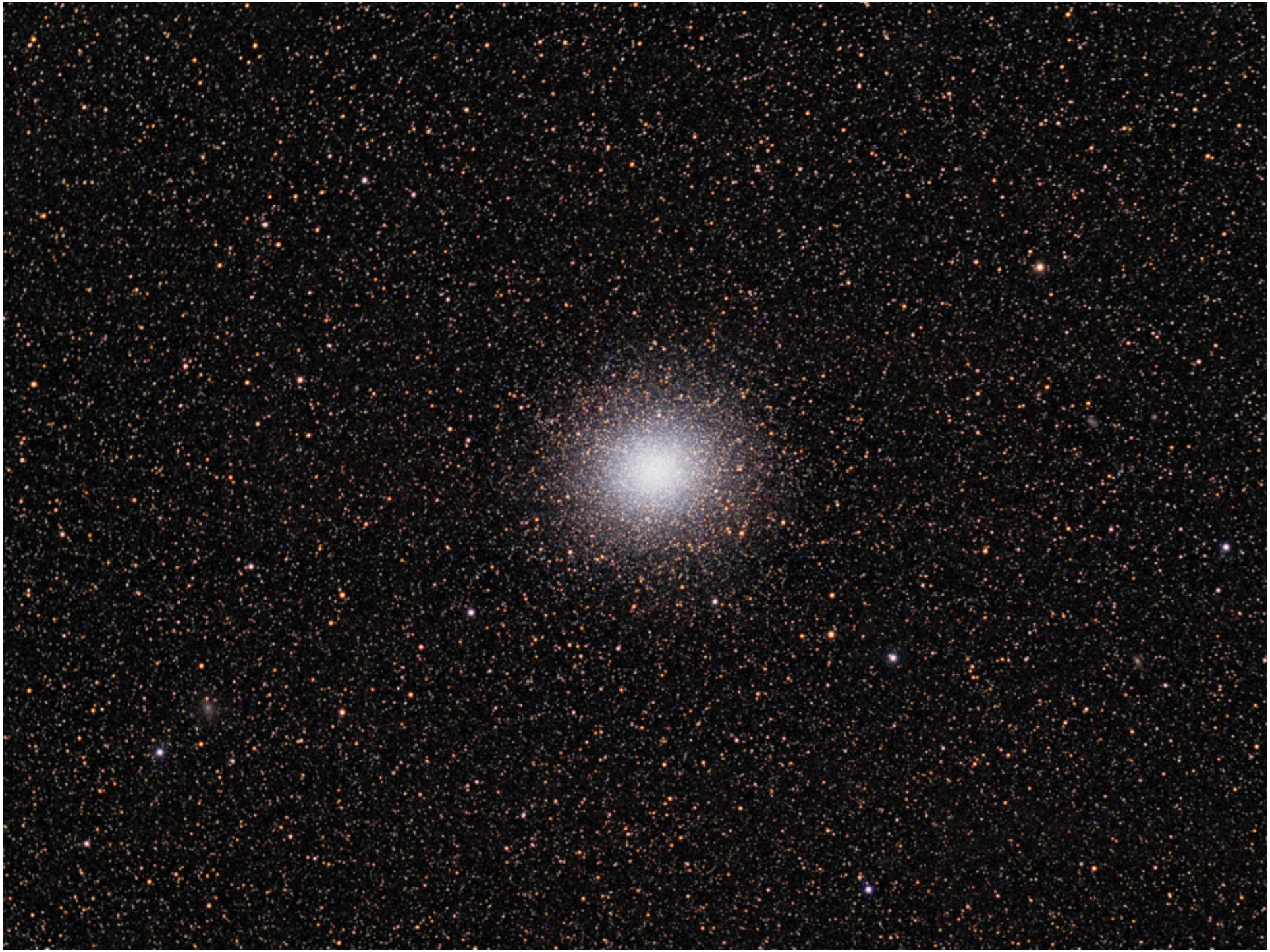


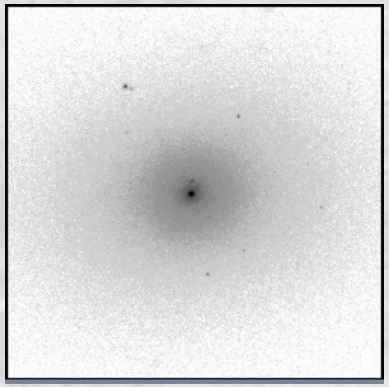
W.E.Harris, IAU246, September 2007

McMaster University

Giant Elliptical Galaxies:
Globular Clusters and UCDs

ω Cen

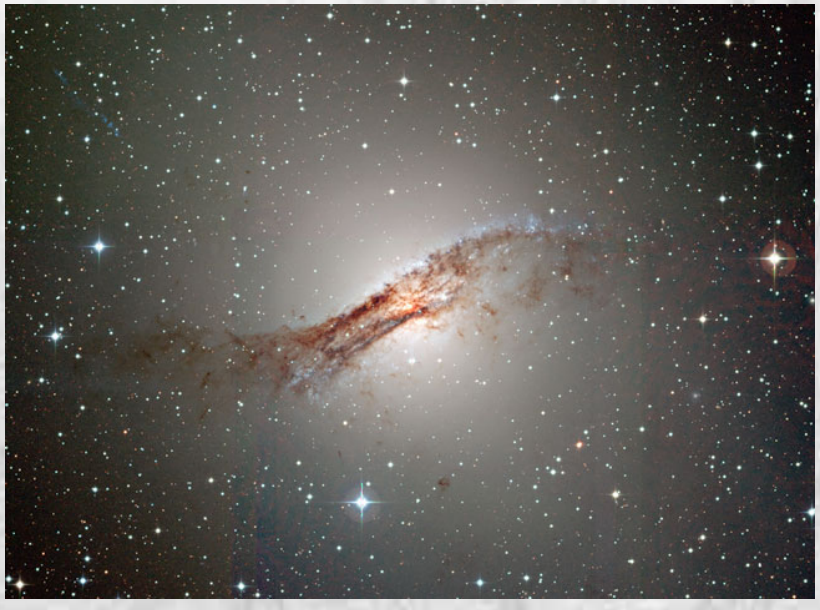
?



dE,N

?

