Pre-main sequence binaries and the origin of field stars

The correlation between Hans and the binary frequency

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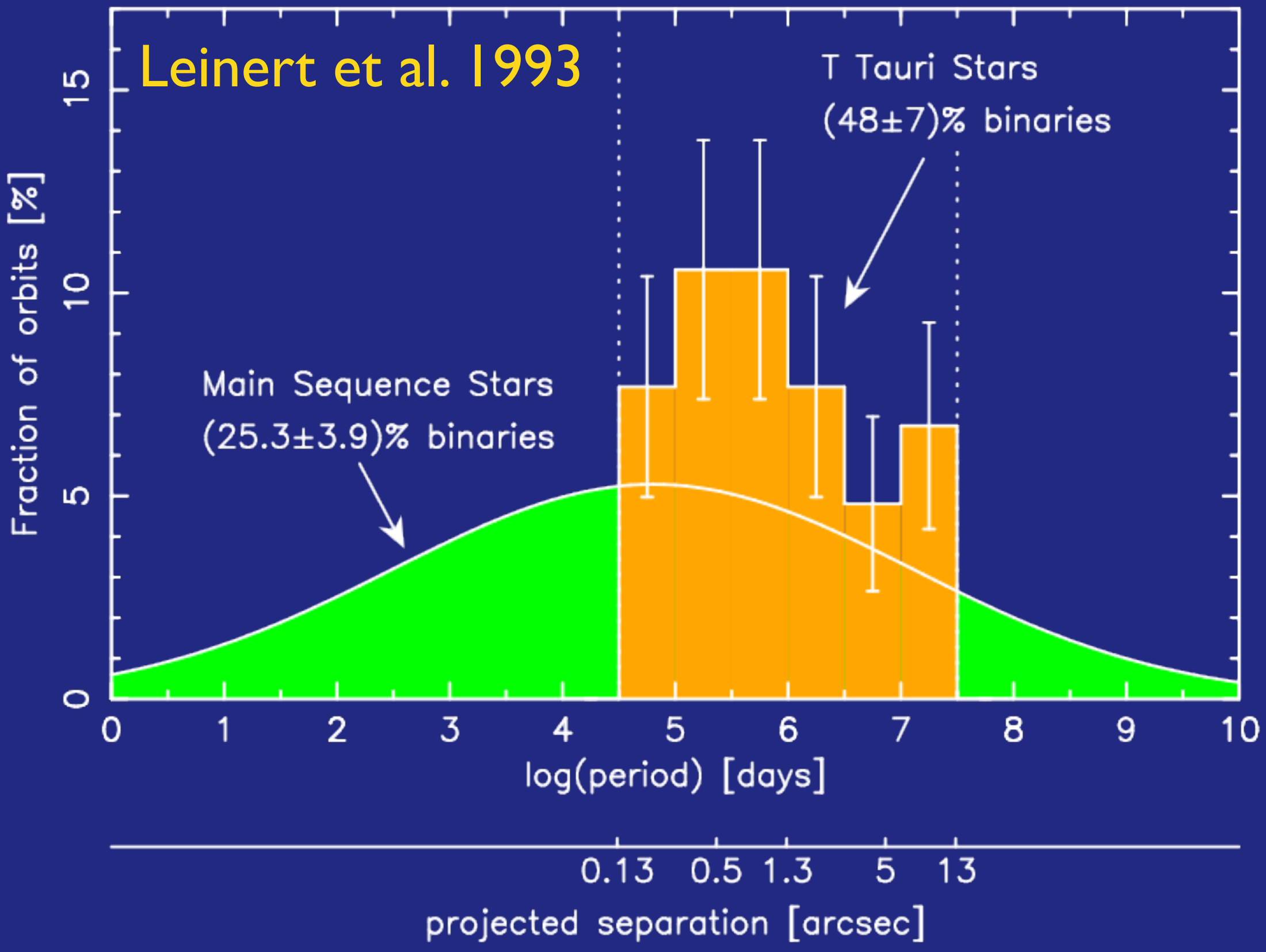
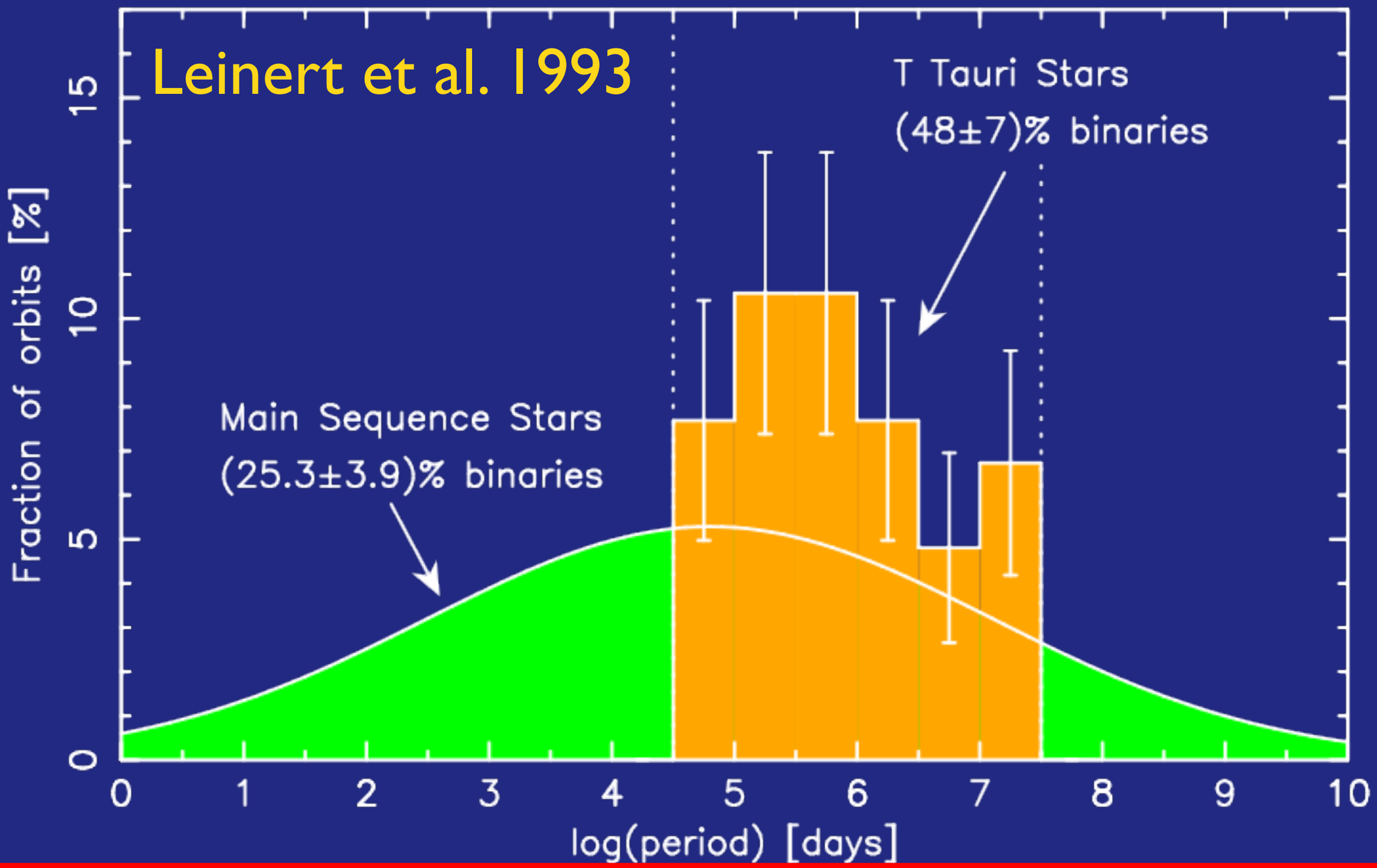
Taurus-Auriga



