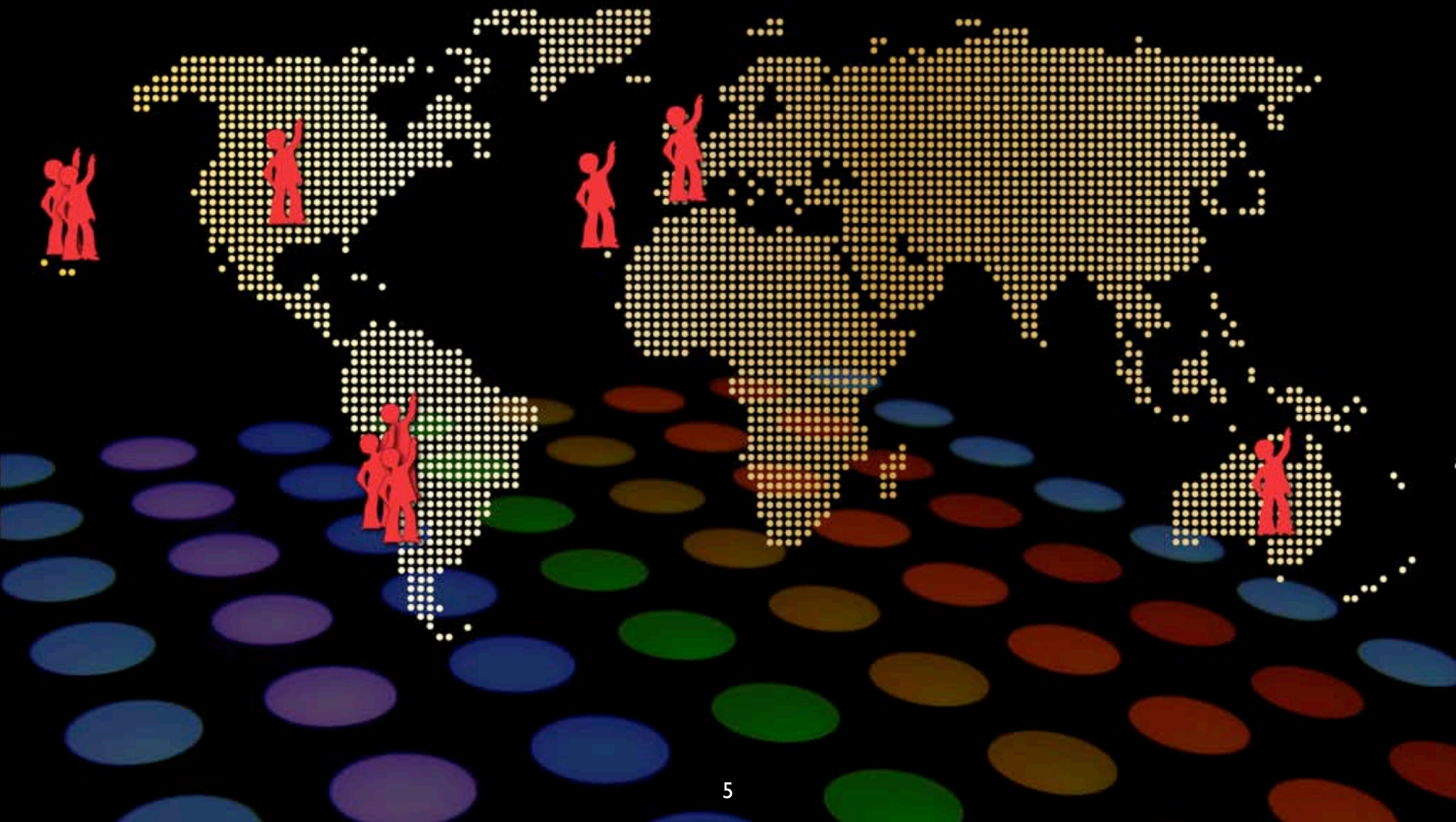
New observations

We have developed:

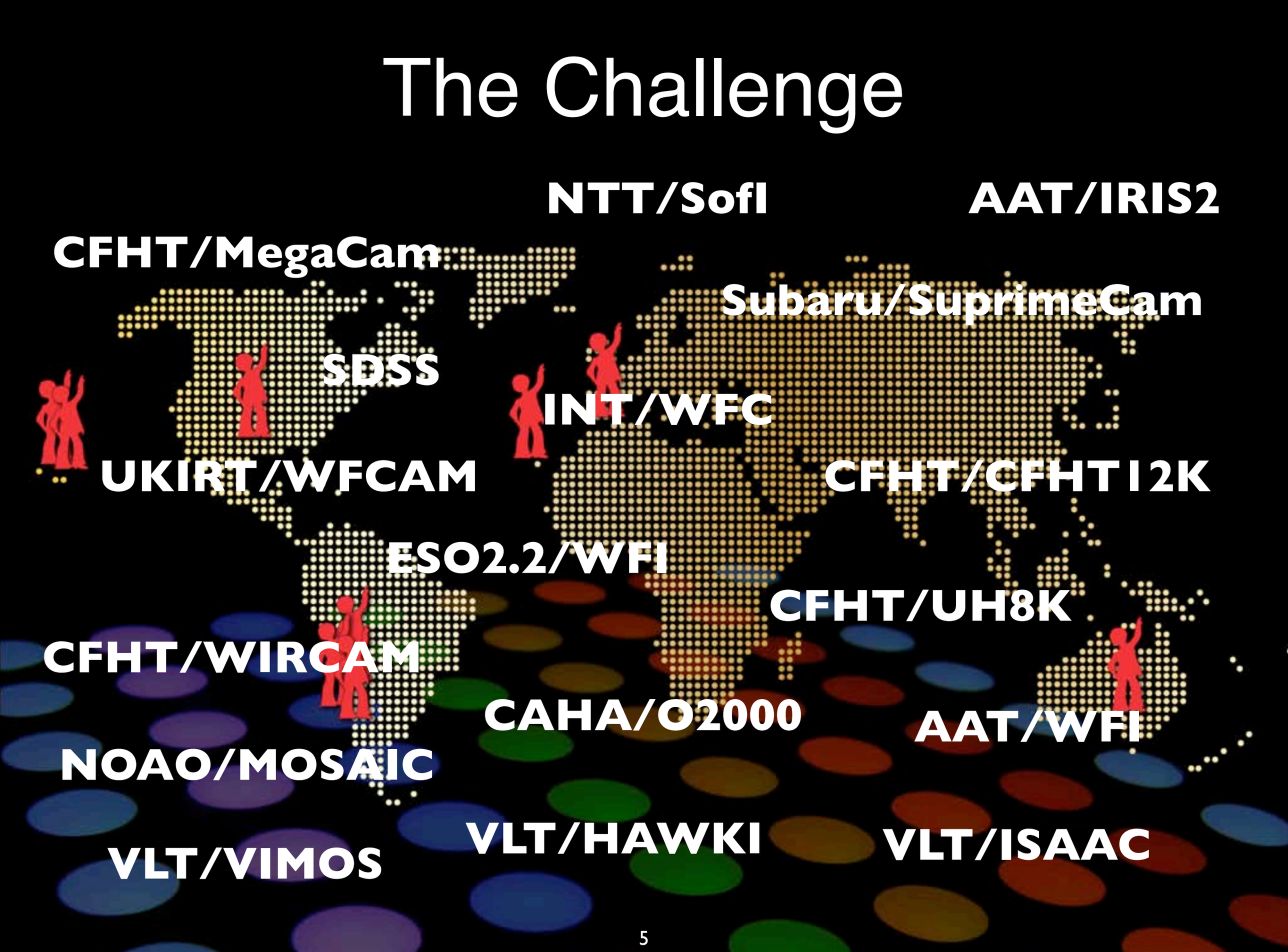
1. Advanced pipeline for automatic processing of vast amount of data