NGC 147



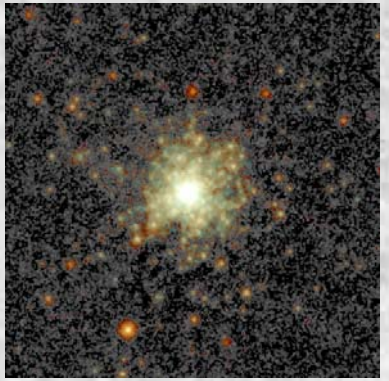
NGC 5128

Unique chance to study a halo population in an E/S0 giant at close range

d = 3.8 Mpc from several standard candles: TRGB, PNLF, SBF, Cepheids, LPVs

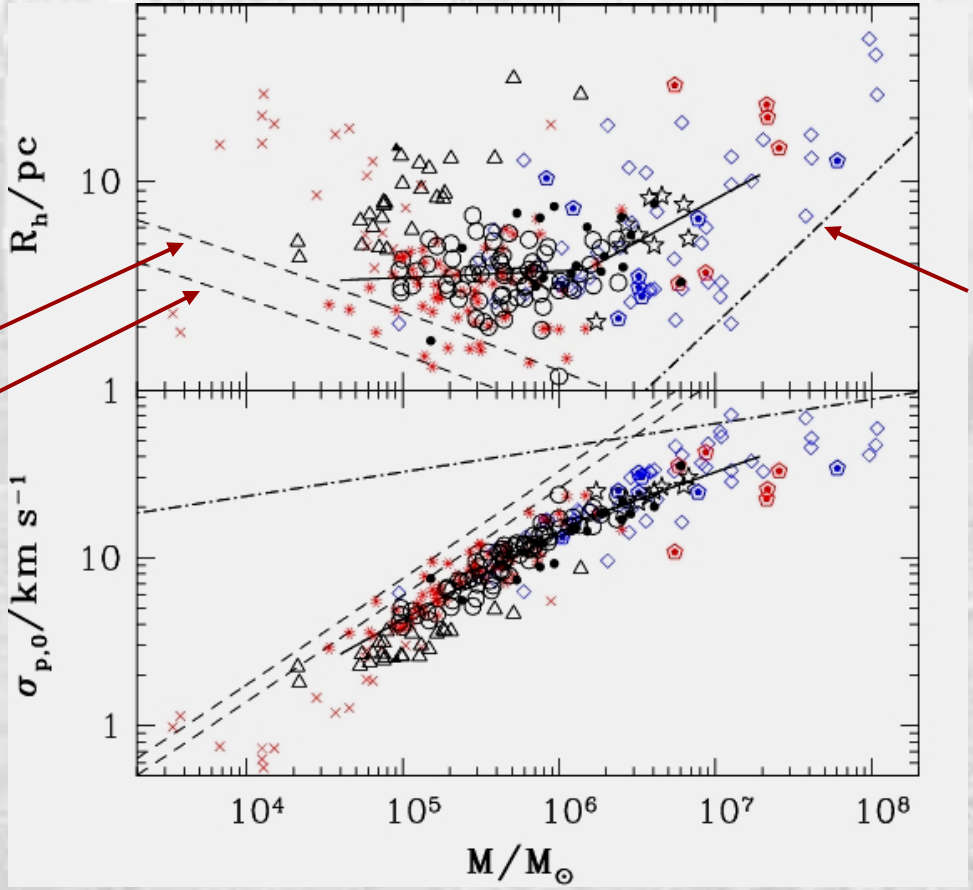
~450 clusters now individually identified, 340 with radial velocities
(many more coming, from programs currenty in progress)

Woodley et al. 2007, AJ *134*, 494: catalog, GCS kinematics, & dynamics



NGC5128-C44

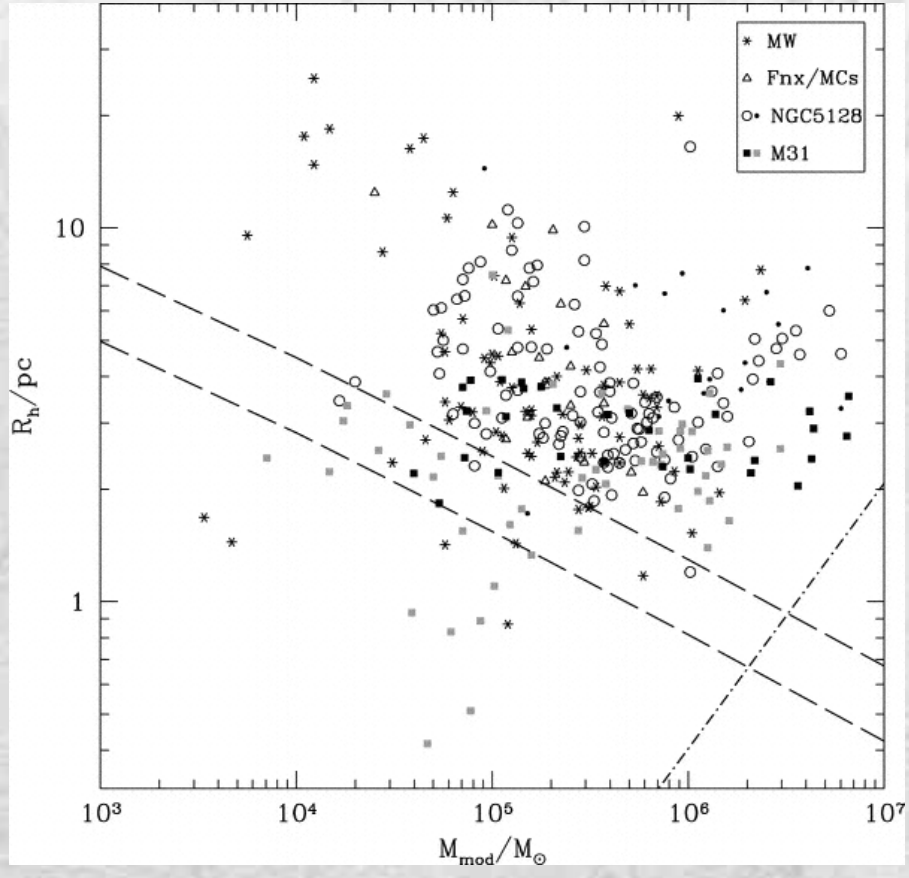
NGC5128, M31, MW are key resources for evaluating similarity of GCs in different galaxies, and probing structures at high-mass end



