Stellar dynamics and the distribution of YSOs

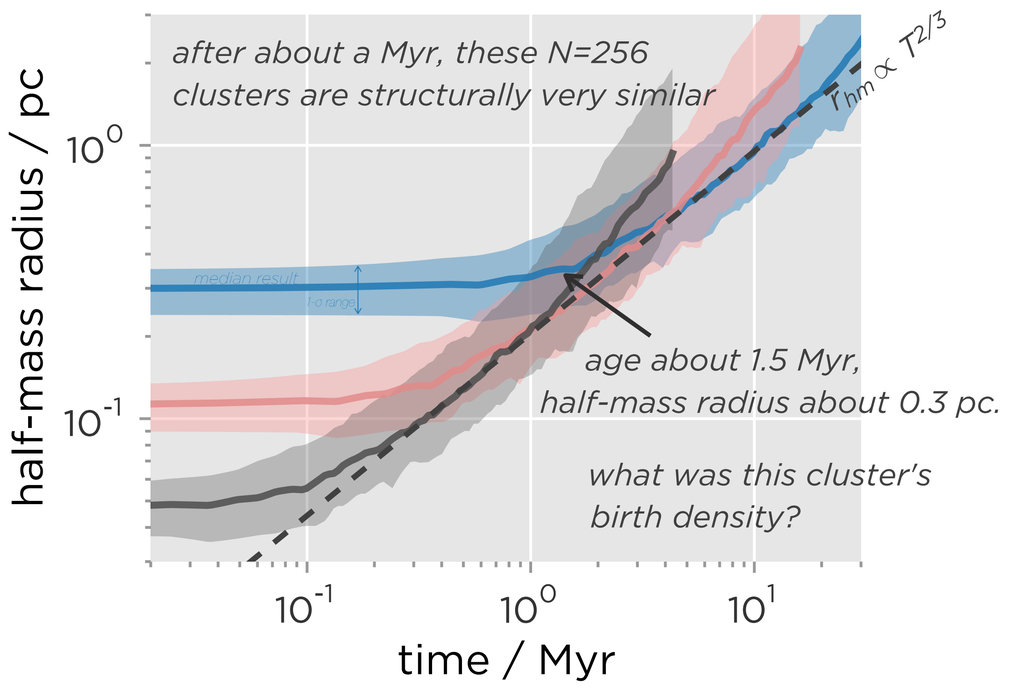
LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN
Nickolas Moeckel
nickolas1@gmail.com
@nickolas1
nickolas1.com

the main point

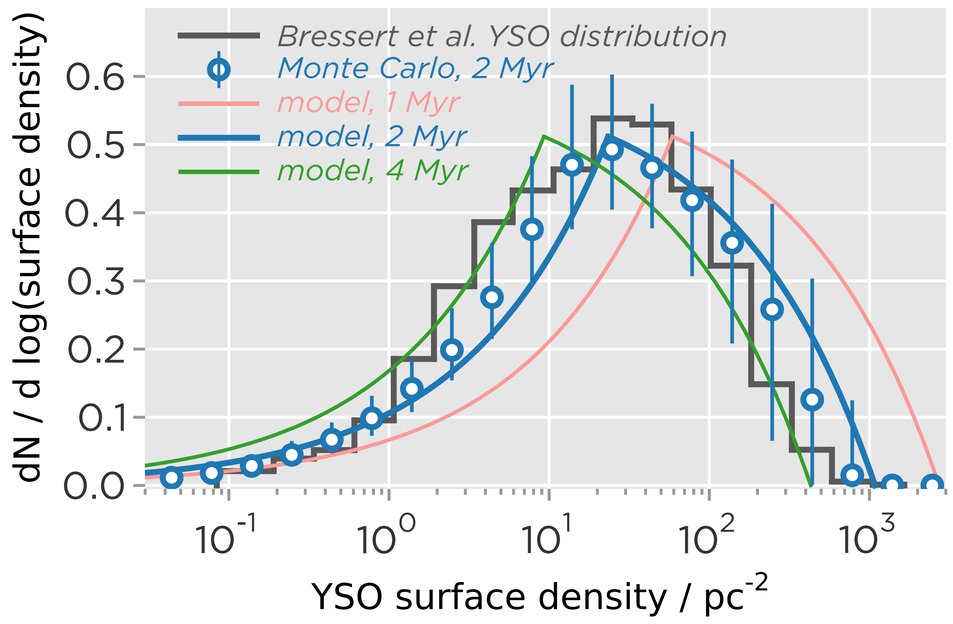
Our understanding of stellar birth locations is evolving from 'most stars form in clusters' to something more akin to 'most stars form in a wide distribution of clusterings or associations'. Determining what the observed distribution of YSOs tells us about the star formation process is the next question. Here I summarize two recent papers making the point that **collisional stellar dynamics can leave an early imprint on YSO positions**, including a toy scenario in which every star forms in a dense cluster that quickly reproduces the observed local distribution of YSO surface densities. **Absent other information, YSO locations at a few Myr do not uniquely constrain the stellar birth environment.**

