MULTIPLICITY AMONG 3500 YOUNG STELLAR OBJECTS IN ORION A

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Binaries play an important role in stellar evolution

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How do they form?

What are the initial multiplicity properties?

?

Can we find a universal law of stellar multiplicity?

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→ Need a full census of young binaries

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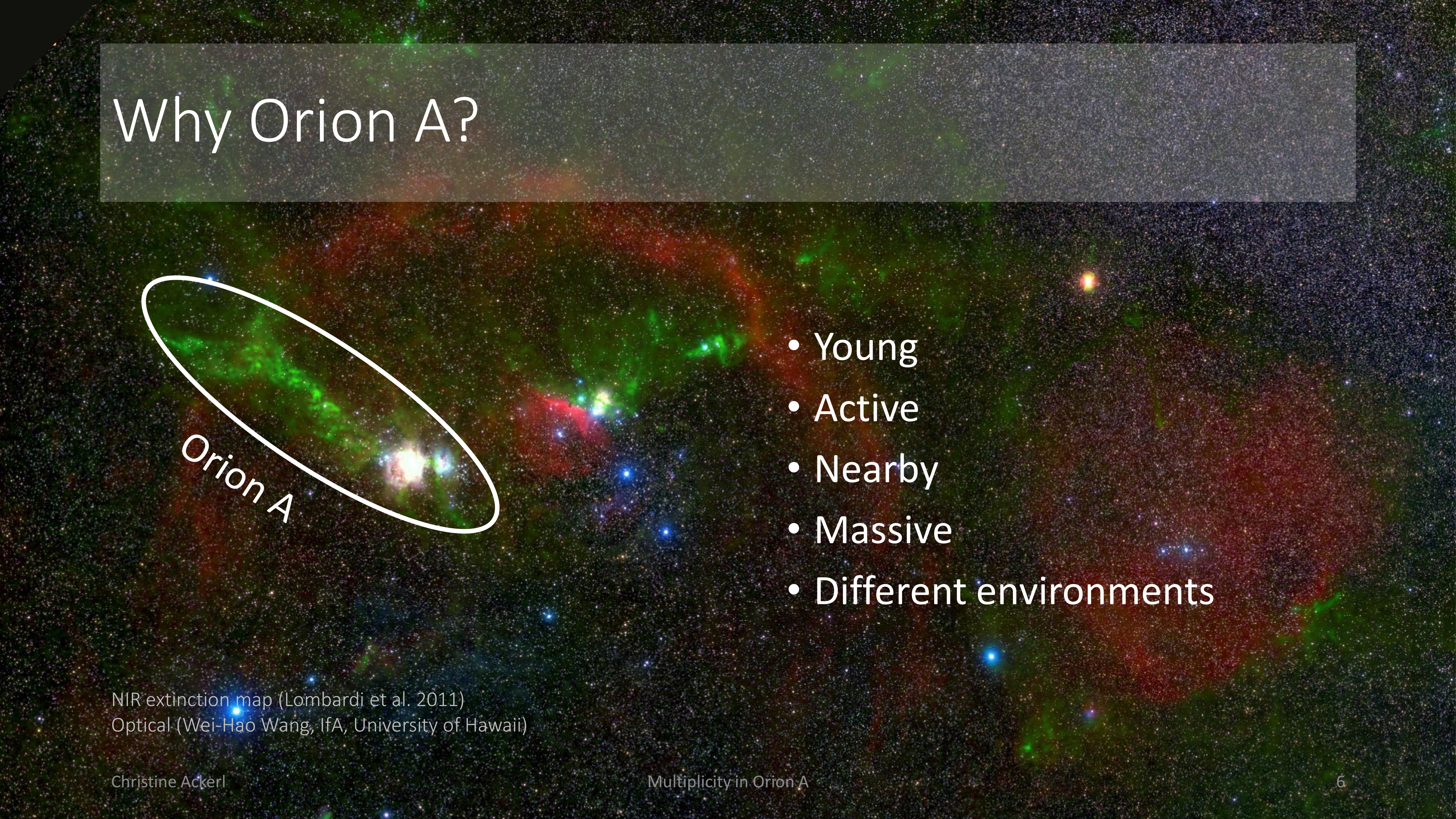
Why Orion A?