Taurus-Auriga



Extrapolated to all periods, (nearly) all T Tauri stars in Taurus are multiple systems

Extrapolated to all periods, (nearly) all T Tauri stars in Taurus are multiple systems

No difference between classical and weak-lined T Tauri stars

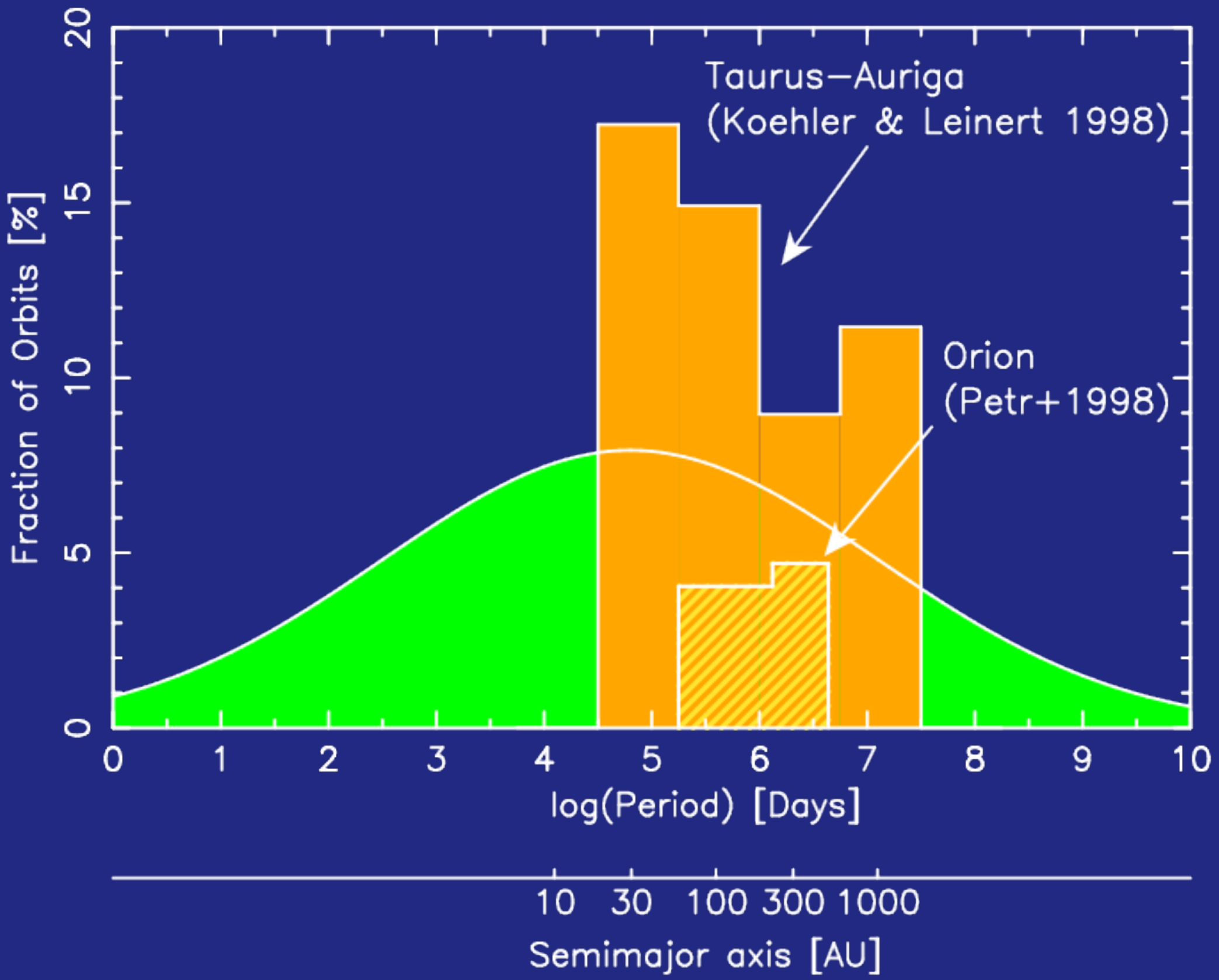
Star formation = multiple formation

Where do most of the low-mass field stars originate?

Not in Taurus-Auriga!

Where did all the single main-sequence field stars form??