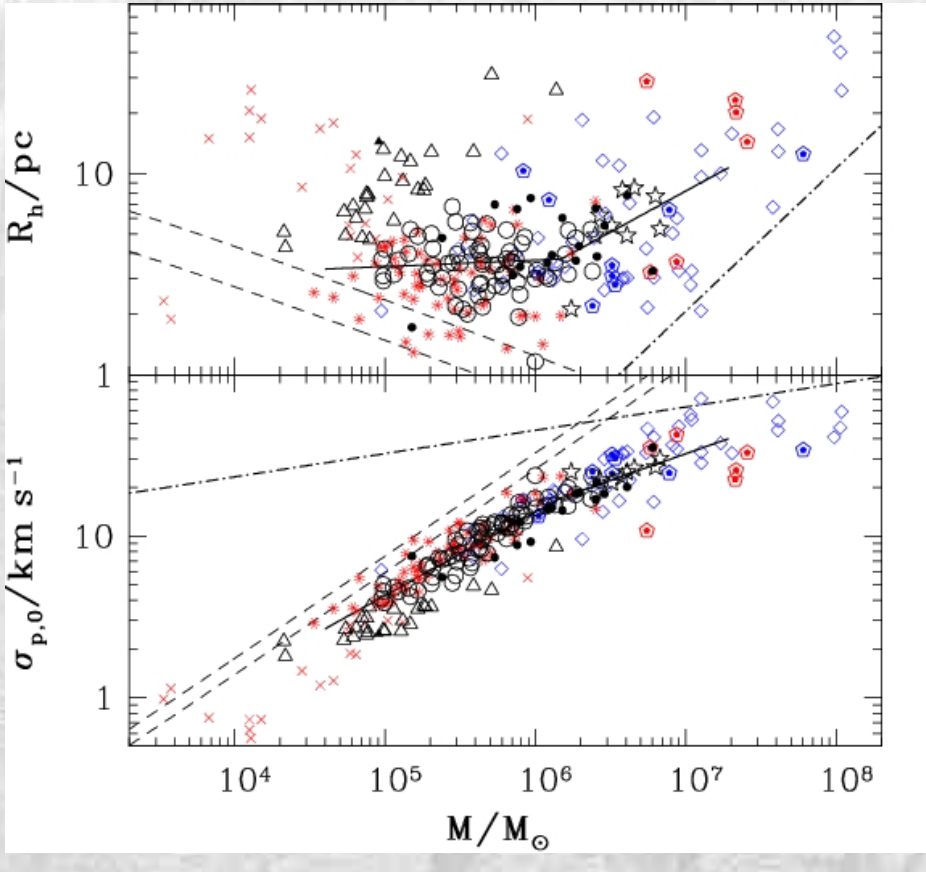
McLaughlin et al. 2007 in preparation

NGC 5128 Milky Way

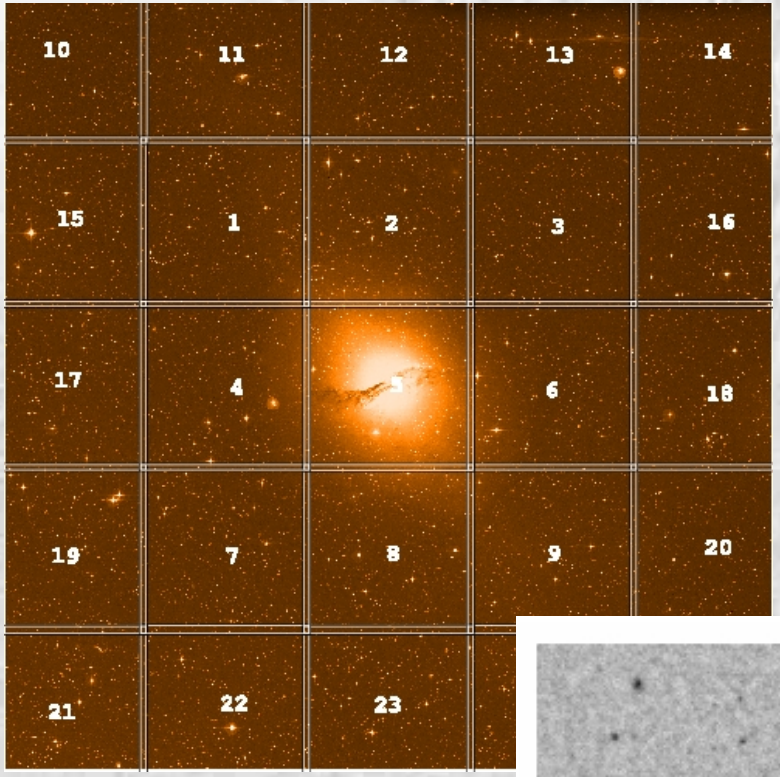
dE,N + NSC DGTO's



Barmby et al. 2007, AJ 133, 2764



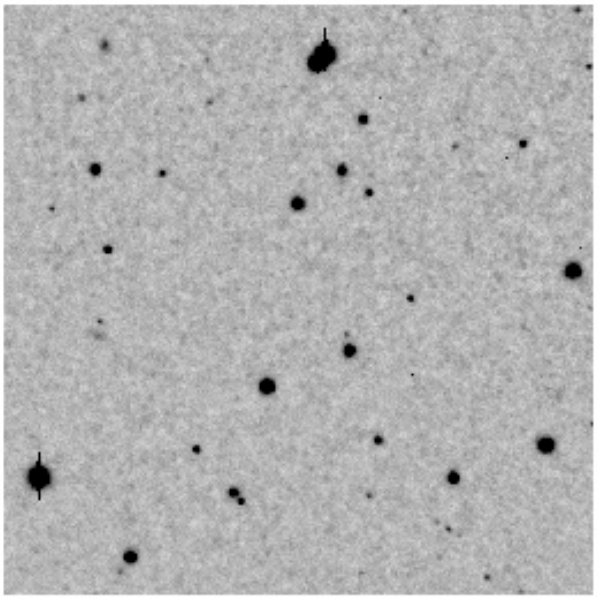
McLaughlin et al. 2007

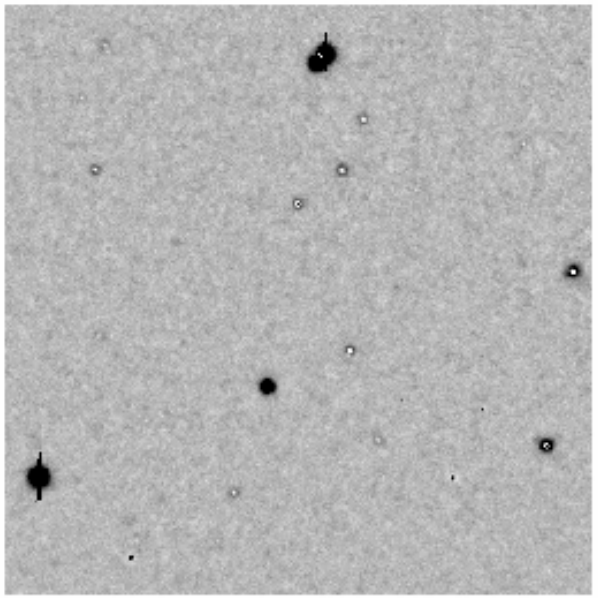


New imaging survey with Magellan IMACS camera, April 2006 (Gomez, Geisler, Harris, Harris, & Woodley)

(B,R) with 0.45” seeing!

Complete coverage of 1.2x1.2 degree field (80x80 kpc at NGC5128)



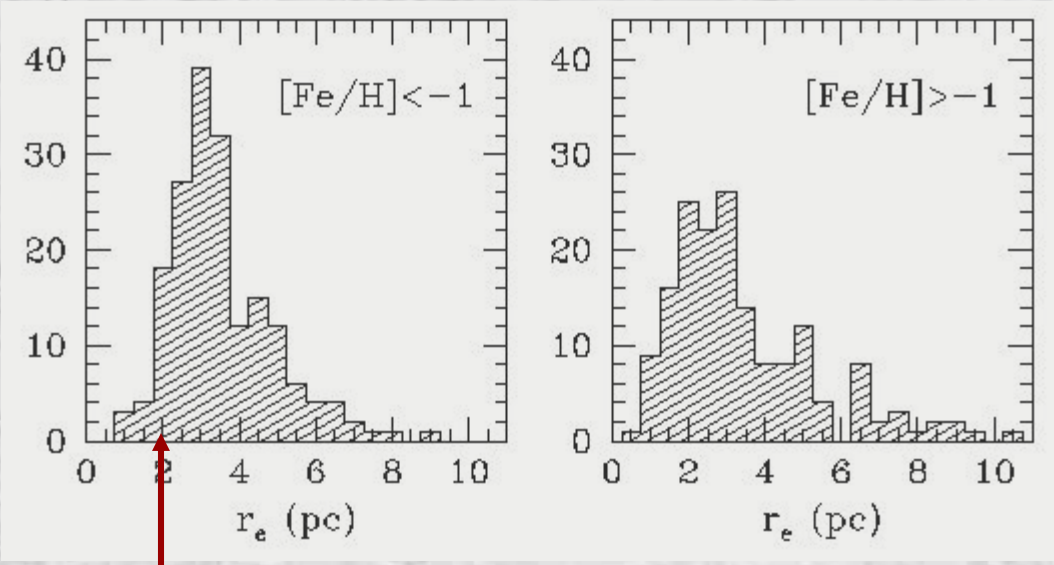


Identification of GC candidates after PSF subtraction is easy!

