Resolved Stellar Populations (RSPs) in the Virgo cluster

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What we would like to do

•Early-type halos contain most of the stars, and most of the oldest ones.

•The photometry of RSPs provide their color magnitude diagrams (CMD).

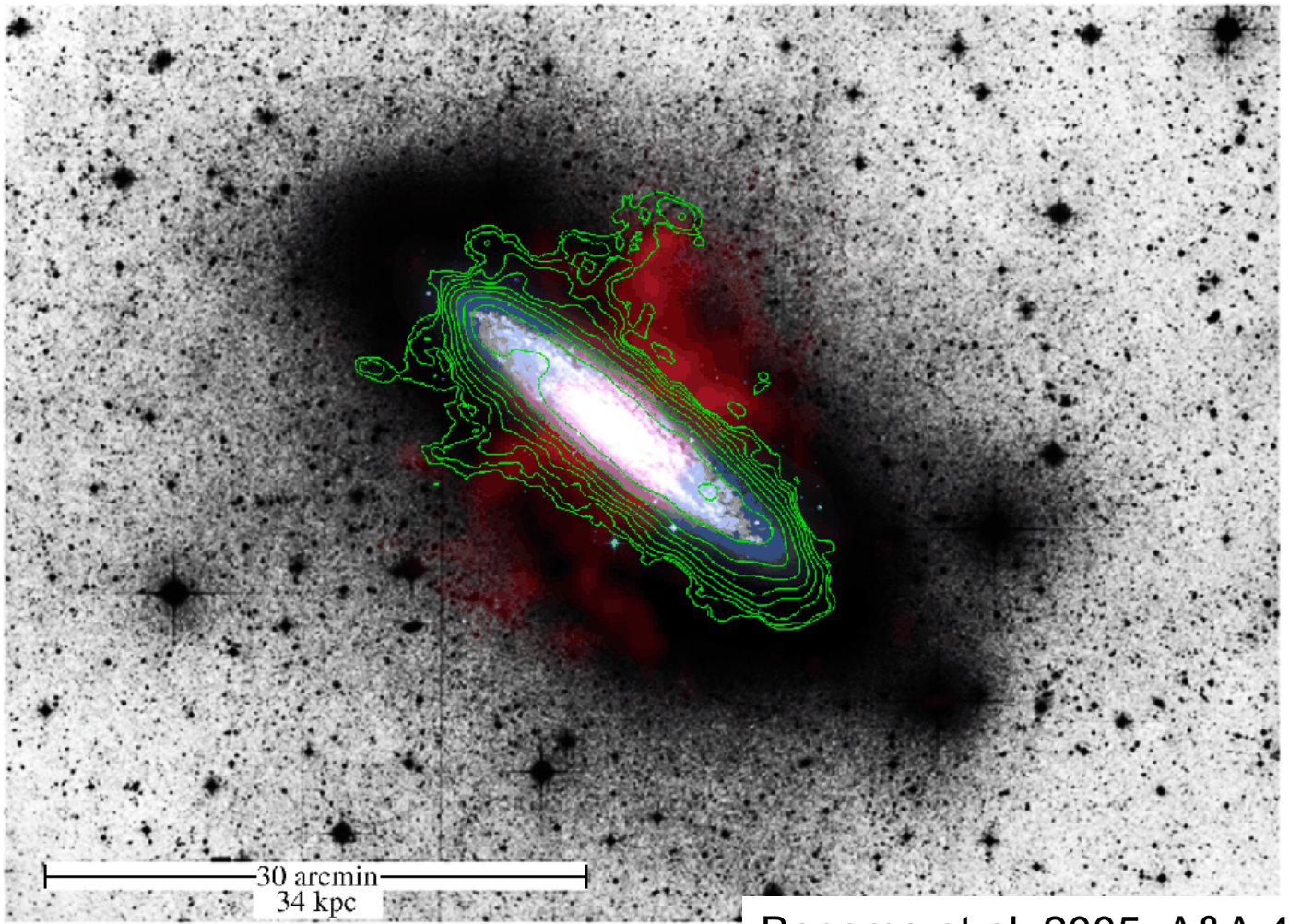
•The comparison with SSP models gives the age distribution (need TOs), the metallicity distribution (RGB & AGB), and distance of a population.

What we can do now

•High angular resolution – outside LG only from space ⇨ HST.

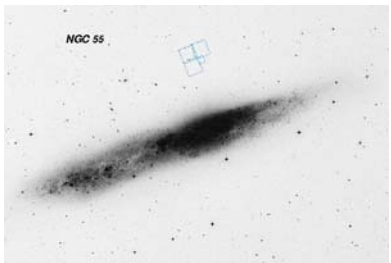
•Problem with crowding: observations confined to very low surface brightness regions ⇨ fewer sources!