2. Advanced algorithms to derive accurate astrometry and proper motions from vast multi-epoch, multi-instrument, multi-wavelength datasets

The Challenge



The Challenge

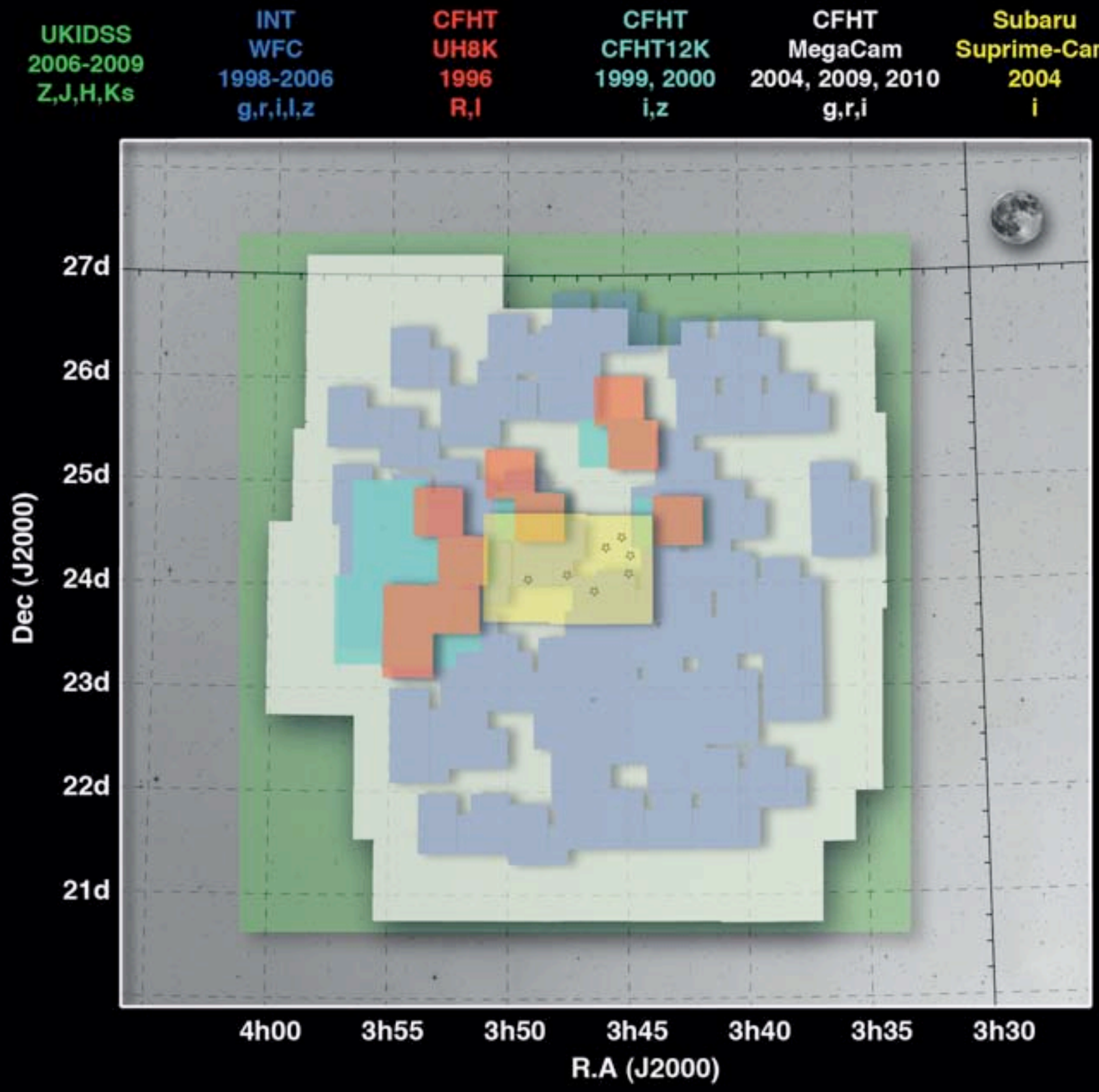


Dancefloor: The Pleiades

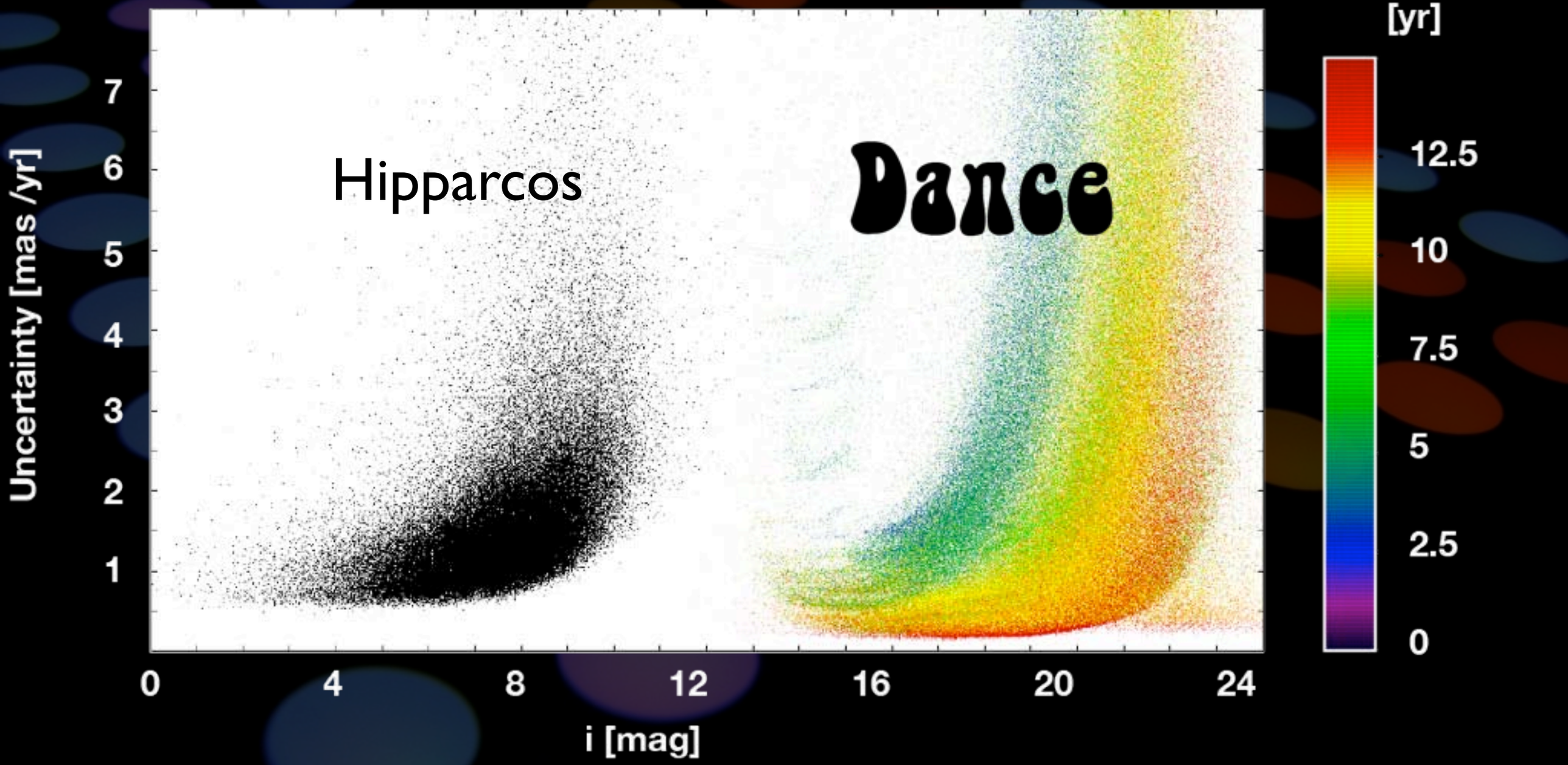
5469 images

$2x10^{11}$ pixels

1.1Tb



Preliminary Results
(lower limits)