Scale 1” = 8.3 pc

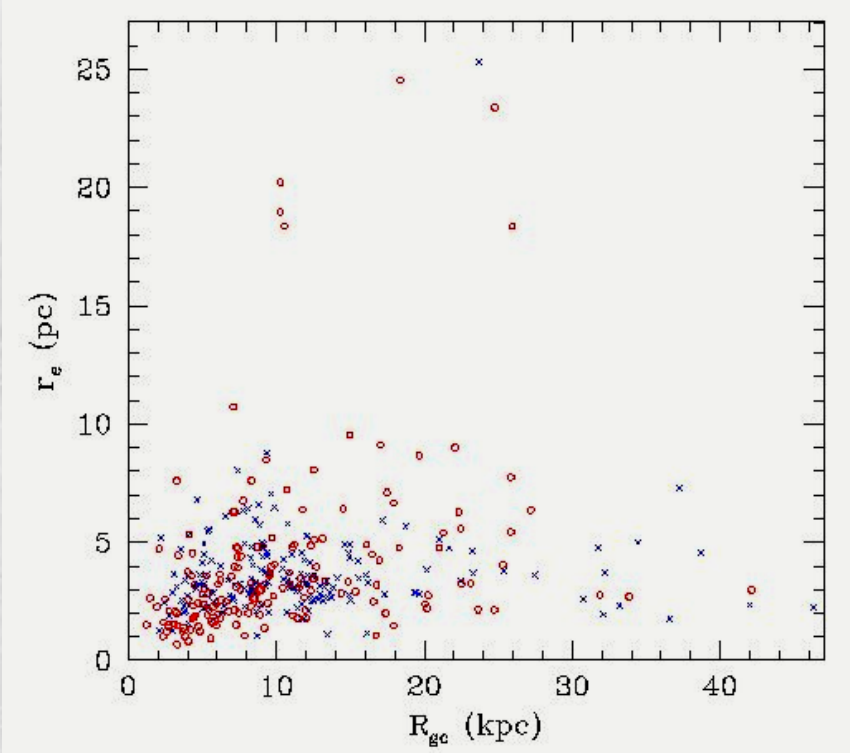
Gomez & Woodley 2007: “ISHAPE” fits to 359 known GCs measured on IMACS images (King profiles convolved with PSF) give well determined effective radii r_e , though not core radii. Results calibrated against subsample of HST-based imaging

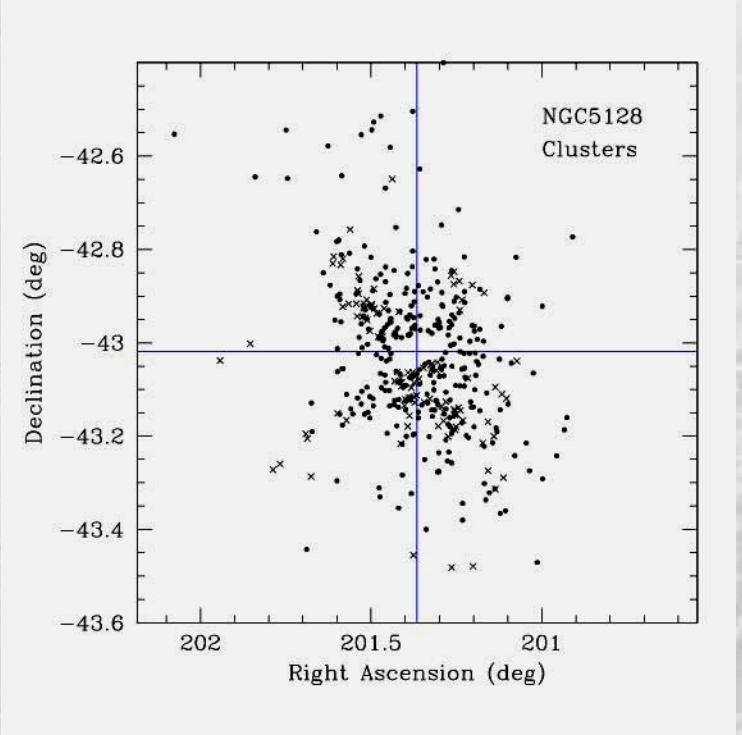
Explore trends with metallicity and galactocentric distance: some preliminary results



Approximate limit of resolution (2 pc) corresponds to 0.1”: Note that 0.45” seeing at distance of NGC 5128 is equivalent to HST resolution at Virgo or Fornax distance