1: idealized initial conditions

Q: How does the radius of a cluster evolve?
A: It expands in a self-similar fashion, starting after a fraction of an initial relaxation time.

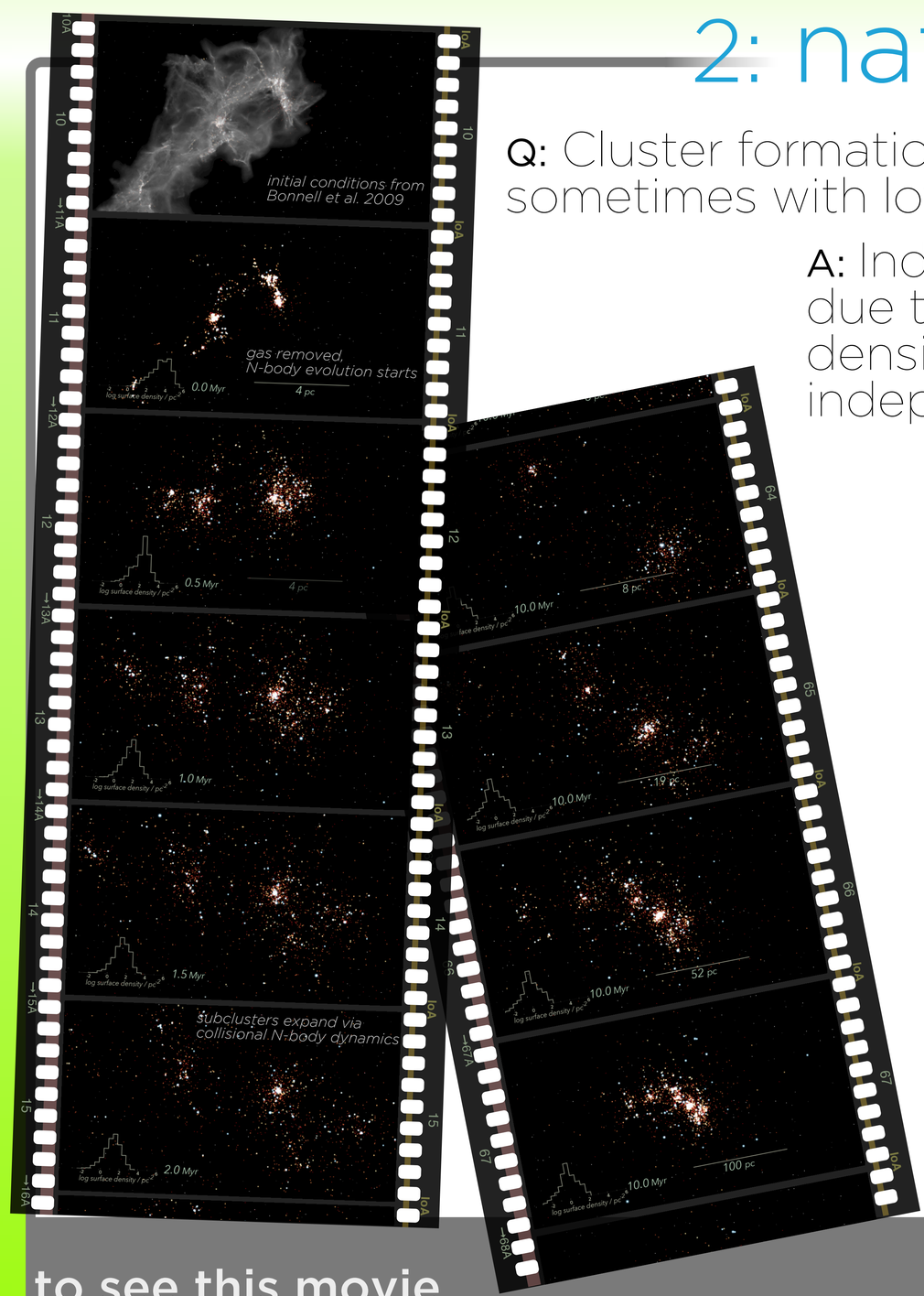


Q: What would it look like if every local star formed in a compact cluster?
A: The shape of the ∑ distribution is fixed, and the location of its peak traces the age.