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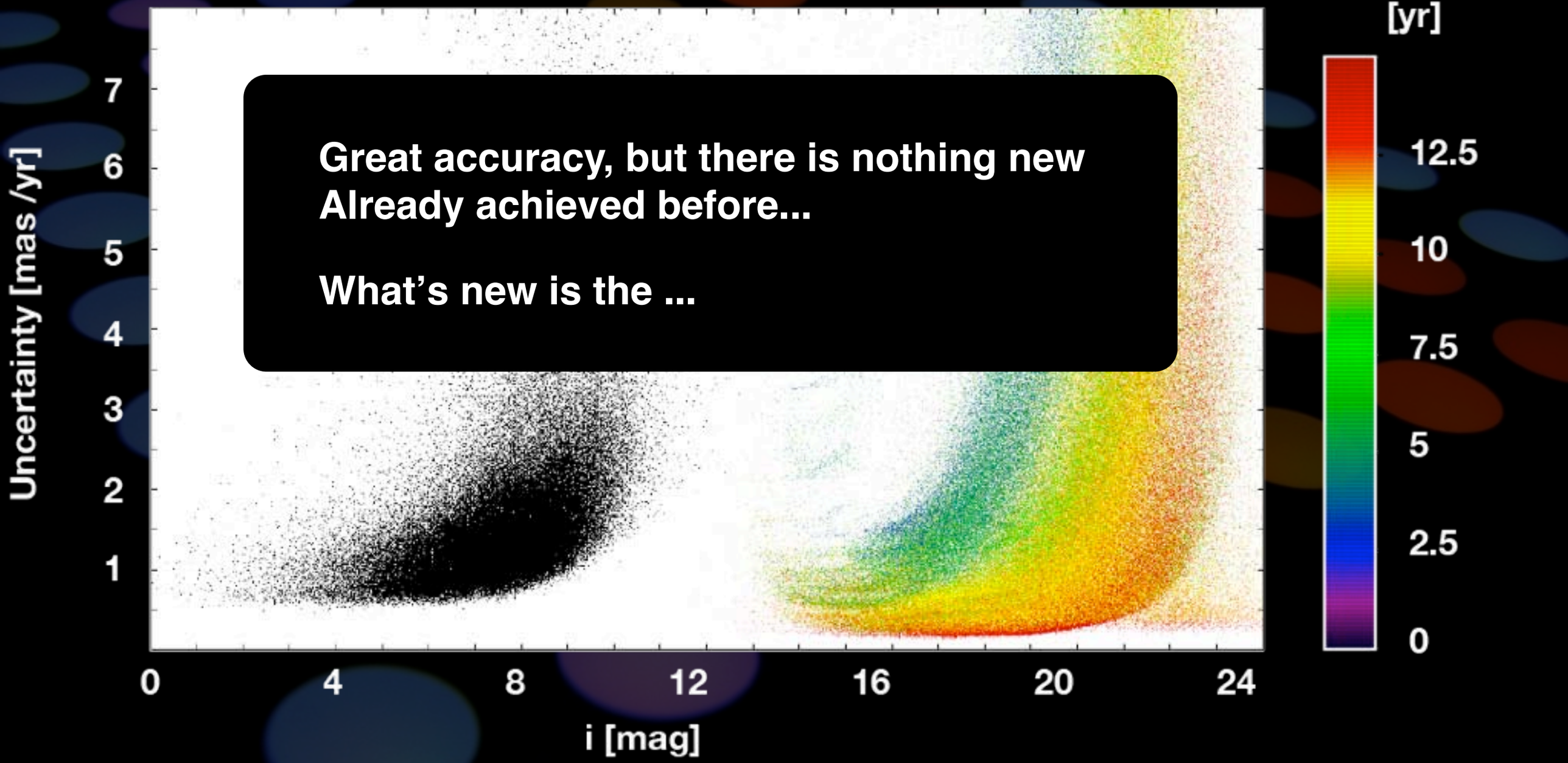

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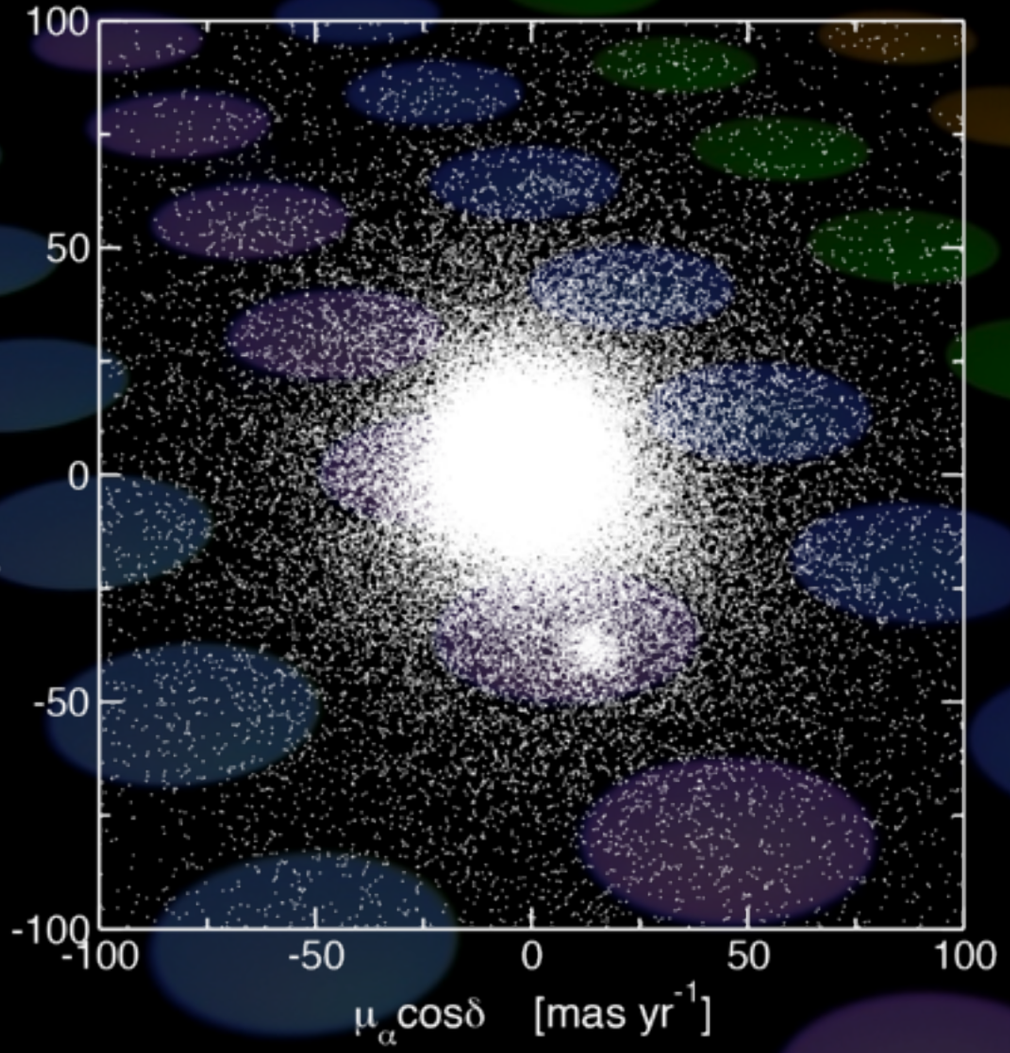