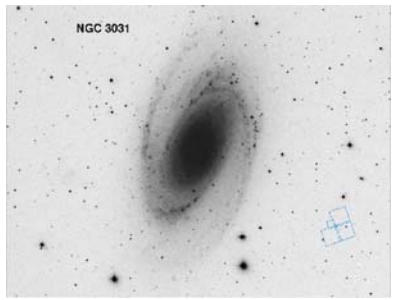
•Single stars are faint . TRGB@M_I = -4.0 Detections and CDM (I vs V-I) can be measured for stars ~ 2 mag down from the TRBG@4Mpc. At Virgo ($m_I \geq 26.86$) ~0.75 mag.. Just!

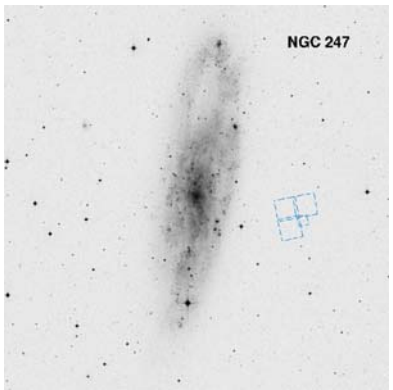


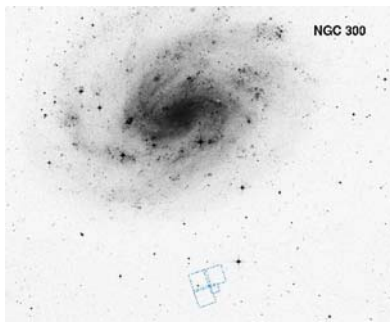
Boosma et al. 2005, A&A 431, 65

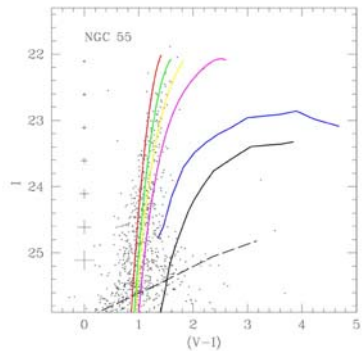