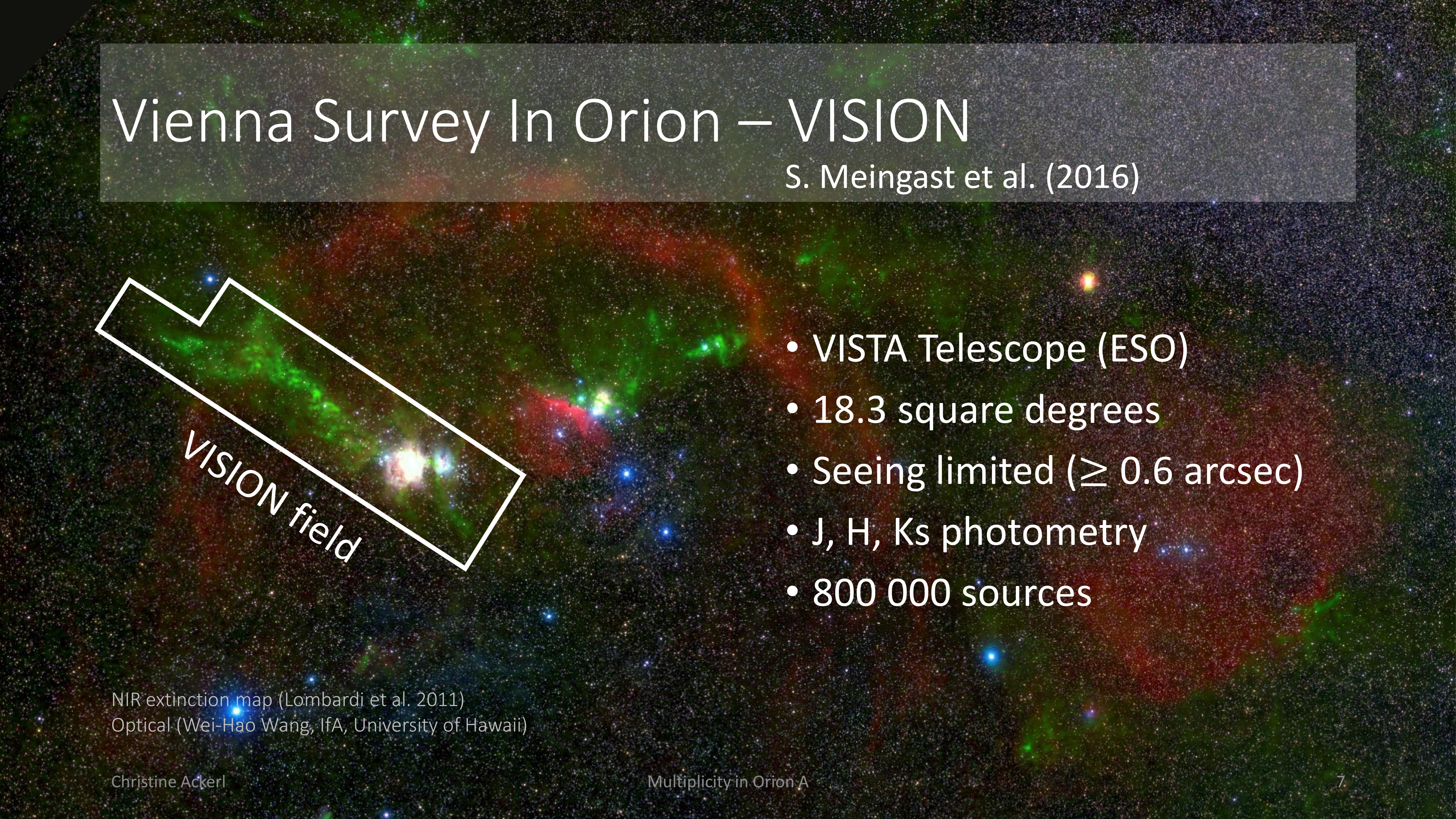


- Young
- Active
- Nearby
- Massive
- Different environments

NIR extinction map (Lombardi et al. 2011)
Optical (Wei-Hao Wang, IfA, University of Hawaii)