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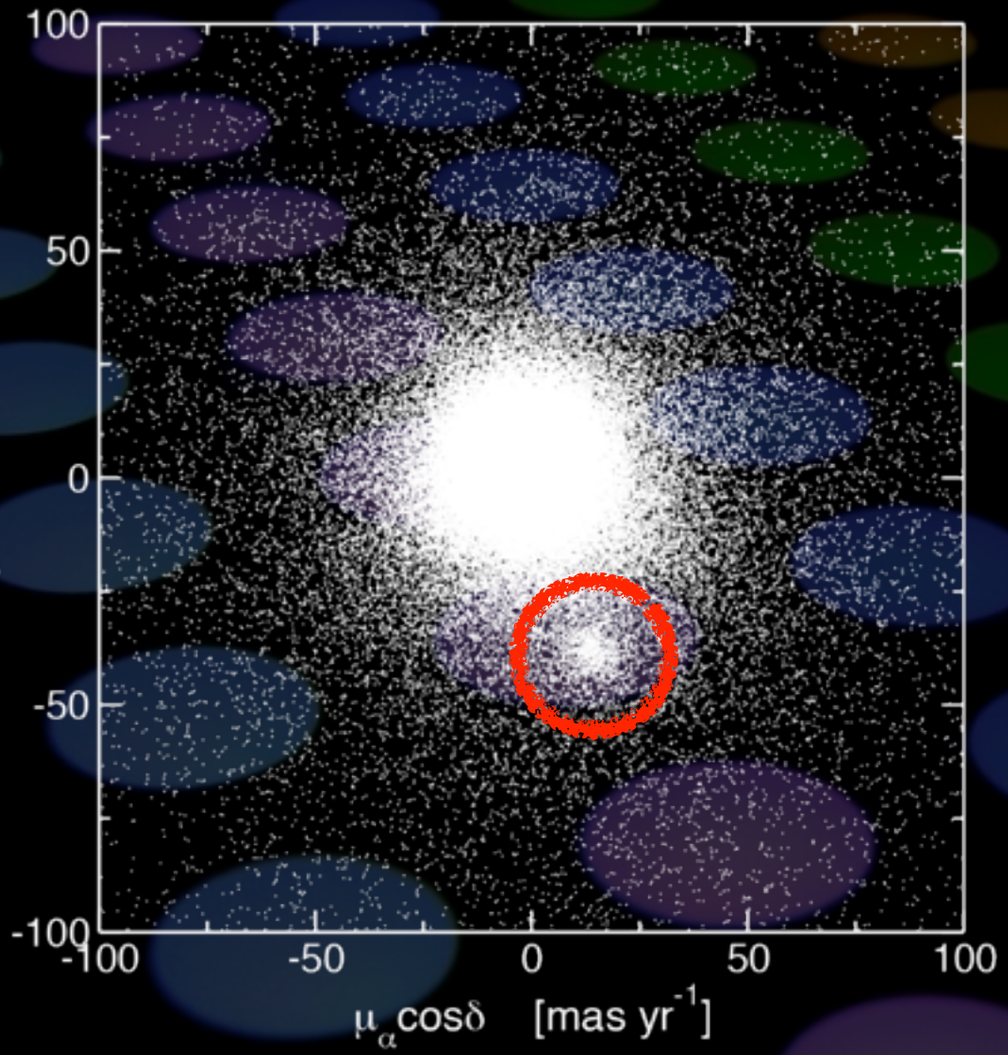

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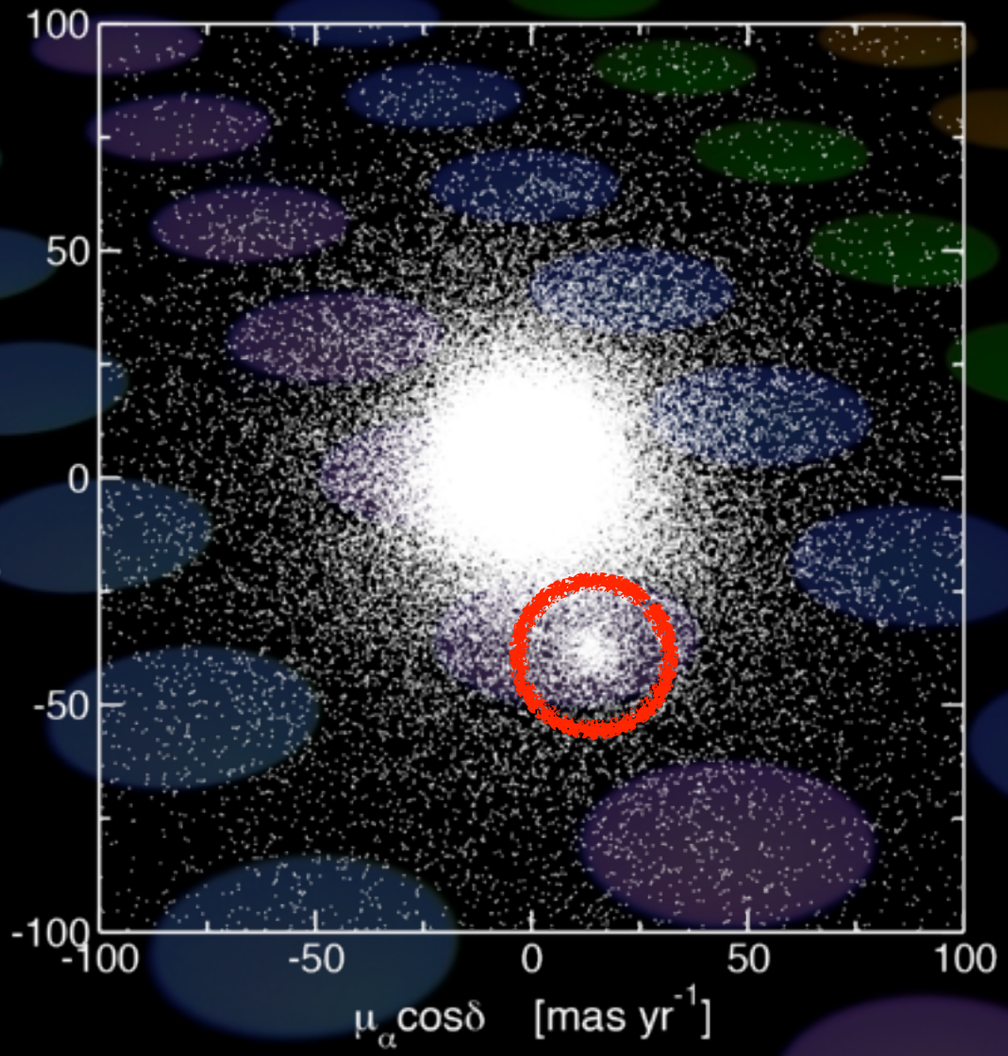