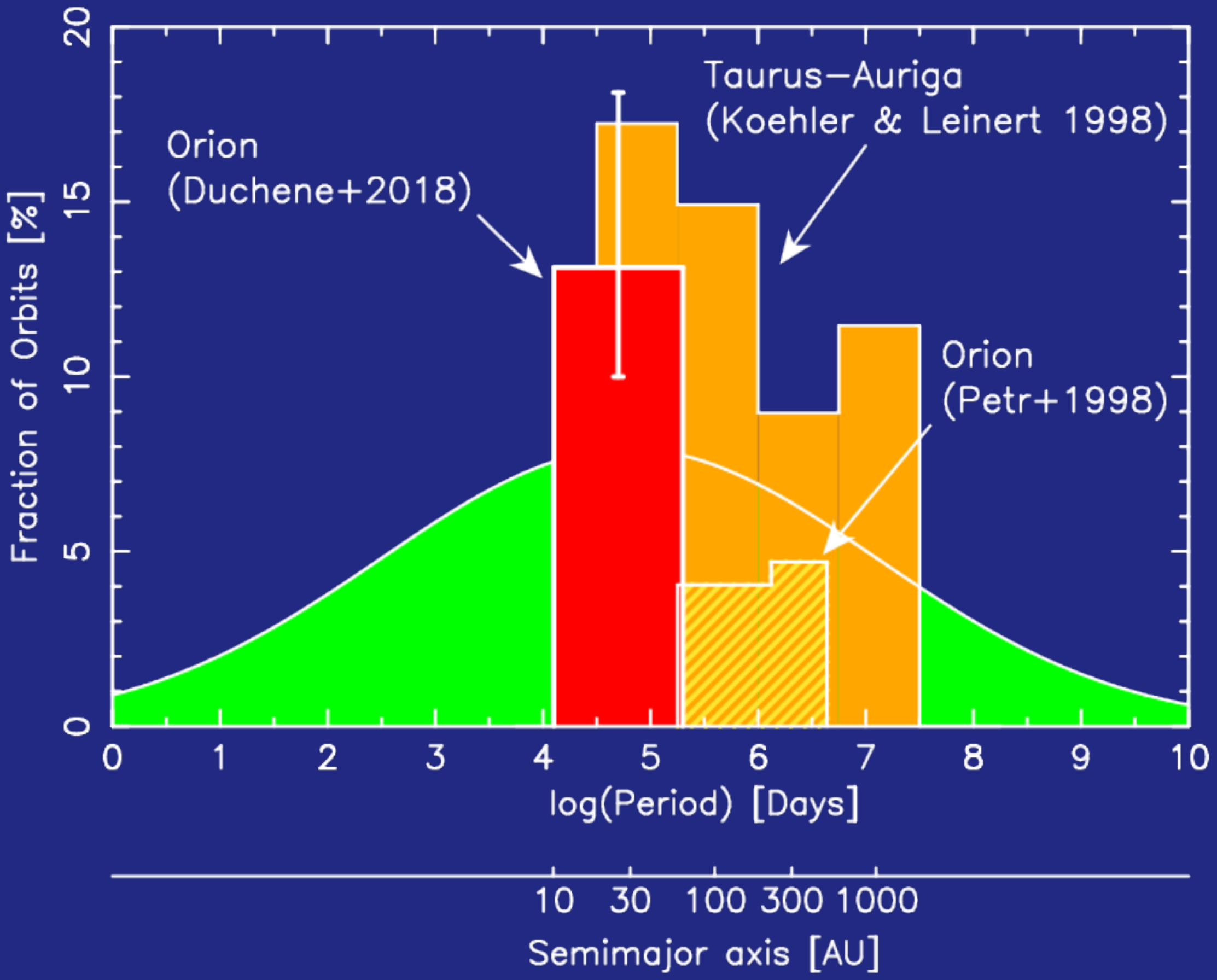
Orion Nebula Cluster



Initial multiplicity fraction = 100%

Binaries are destroyed by
dynamical encounters in dense clusters

Can we find remnants of the
initial binary frequency in the ONC?


Taurus–Auriga
(Koehler & Leinert 1998)
Orion
(Duchene+2018)
Orion
(Petr+1998)
Fraction of Orbits [%]
0
5
10
15
20
0
1
2
3
4
5
6
7
8
9
10
log(Period) [Days]
10
30
100
300
1000
Semimajor axis [AU]

Where do most of the low-mass field stars originate?