Vienna Survey In Orion – VISION

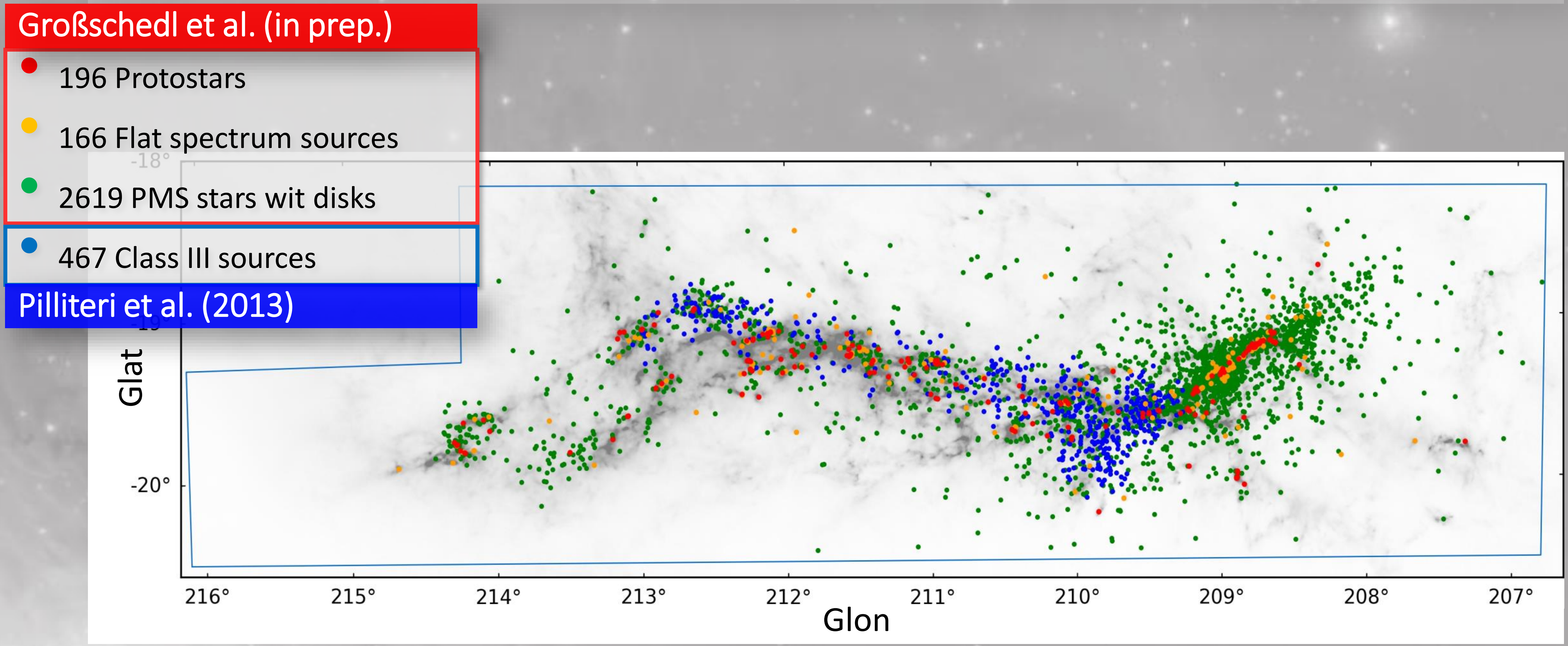
S. Meingast et al. (2016)



- VISTA Telescope (ESO)
- 18.3 square degrees
- Seeing limited ($\geq$ 0.6 arcsec)
- J, H, Ks photometry
- 800 000 sources

NIR extinction map (Lombardi et al. 2011)
Optical (Wei-Hao Wang, IfA, University of Hawaii)