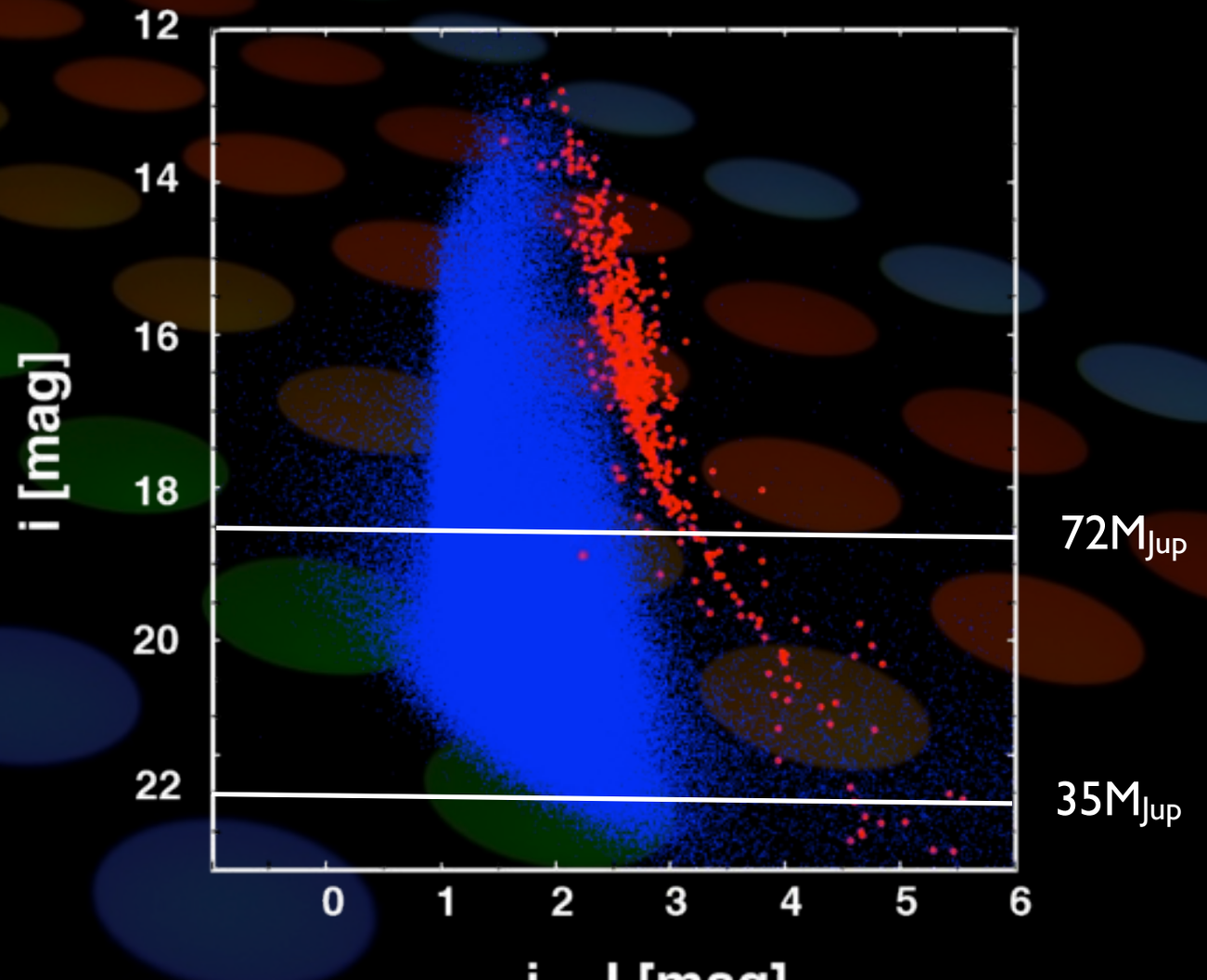

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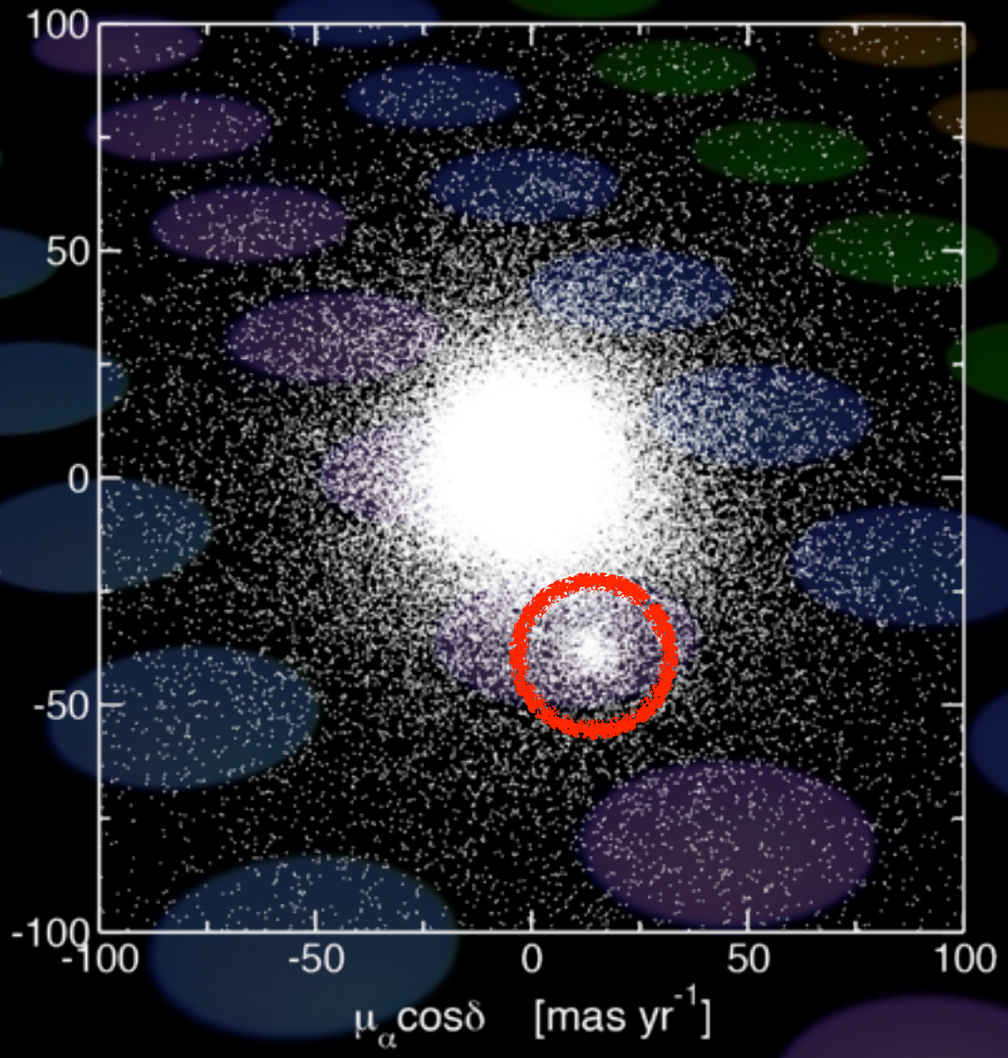

