How to discriminate between cluster galaxy properties imprinted at birth and resulting from environmental transformation?

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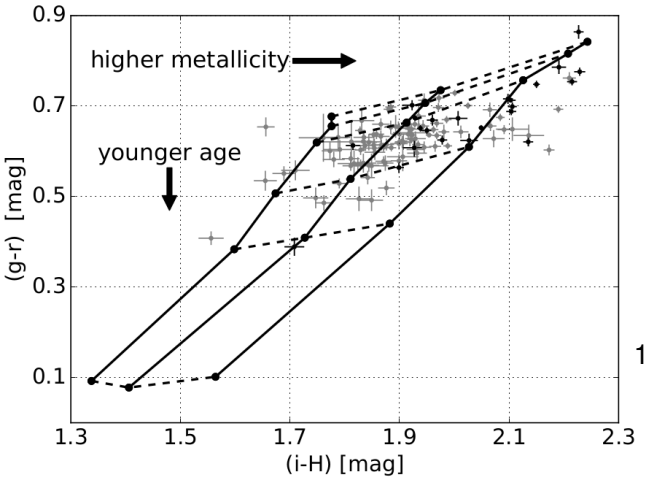
Virgo early-type dwarfs: ∼half of their stars older than 5 Gyr



Urich et al. 2017

120 early types
$-16 > M_r > -19$
www.SMAKCED.net

SSP model grid (BC03)
1, 3, 4.5, 7.5, 10.5, 13.5 Gyr
Z = 0.008, 0.004, 0.02

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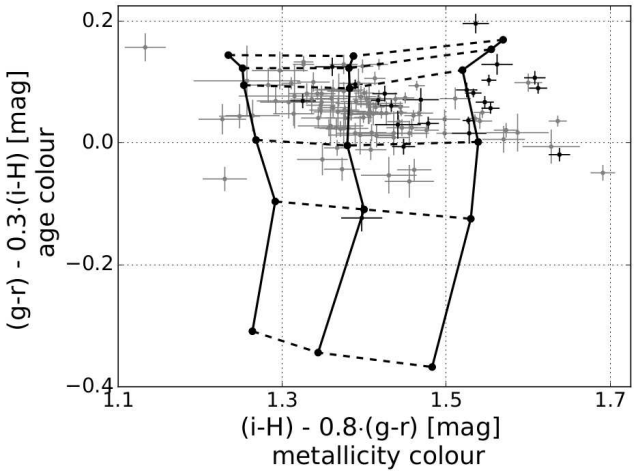

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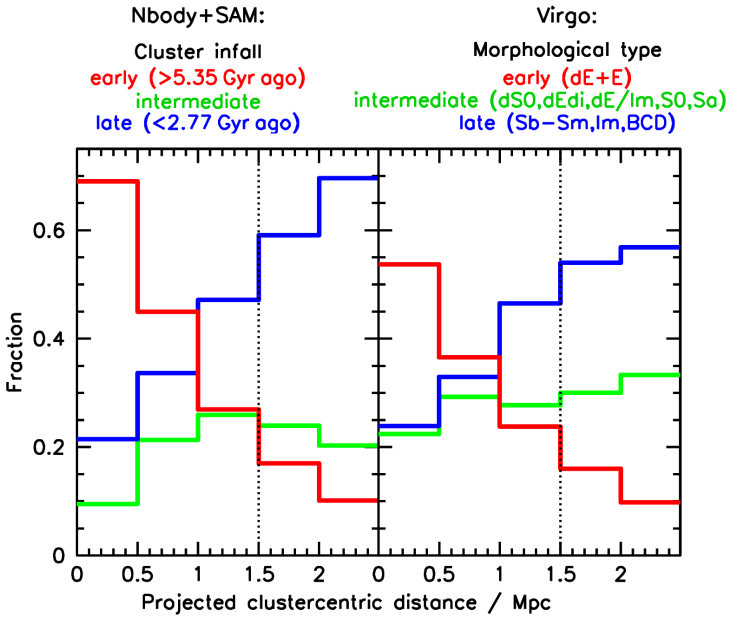
Morphology-distance relation is a relation with infall time



Lisker et al. (2013)

Stellar metallicity:
built up in earlier environments and/or at earlier stage of their cluster

