Evolution: discussion

Census, Evolution, Physics
New Haven November 16-18, 2015
what is the best way to connect galaxy populations across cosmic time?

- statistical number density matching (rank order analysis)
- multi-epoch sub-halo abundance matching
- constant velocity dispersion
- stellar archaeology (reconstructed SFH)
- empirical (“data driven”) models (e.g. Leitner, Peeples)
- ‘physics’ models
can we trace evolutionary track in size, SFR, morphology?

Faber et al. 2007

Barro et al. 2015

van Dokkum et al. 2015
questions

- what is the goal of model-independent cross-epoch ‘matching’ methods
  - for observers?
  - for theorists?
- what unique insights have we gained from progenitor-descendant studies?
- what kind of (theoretical & observational) work is most important to make progress?
The way that even basic quantities like luminosity and stellar mass are measured in different ways in theoretical simulations & observations – this can lead to significant differences in conclusions about evolution – are we now reaching a point where we should worry about this?

Even harder for size, velocity dispersion, morphology, metallicity…

Plea to observers: please publish (or at least release) your ‘observational plane’ results (e.g., luminosity functions as well as stellar mass functions)!
open questions

- are certain parameters better for linking populations across epochs than others (e.g., velocity dispersion or $\Sigma(<1\text{kpc})$, rather than luminosity or stellar mass)?
- can we be sure that certain quantities increase monotonically?
- should we work forwards (identify descendants) or backwards (identify progenitors)? Answer can be different.
- is just knowing what the largest progenitor is doing good enough?
- is tracing the ‘average’ history of a population meaningful if there is a very large amount of scatter in the ensemble trajectories?
- special issues at very low and very high masses?