3448 Young Stellar Objects



Largest sample of young visual binaries

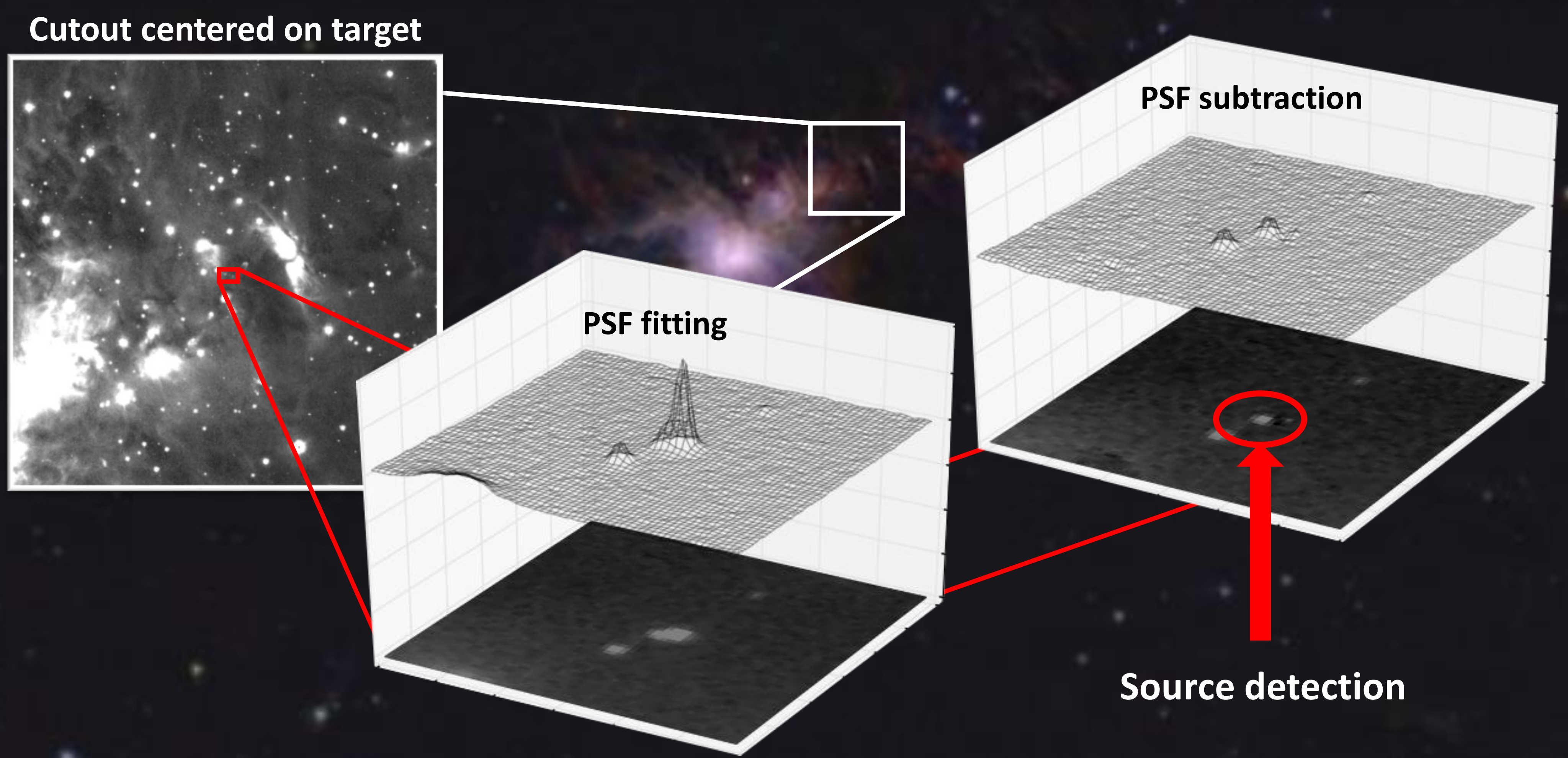
- Exceeds sample size of previous studies (Kounkel et al. 2016) by order of magnitude

→ better statistics, less errors

- Estimate background contamination
- Get probability of source being a companion

- Compare :
  - Different environments
  - Different evolutionary stages

How to find close companions?