Not in Taurus-Auriga
and not in the ONC

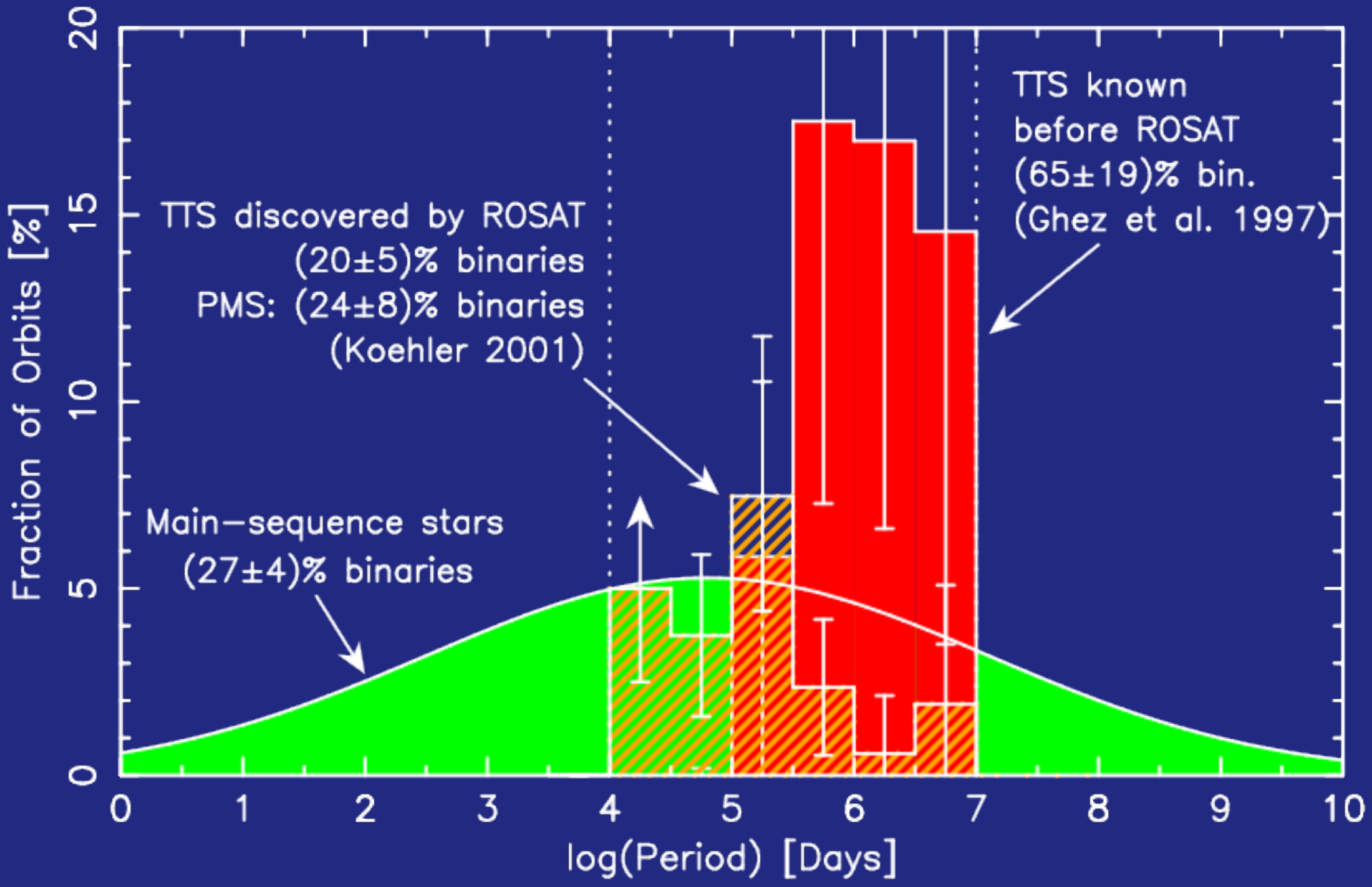
(too many close binaries)

Do all Star-Forming Regions produce lots of close Binaries?