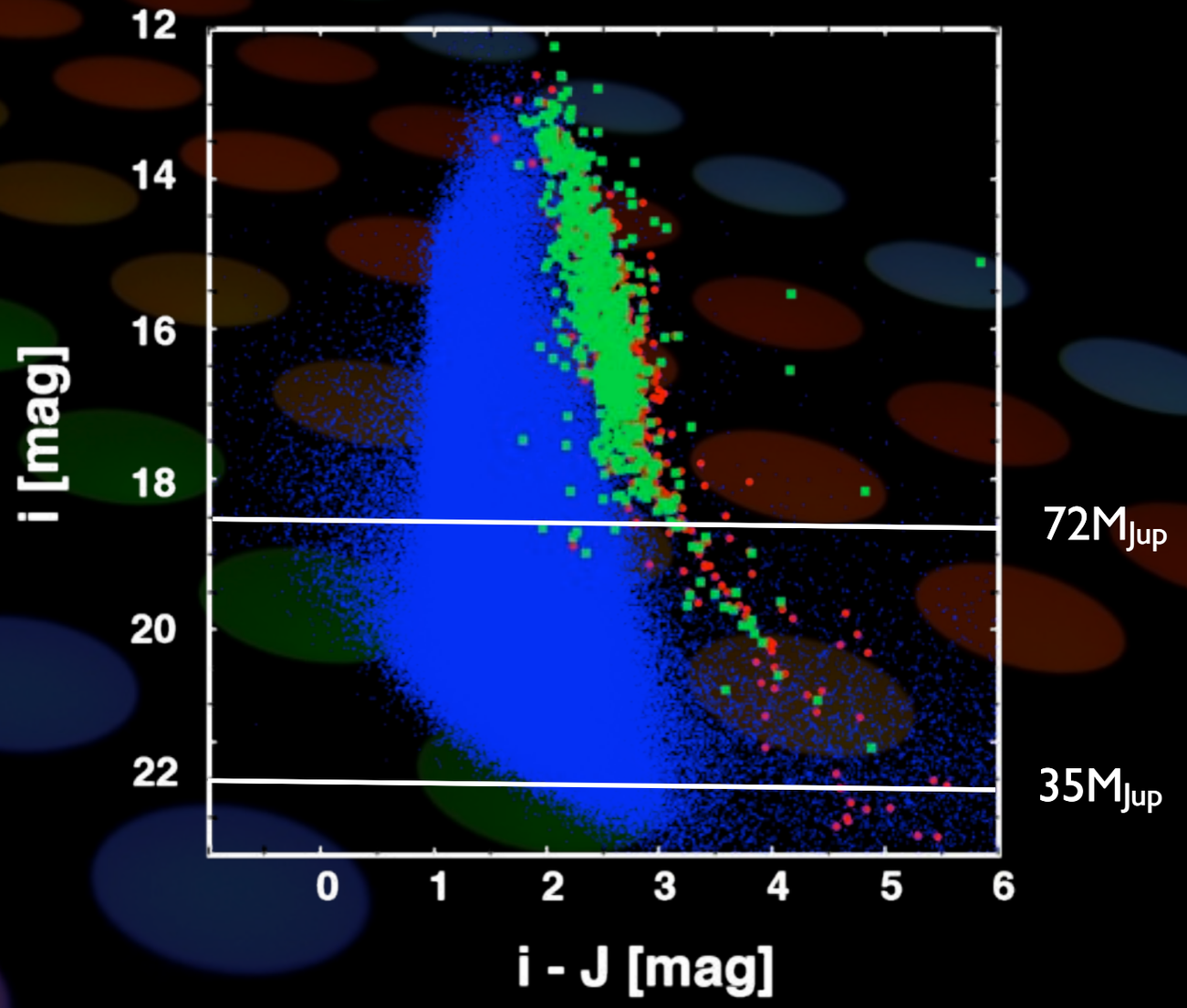

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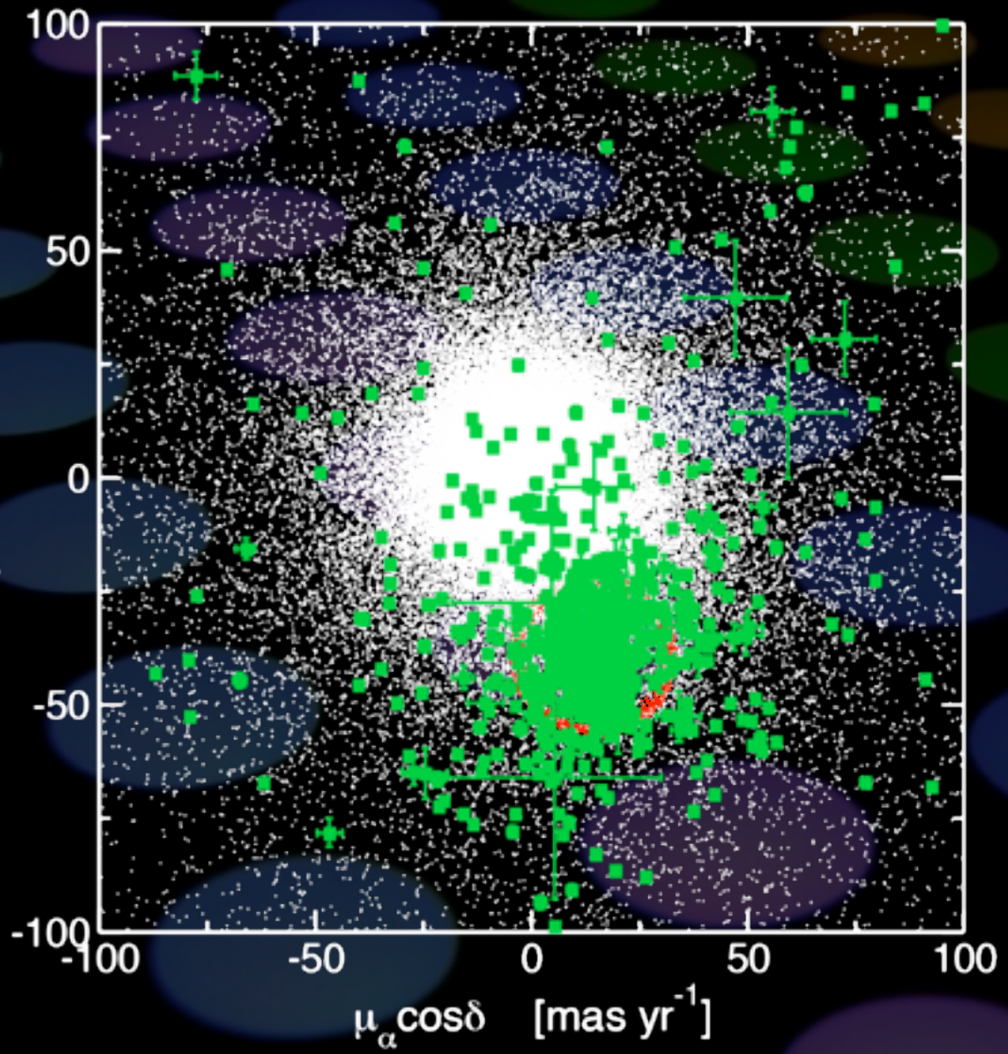