Big data – big trouble

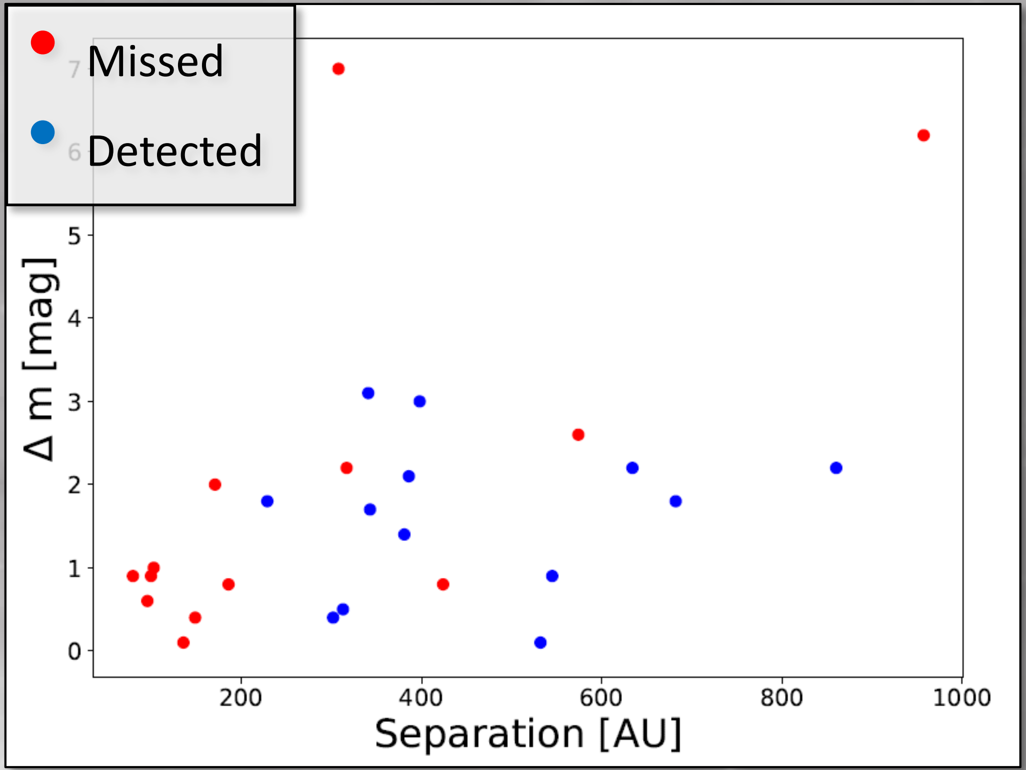
- No visual examination possible
  - $\Rightarrow$ Need automatic routine
    - False positives/negatives?

Solutions

- Know the data - avoid surprises
- Test on known binaries and singles (Kounkel et al. 2016)

What can we expect?

Comparison to known binaries and singles (Kounkel et al. 2016)