Observing with Hans

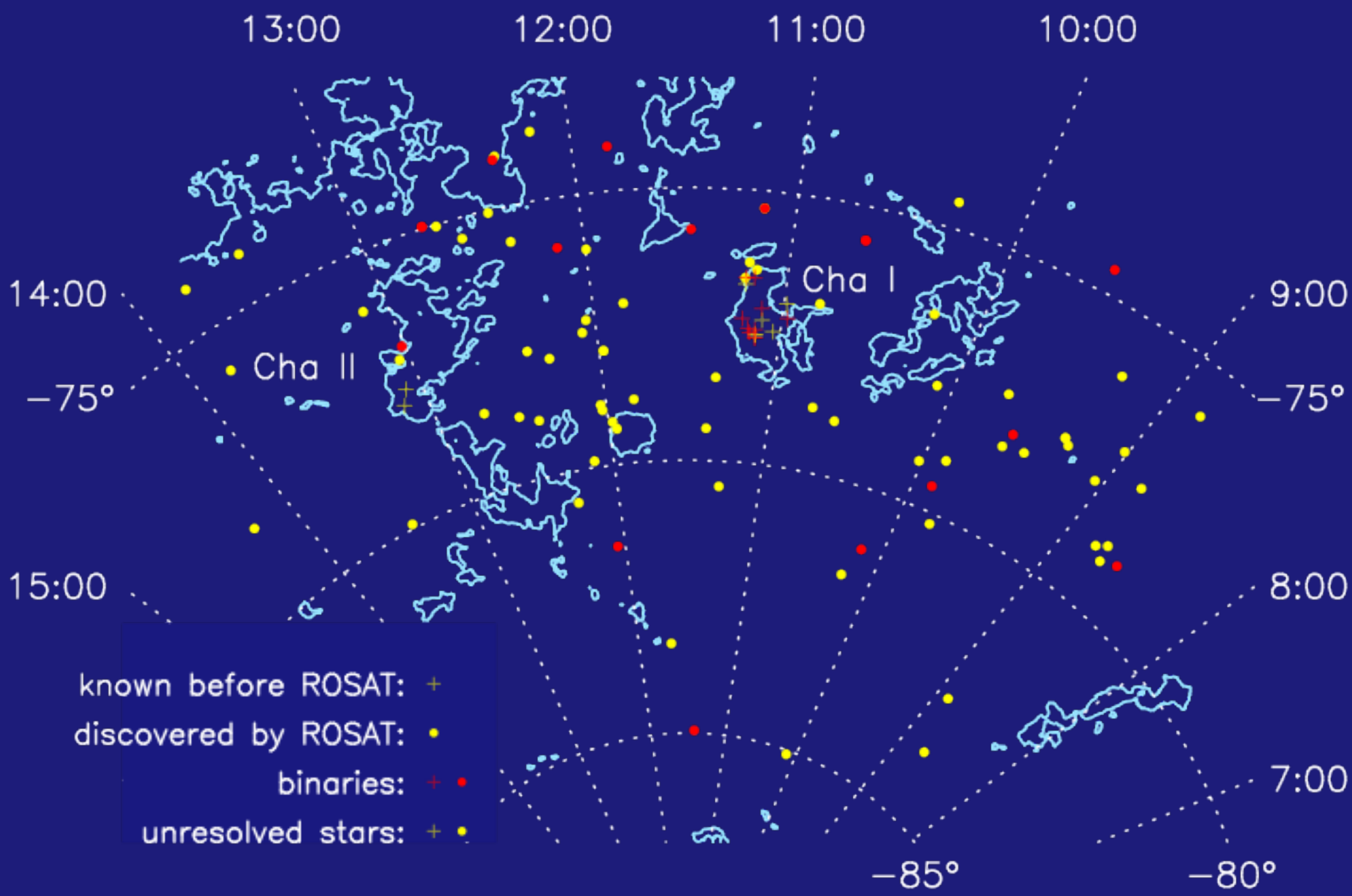
ROSAT-selected T Tauri stars in Chamaeleon

Chamaeleon



Ghez et al. 1997, Köhler 2001

Chamaeleon



Two different populations

- Classical T Tauri Stars associated with dark clouds Cha I & II at ~150 pc
- Many (most?) ROSAT-selected stars are part of the moving group ϵ Cha
- Distance ~100 pc
- Age 3 - 5 Myr
- See also Briceno & Tokovinin 2017

Takeaway points

- Binary distributions in Taurus-Auriga and the Orion Nebula Cluster do not match main-sequence stars
- Density plays a role, but there must be more
- ϵ Cha agrees with the field
- What is the difference between Taurus and ϵ Cha??
- What is/was going on in ϵ Cha?