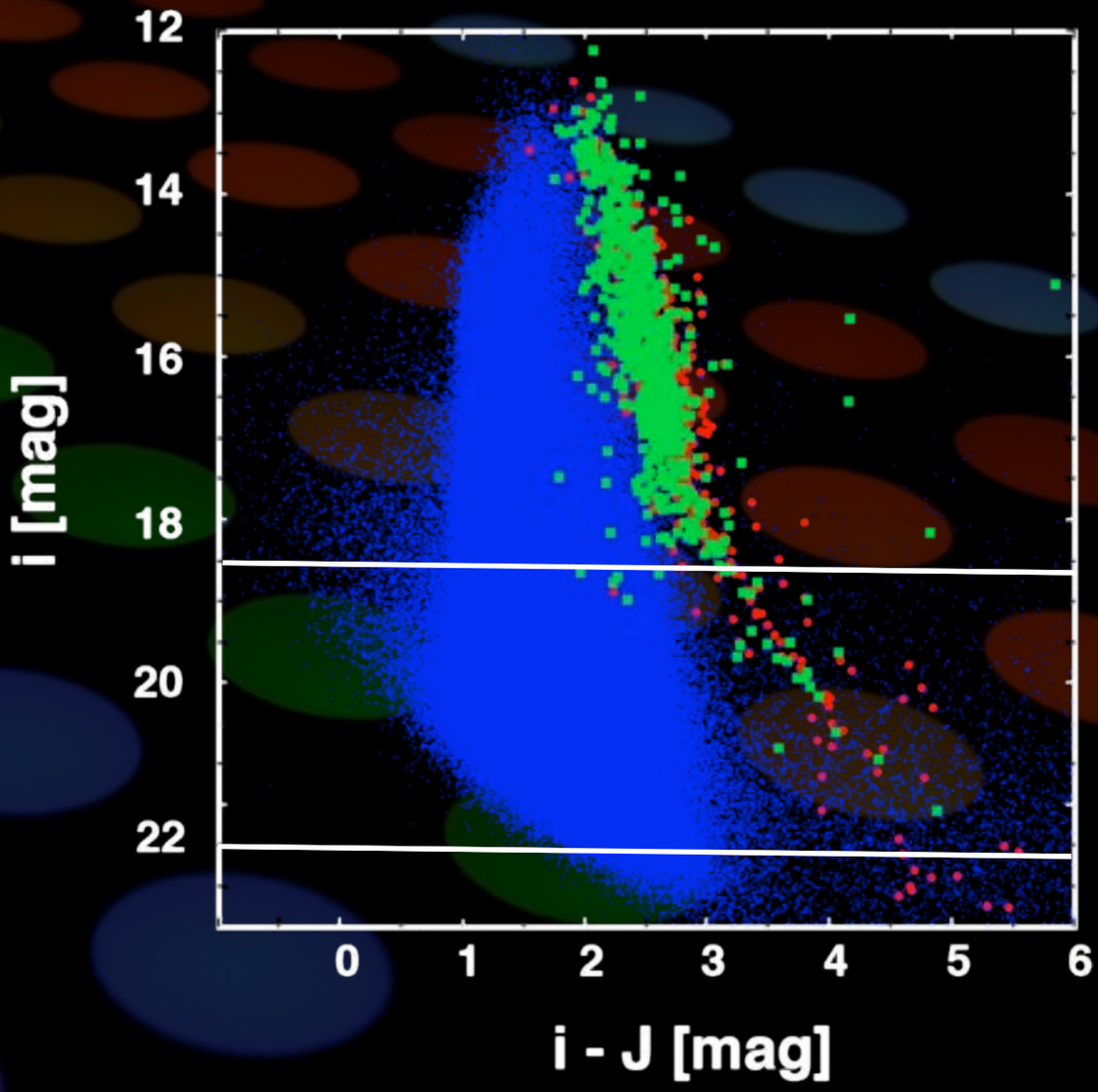

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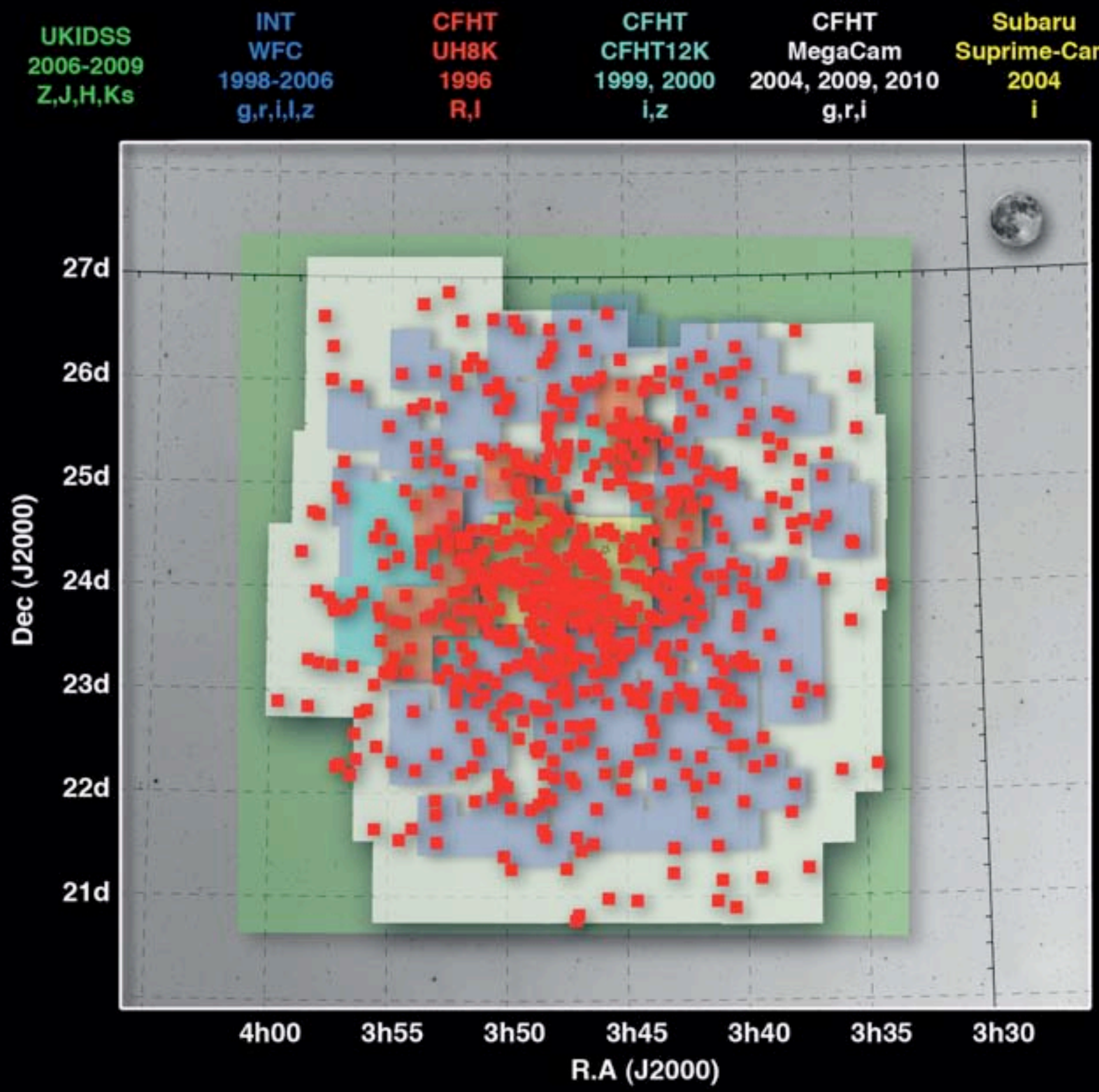


Perspectives / Plans

Association	Age [Myr]	Distance [pc]	μRA [mas/yr]	μDec [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 1	100	210	19	4
Hyades	625	40	~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

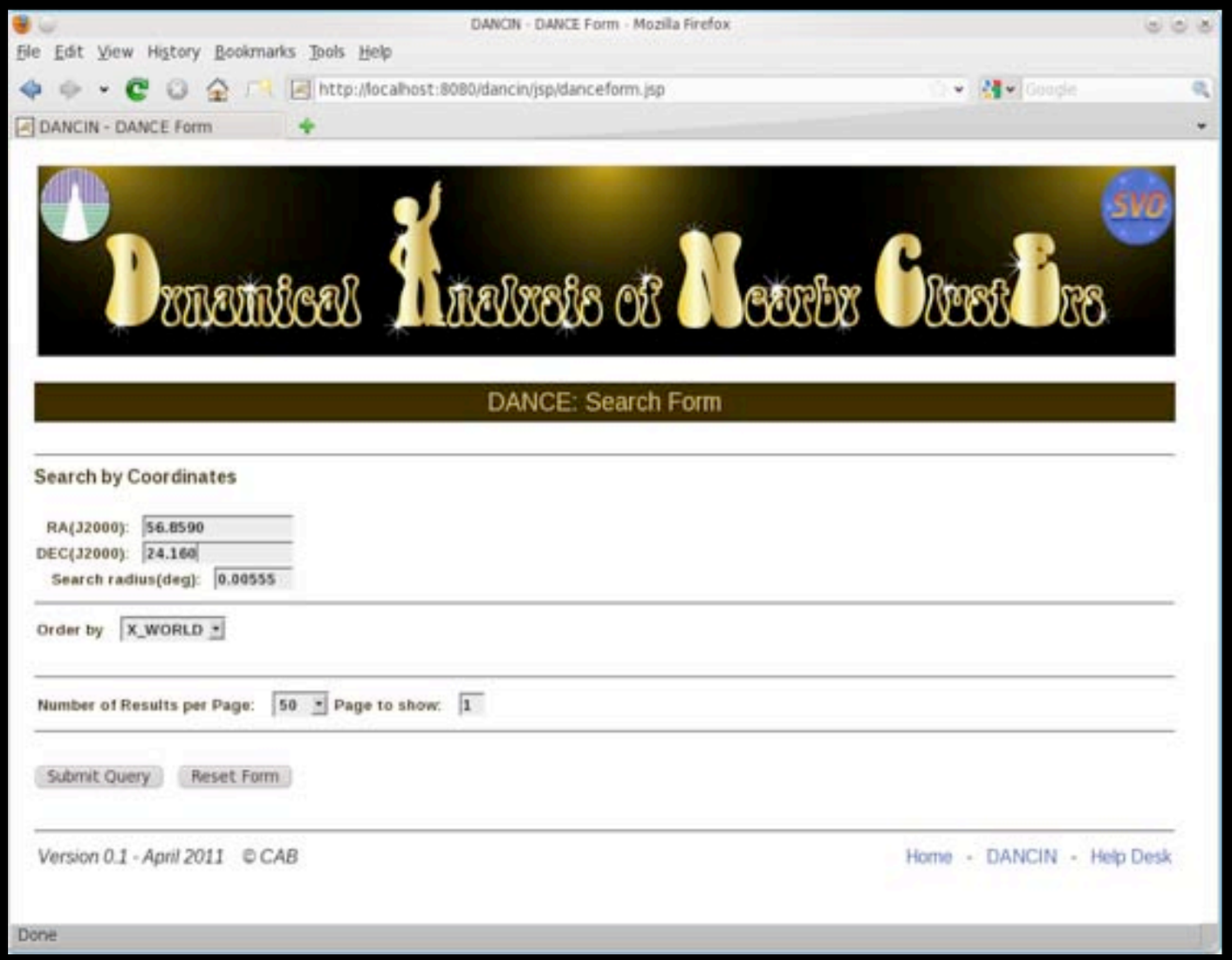
but DANCE is very rich nevertheless!