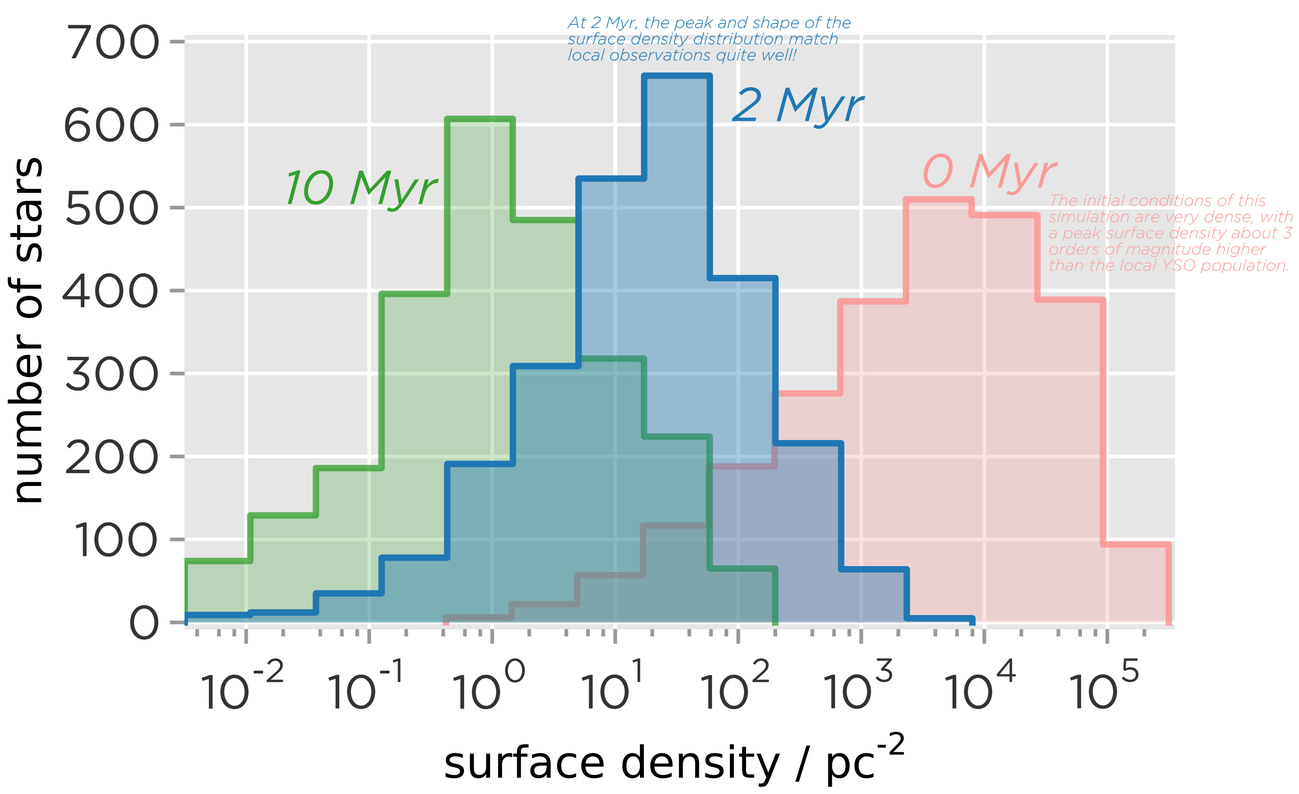
the paper is **Gieles, Moeckel & Clarke 2012** http://arxiv.org/abs/1207.2059

2: naturalistic initial conditions



Q: Cluster formation simulations tend to create very dense clusters, sometimes with lots of substructure. What happens over longer timescales?

A: Individual small-N subclusters expand on short timescales due to collisional dynamics, as expected, and the global YSO density distribution drops In response. This is largely independent of residual gas expulsion.



to see this movie
http://www.nickolas1.com/virialisedsubclusters.html

the paper is
Moeckel, Holland, Clarke & Bonnell 2012
http://arxiv.org/abs/1205.1677