Effective radius versus projected galactocentric distance



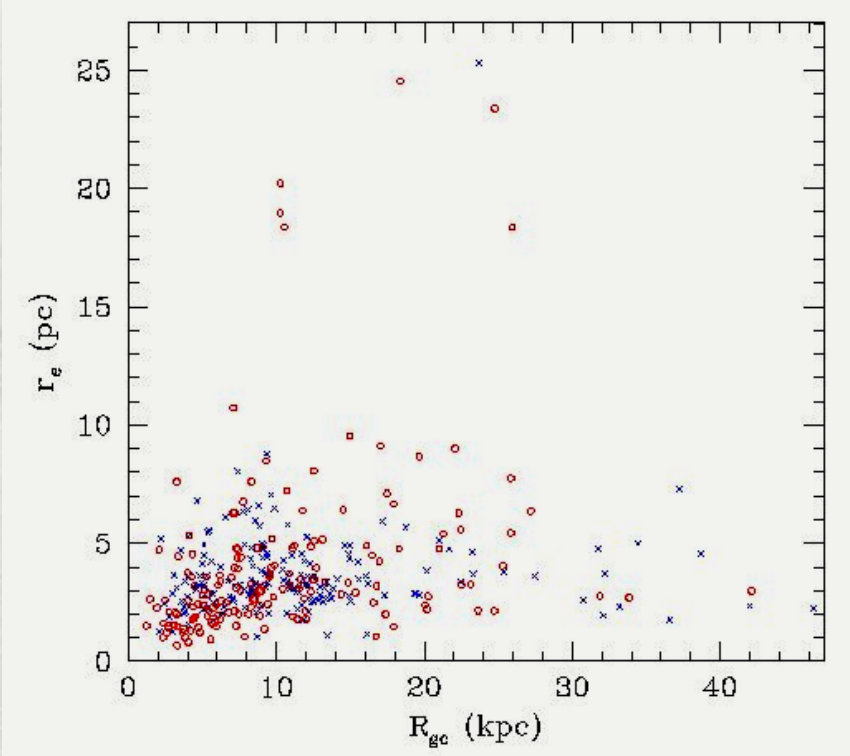


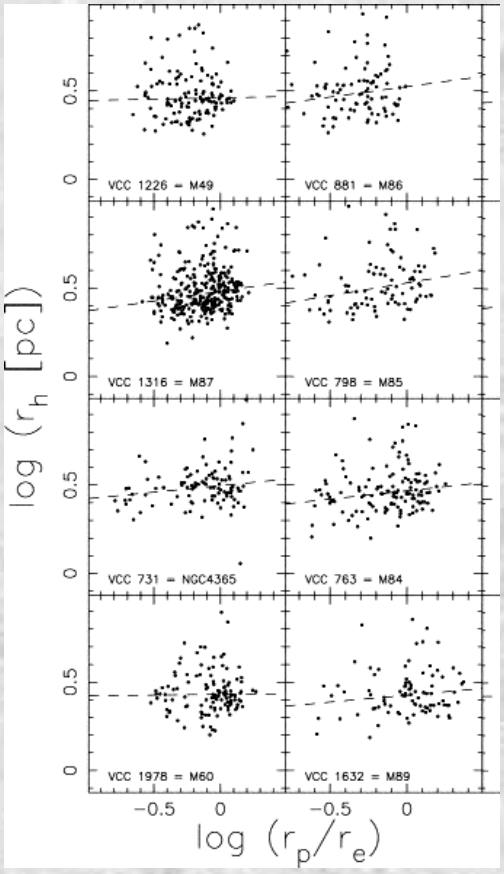
[Fe/H] < -1

[Fe/H] > -1

Radial range is 0 → 9 $R_{\mathbf{eff}}$

Effective radius versus projected galactocentric distance



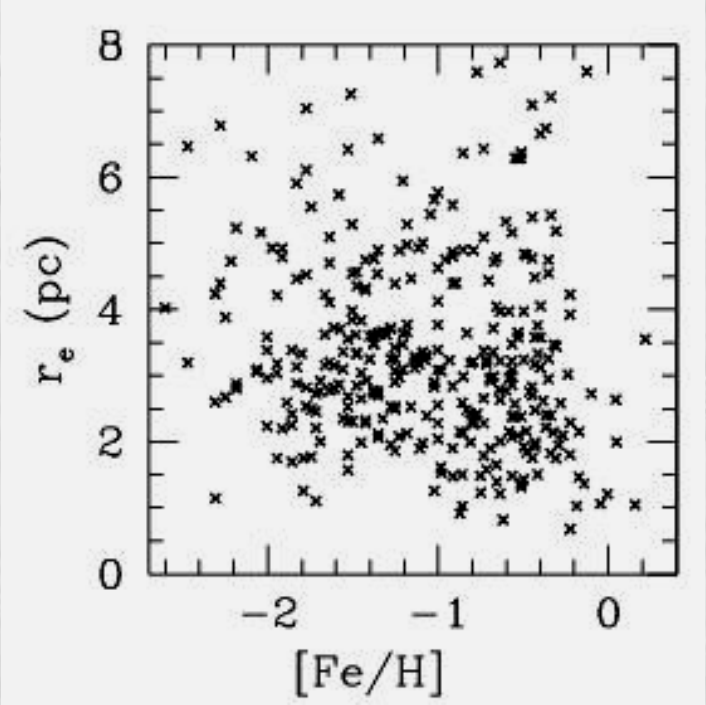


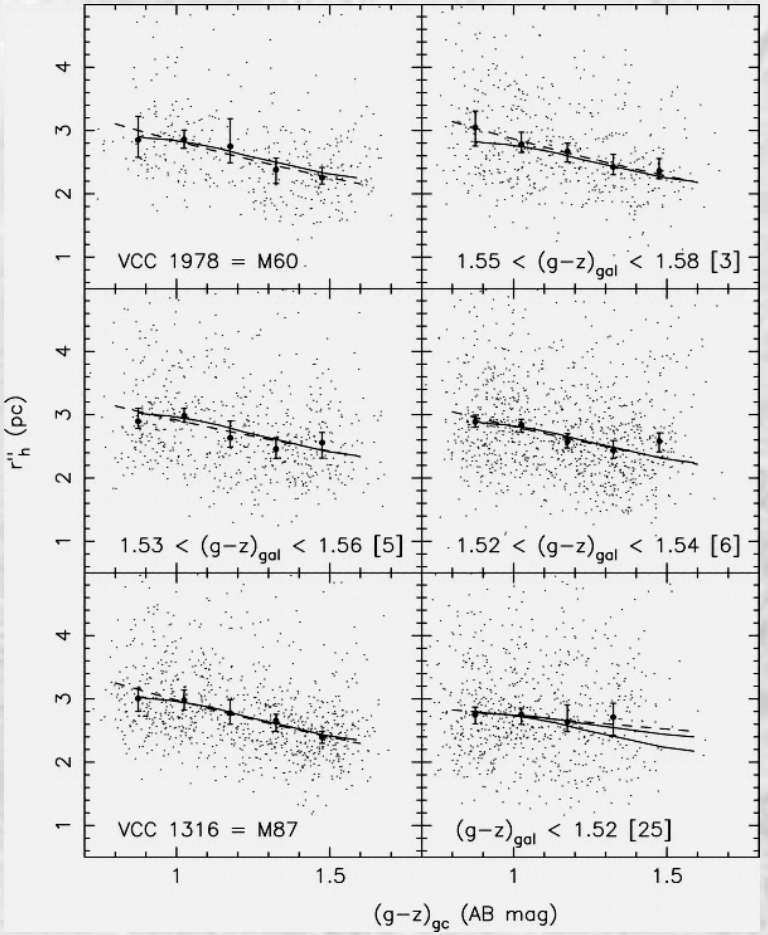
[Fe/H] < -1

[Fe/H] > -1

Jordan && 2006 (VCS)

Effective radius versus metallicity (continued)

