Hervé Bouy

— COSMIC DANCE —

Combining 20 years of Subaru data to search for young brown dwarfs and planetary mass objects

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The Pleiades
THE PLEIADES

★ 150 years of searches
THE PLEIADES

★ 150 years of searches
★ COSMIC-DANCE

⇒ 190% more members
⇒ 500% more brown dwarfs
QUESTION: THE ORIGIN OF STELLAR MASSES

How are stellar masses distributed within a cluster?
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How are stellar masses distributed within a cluster?
**THE ORIGIN OF STELLAR MASSES**

**Gaia is streaming data**
Complete census of all nearby associations *up to* $G=20\text{mag}$

**But ... Gaia will be blind in the**

**Substellar & Planetary Mass Domain**

- **Gaia**
- **COSMIC-DANCE**
- **M**, **L**, **T**, **Q**

which are most important because...

**Exquisitely sensitive** to inborn and evolutionary effects

**Core of young associations**

- **Gaia**
- **Optical**
- **COSMIC-DANCE**
- **Infrared**

**Present** Mass Function closest to **Initial** Mass Function
THE IDEA:

Combine SuprimeCam 2002 images with CFHT 1998 images

Pleiades ppm: \(\sim 45\text{mas/yr}\)
In 4 yr: 160 mas = 0.8 pixel
THE IDEA:

... and many more archival images!

19 yr TIME BASELINE
~35,000 images
~80deg²
8 Observatories
11 Optical / Infrared Cameras

Sensitivity
4 to 5 mag deeper than *Gaia*

Wavelength Coverage
optical to *near-infrared*

Plotted in the i-band for a meaningful comparison with Gaia and LSST, but including near-IR K-band up to 19.5mag
PRECISION ASTROMETRY FROM THE GROUND

Pleiades co-moving members
AND LATER ON...
... including Hyper SuprimeCam images

T-dwarf
$15 < M < 20 M_{\text{Jup}}$
IC4665

30 Myr - 300pc

IC4665
30 Myr - 300pc
UPPER SCO + OPHIUCHUS

1-10 Myr - 120-160pc

M < 10M\textsubscript{Jup}

PRELIMINARY
How are stellar masses distributed within a cluster?

Miret-Roig + 19

\[ M \] 

10^2

10^1

10^0

10^{-1}

10^{-2}

IC 4665

Pleiades

Miret-Roig + 19
Follow-up

**Ultracool Atmospheres**

![EMIR spectra](image)

**Protoplanetary & Debris Disks**

![Model vs. Fitted Data](image)

**Ages**

e.g. Lithium depletion boundary (Barrado et al., 2016)

**Exoplanets**
PERSPECTIVES

Ultracool Atmospheres

Protoplanetary & Debris Disks

Exoplanets

Ages

e.g. Lithium depletion boundary (Barrado et al., 2016)

HSC
SCExAO

PFS
IRD

Subaru-ULTIMATE
Thank you!

http://www.project-dance.com

Unravelling the origin of the mass function

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