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



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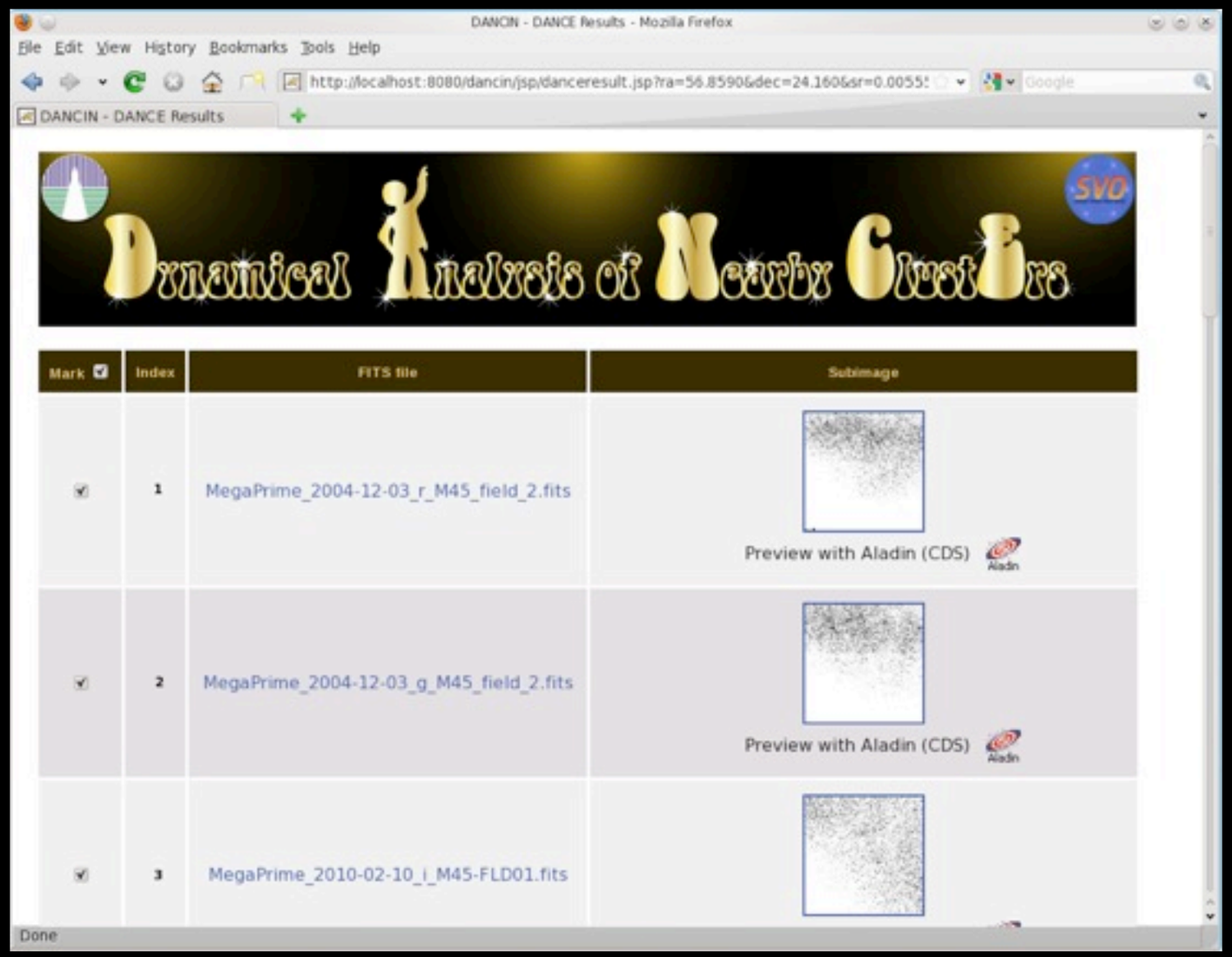

DANCERS

Observations	Software	Archives mining / Data processing	Numerical Simulations (DESC Project)	Database & V.O
				
Jean Charles Cuillandre, Jérôme Bouvier	Emmanuel Bertin Astromatic.net	Hervé Bouy	P.I.: Estelle Moraux, Christophe Becker, Thomas Maschberger	Maria Arevalo, Enrique Solano,

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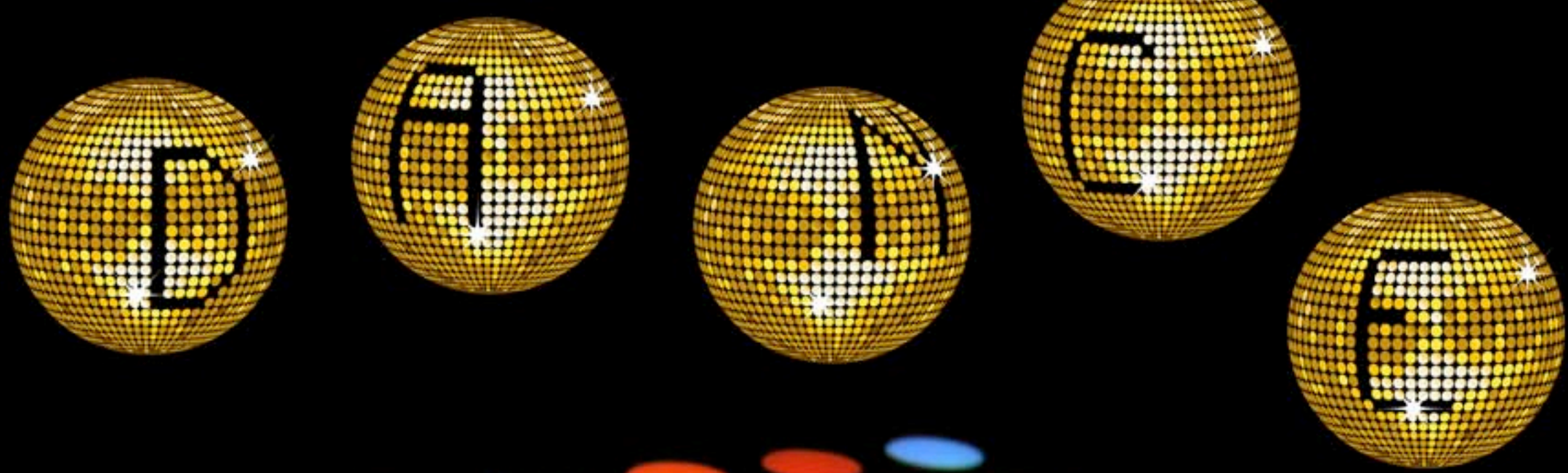

Thank you..

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