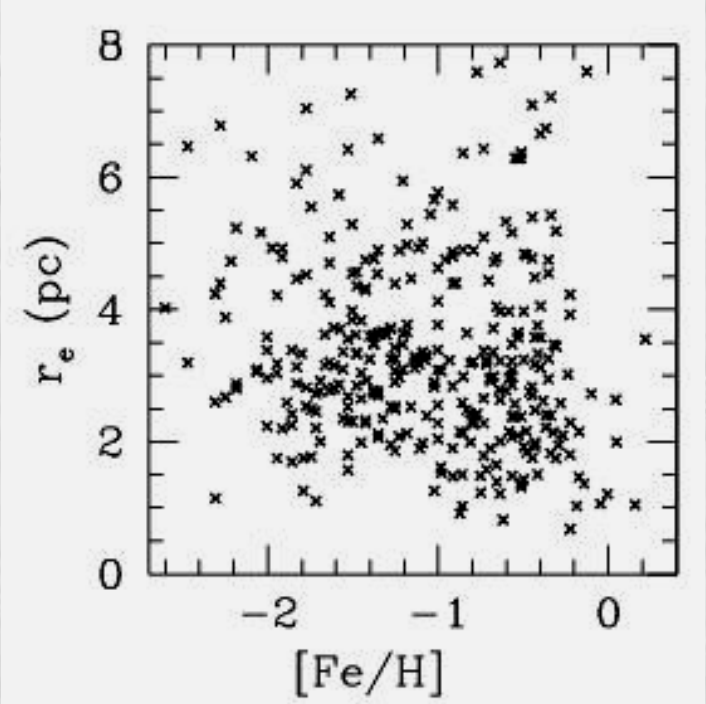


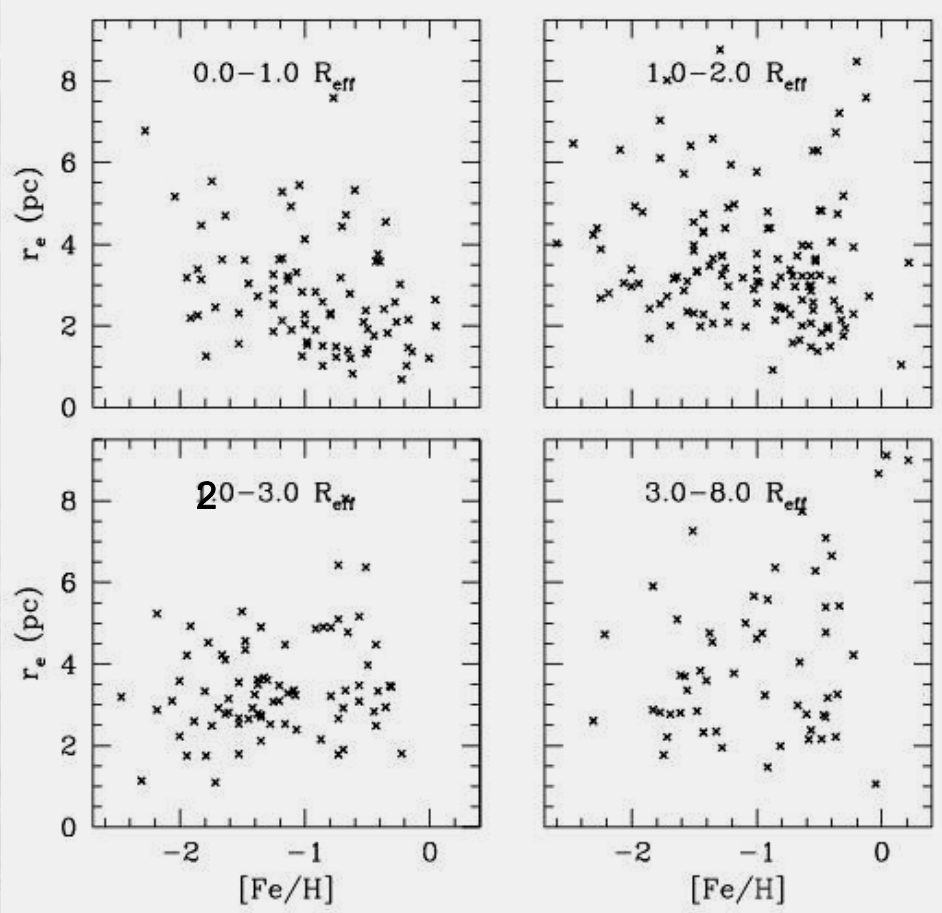


Metal-richer clusters have smaller radii …

Jordan && 2006 (VCS)

Effective radius versus metallicity (continued)





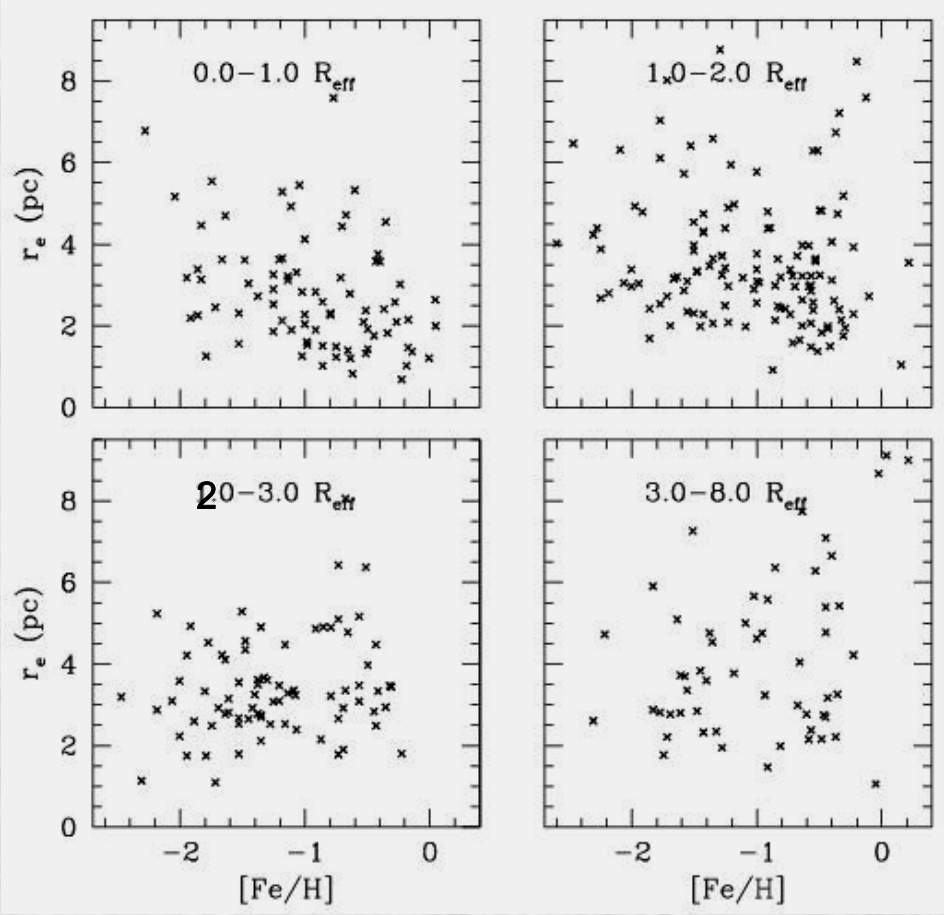
Metal-richer clusters have smaller radii …

But not beyond 2 R_{eff} !

Effective radius versus metallicity (continued)

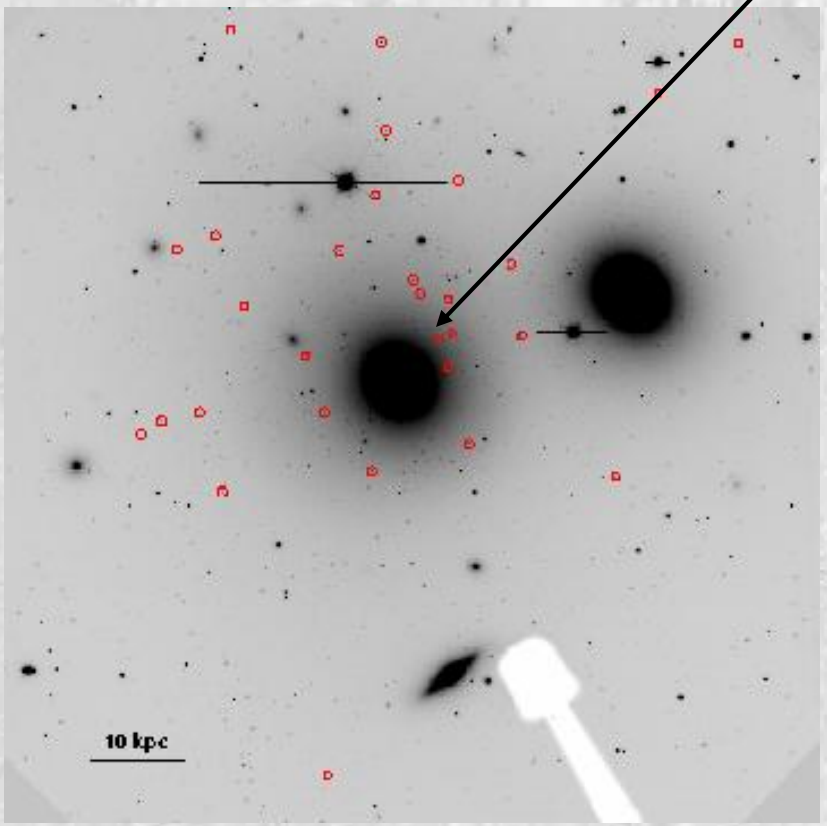
Larsen & Brodie (2003) – effect due to basic $r \sim R^{1/2}$ relation plus higher central concentration of redder GCs; $r_e(Z)$ relation should "damp out" at larger R

Jordan (2004) – mass segregation of stars within GC, coupled with lower lifetimes for higher-Z RGB stars; not related to R