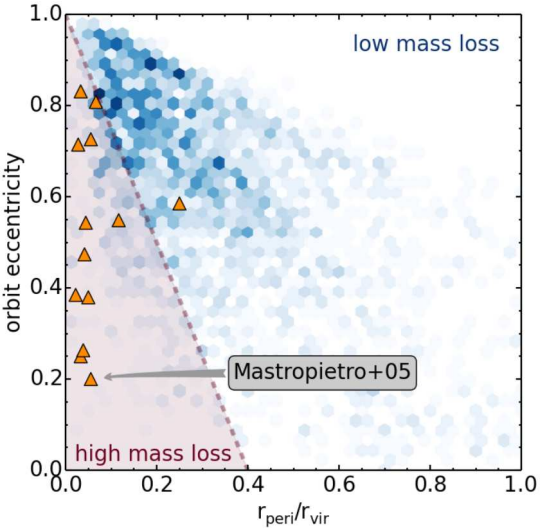
What are potential *kinematic* progenitors of early-type dwarfs?

Vcirc curves of CALIFA galaxies versus Virgo early-type dwarfs

Bahar Bidaran's talk on Thursday

More SAURON Virgo data to be analyzed, MUSE Virgo data upcoming!

No, harassment is not as efficient as you may have thought



Smith et al. (2015)

Darker pixels are more common orbits in cosmological simulation

Shaded region shows sufficiently strong harassm. to begin stripping the stellar body

Galaxy properties & environment

Stellar metallicity:
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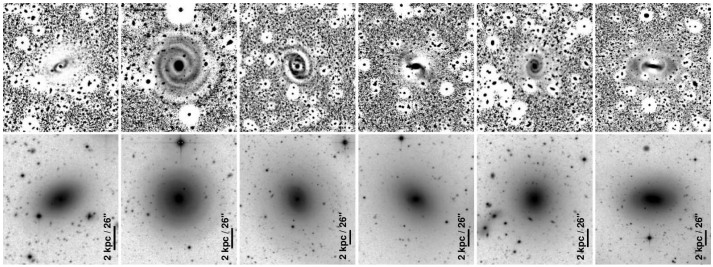
Internal dynamics:
? set mainly during (baryonic) formation epoch of the galaxy ?

What does disk substructure in early-type dwarfs tell us?

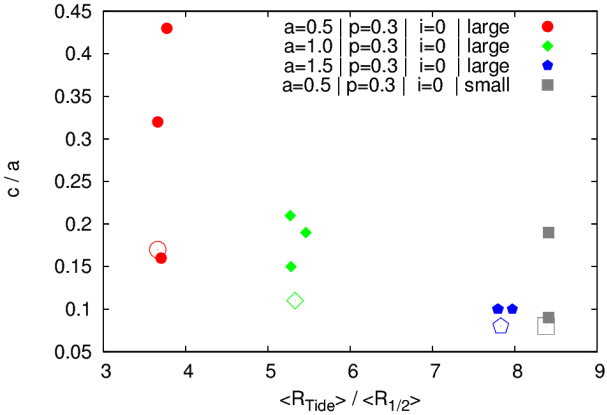


Selected Virgo early-type dwarfs with deep imaging: unsharp masks!
Lisker et al. (2009)

Intact stellar disks in early-type dwarfs in a cluster environment

Josefina Michea's talk in ∼15 mins

Does tidal interaction re-shape low-mass disks?



Bialas, et al. (2015)

N-body simulation using a few selected orbits to study tidal influence

→ A little bit. Only sometimes a lot.

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Structural properties:
? set mainly in earlier environments ?

Virgo galaxies in observer's phase space

Illustris low-mass galaxies in observer's phase space

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Distribution & motion:
reflects (recent) cluster assembly and subgroups!

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Conclusions / Wish List / Points for Discussion

How to discriminate between cluster galaxy properties imprinted at birth and resulting from environmental transformation?

Simulation predictions for metallicities, abundances and gradients? Depending on birth environment? Depending on later environment?

Simulation predictions for structure & internal dynamics of low-mass galaxies depending on where they were formed? Influenced by low-velocity interactions in groups? By other events?

Observers, why not study *all* environmental quantities: phase-space, local density, cluster-centric distance, large-scale environmental proxies, ...?
Then bug simulators to interpret it for us, like we're doing at this workshop.
(→ *e.g. Rory's talk on Thursday*)

Observational surveys to describe *populations* of galaxies even more quantitatively: dynamics & stel.pops. (e.g. FDS+SAMI), star formation rates and histories (e.g. VESTIGE), ...