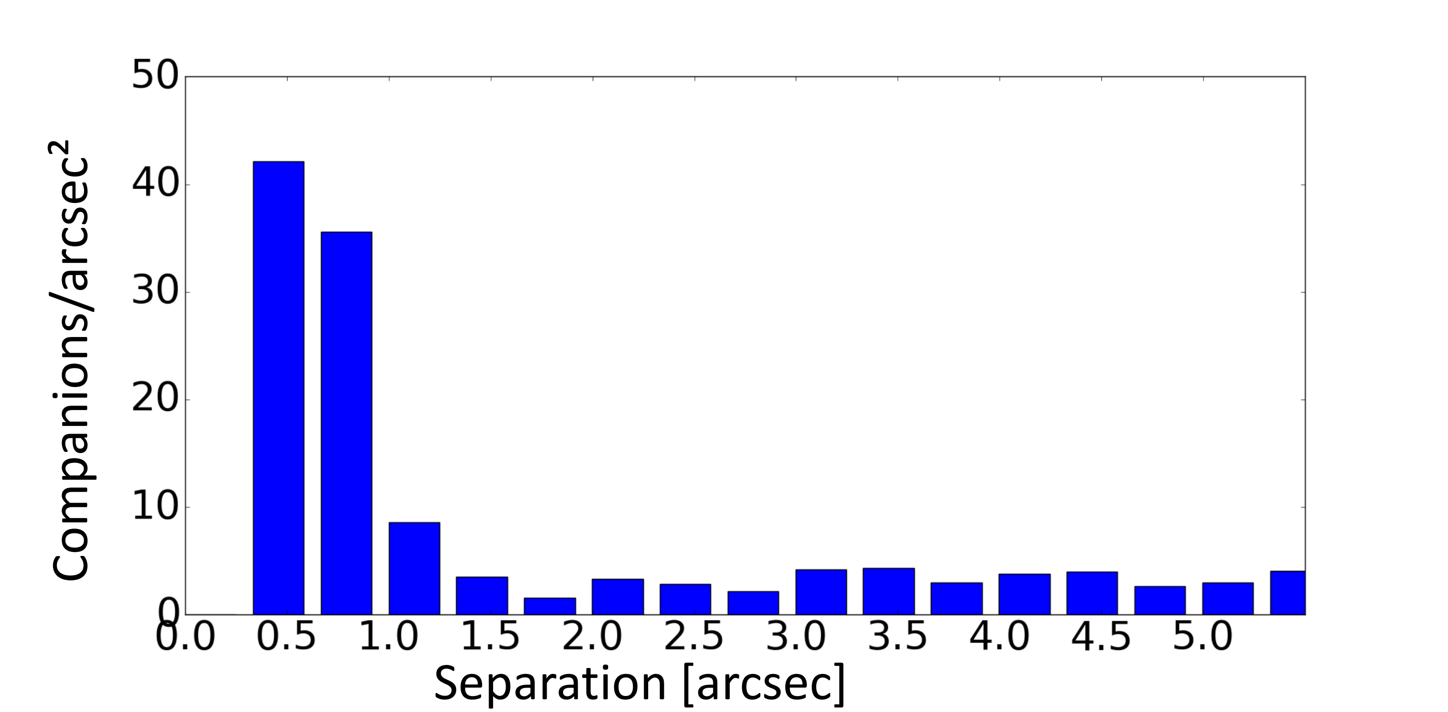
Detected all sources with

- Separation > 229 AU,
- $\Delta m < 2$ mag
- $m_H < 19.6$ mag

Less than 3% false positives

First preliminary results

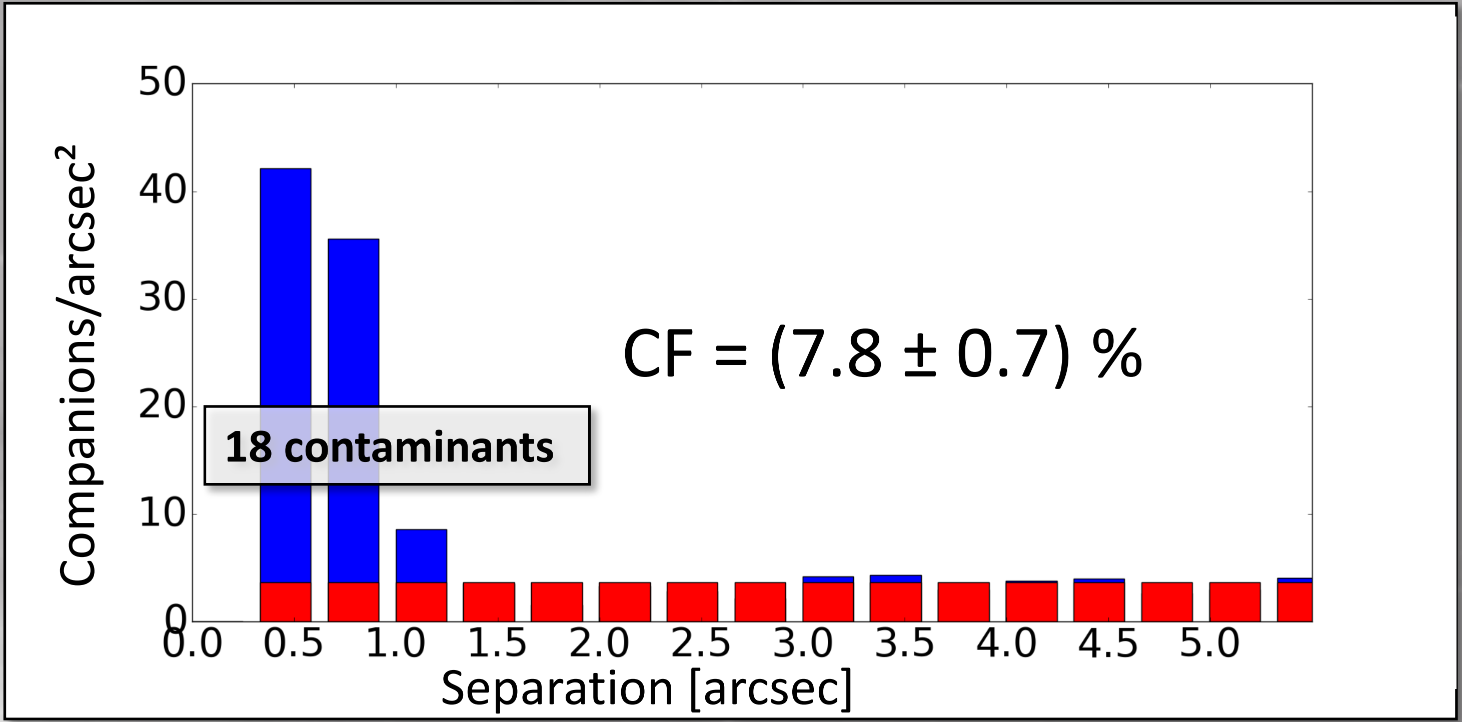
Separation distribution



- H-band, clusters excluded
- 1616 targets
- 144 companion candidates
- 0.5 to 2 arcsec

First preliminary results

Separation distribution



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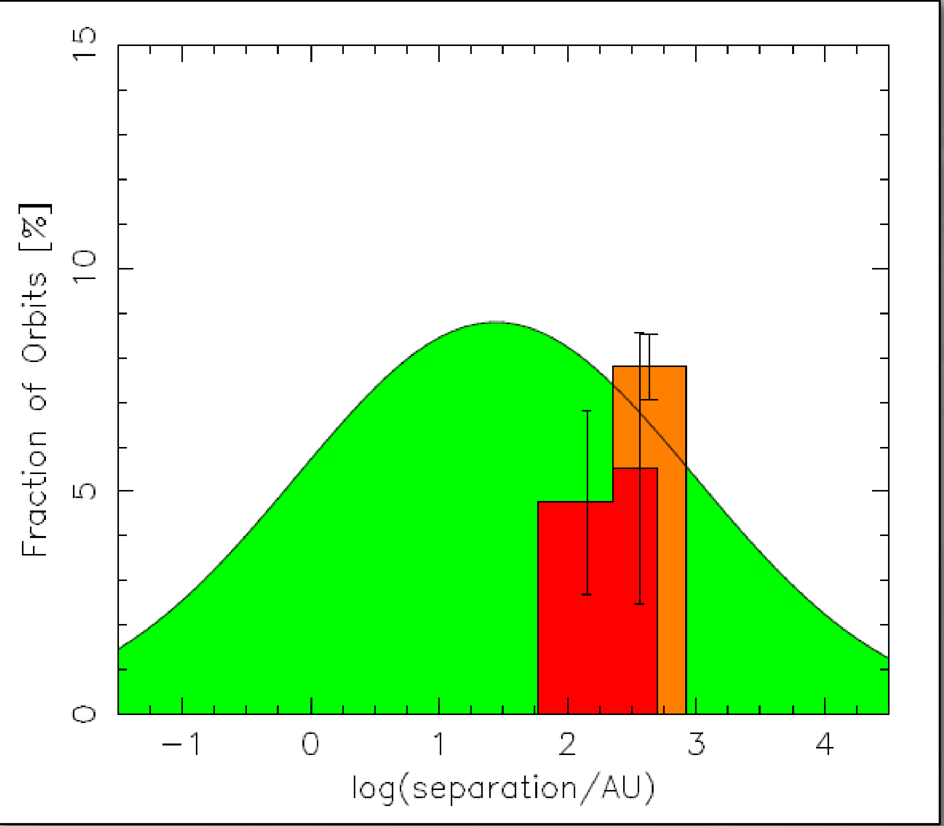
The bigger picture



This study

(clusters excluded)

ONC, M. Petr et al. 1998

MS field stars,

Duquennoy & Mayor 1991

Summary and Outlook

- Developed routine for automated detection of companion candidates in the VISION YSO sample

- Preliminary CF = (7.8 ± 0.7) % within 0.5 - 2 arcsec

- Future work:
  - Analyse remaining targets
  - Apply statistical test
  - Extend analysis to J and Ks bands
  - Compare different environments and ages within our sample
  - Compare to other star forming regions