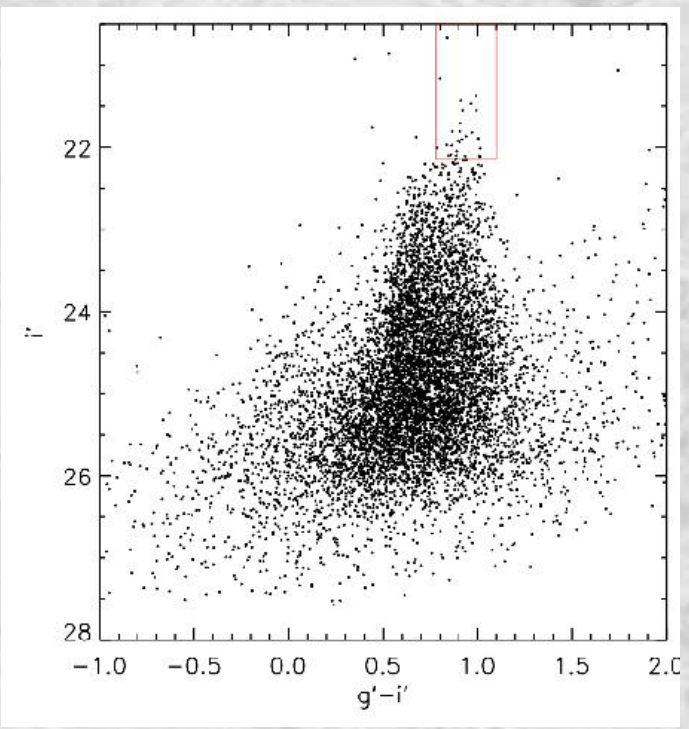


See Doug Geisler's poster for more --

Gemini/GMOS photometry of the high-SN globular cluster system around the Hydra cD, NGC 3311 (d=54 Mpc)



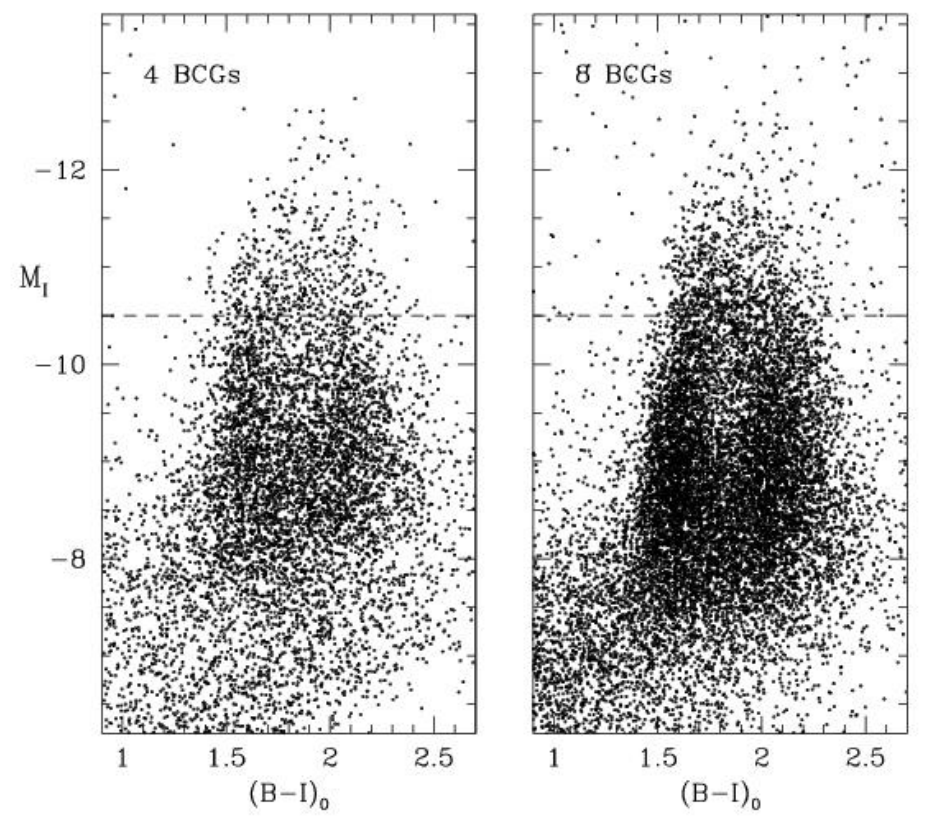
Wehner &Harris 2007, ApJL in press



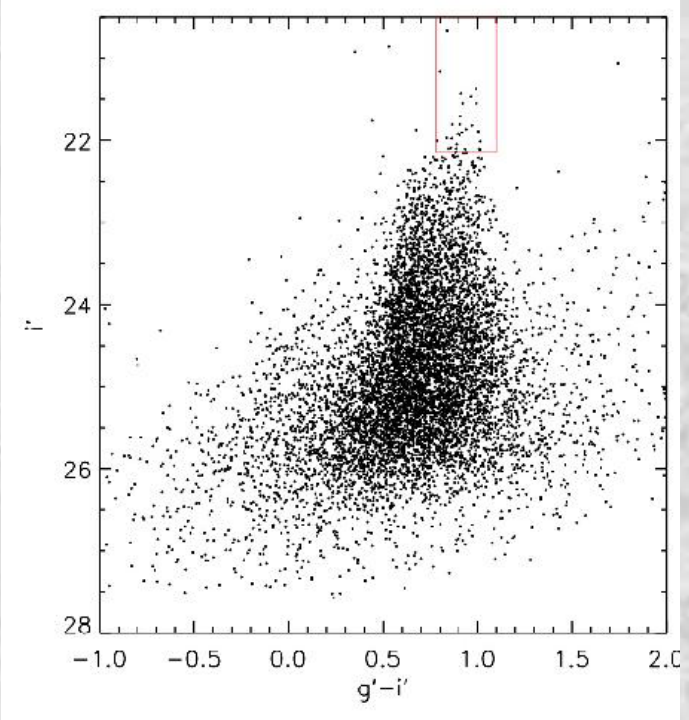
UCD candidates? high-mass extension of GC red sequence

Masses in range (6 – 30) x 10^6 M(Sun) for M/L = 3

Clearly delineated “sequence” reaching UCD regime in a *single* galaxy was not previously seen in our ACS survey



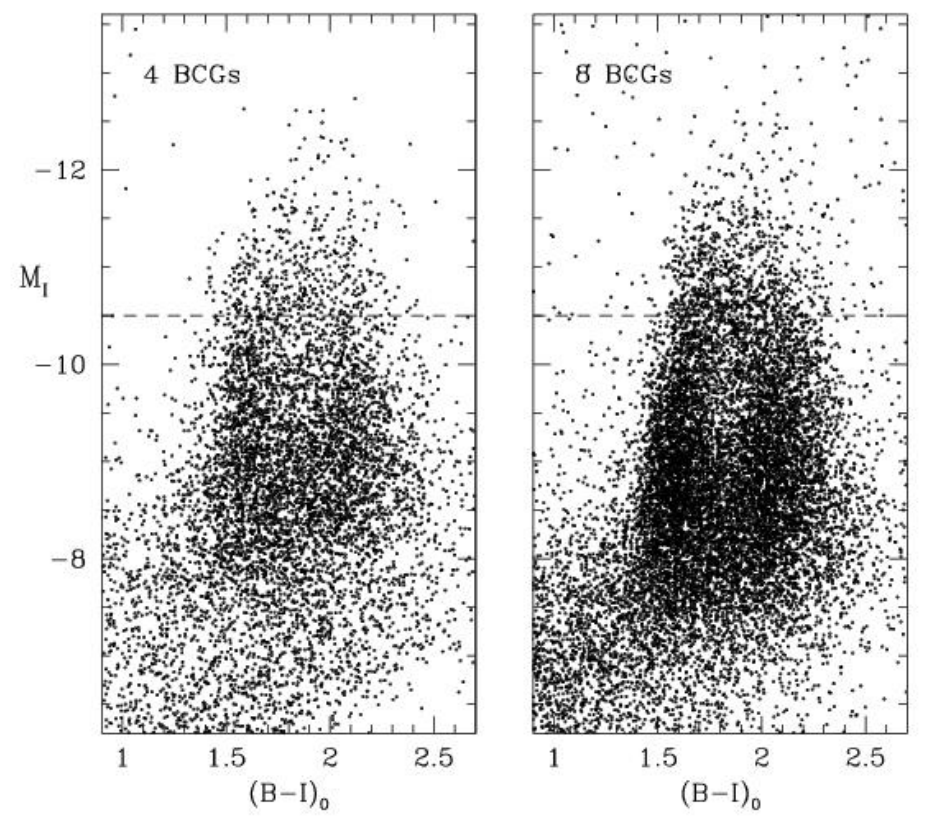
Wehner &Harris 2007, ApJL in press

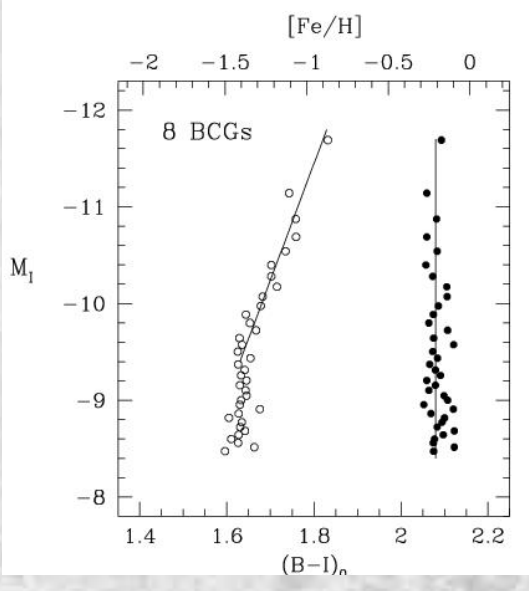


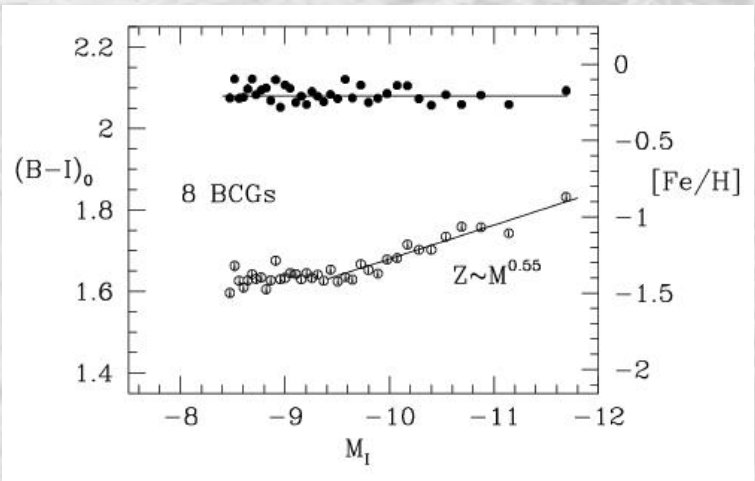
HST/ACS imaging of GCSs in 12 cD galaxies (Harris && 2006, 2007)

NGC 3311

What is the origin of the mass/metallicity relation along the blue GC sequence? Why is it *nearly* but not *totally* universal?

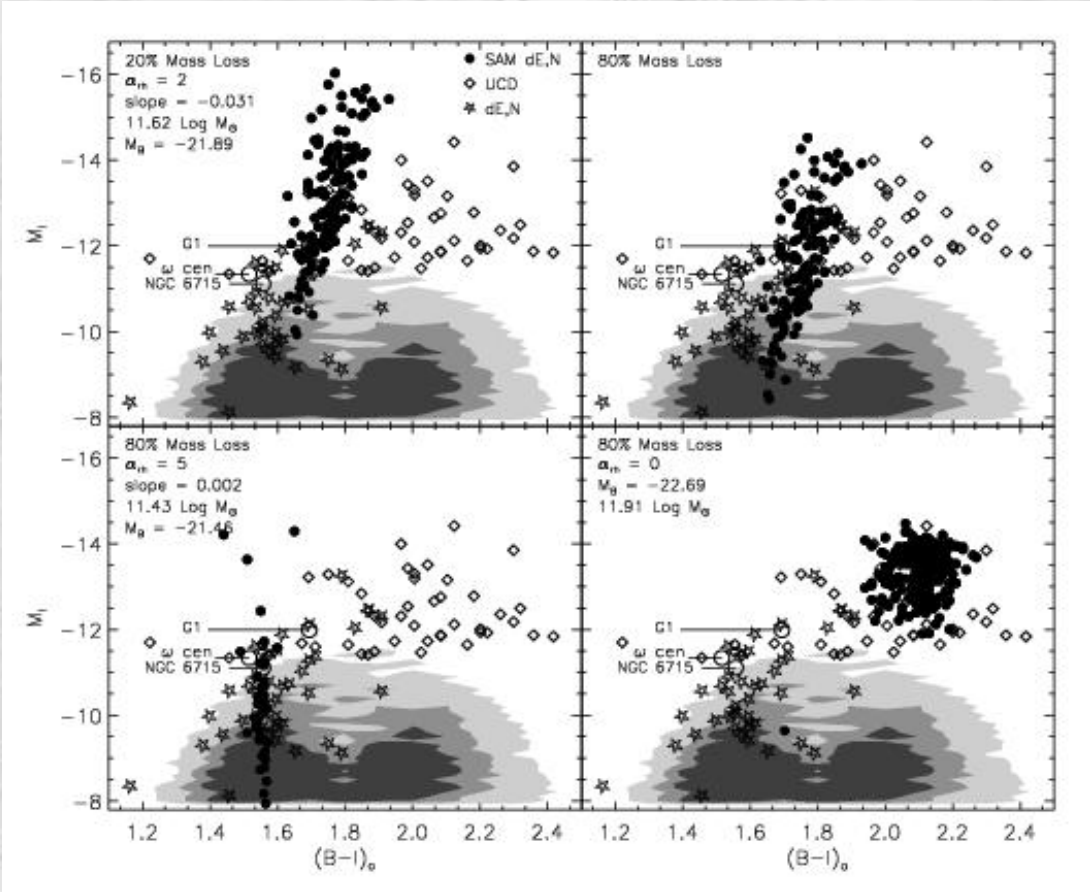






HST/ACS imaging of GCSs in 12 cD galaxies (Harris && 2006, 2007)

Semianalytic modelling of gE formation (Somerville code) modified to track “nuclei” of dwarfs (UCD-like, or giant GCs)



Rothberg, Harris, Whitmore, Somerville & Cockcroft 2007, ApJL submitted

Blue-sequence MMR appears for normal input parameters!

$\dot{m}(SN) \sim V_c^{-\alpha}$

Changing the SN heating efficiency can eliminate the MMR, or produce genuine UCDs (but not both at once) → rare galaxies with no MMR should have no UCDs either (such as M49)