RSPs in late type halos

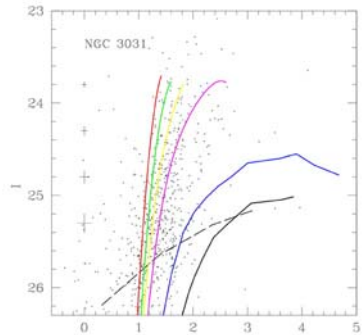


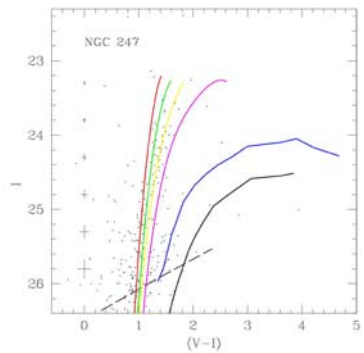


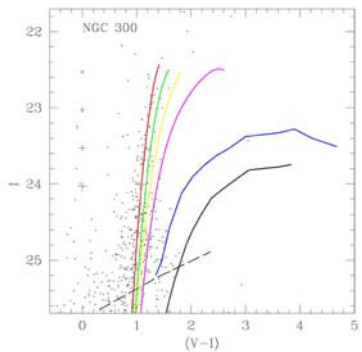




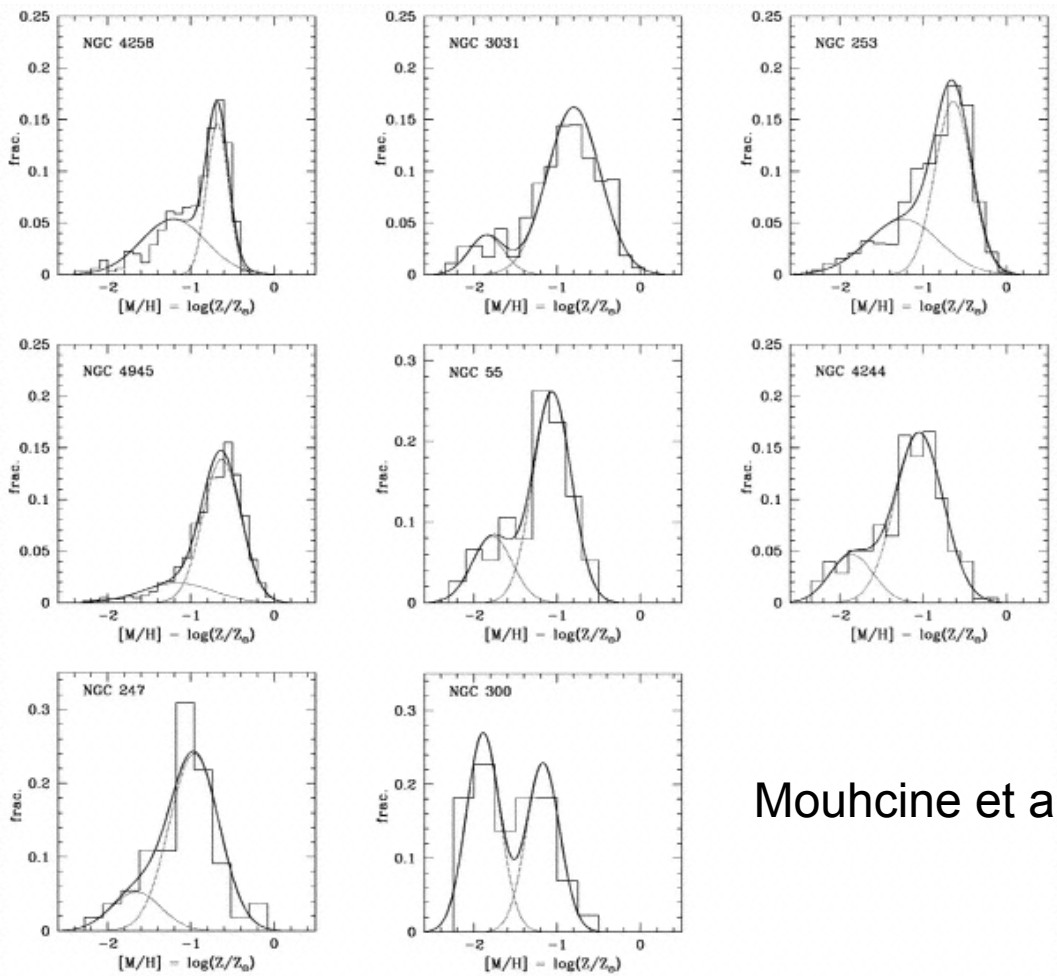








Mouhcine et al. 2005, ApJ 633, 828



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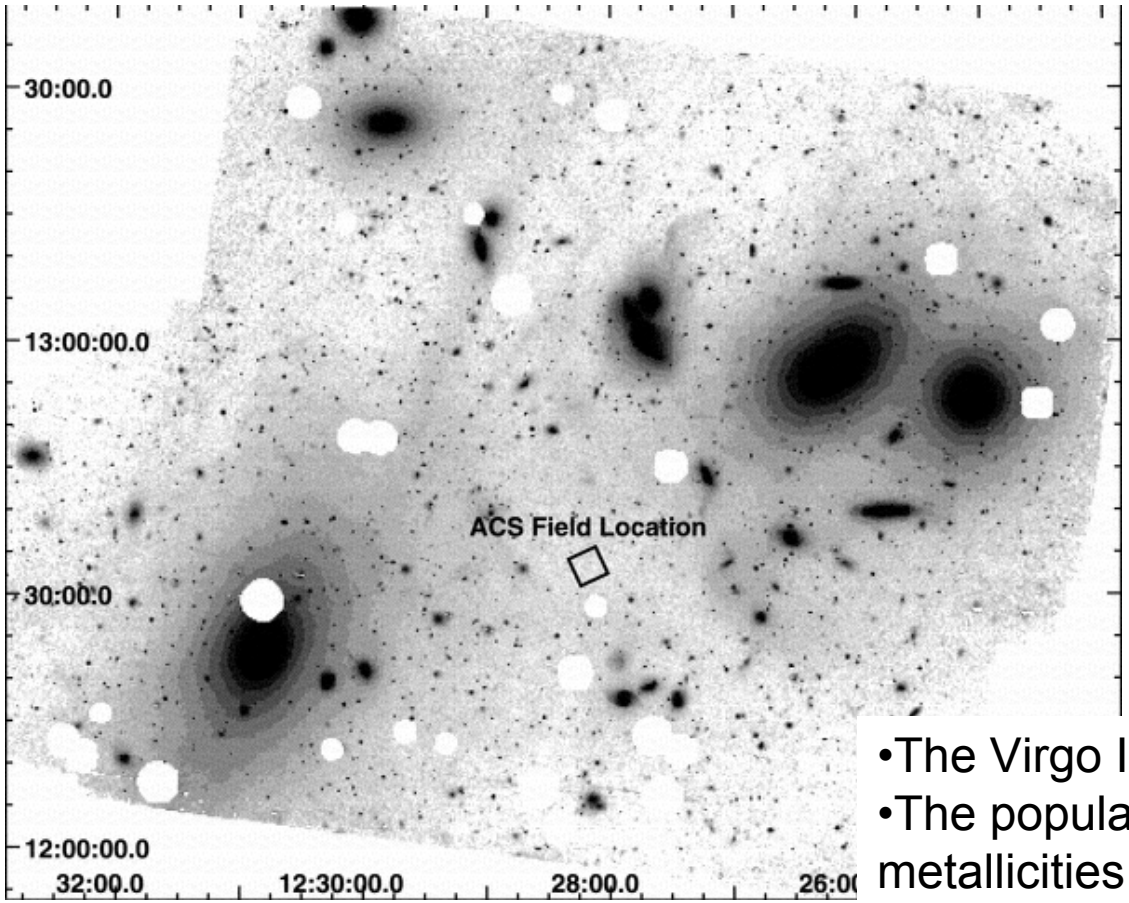
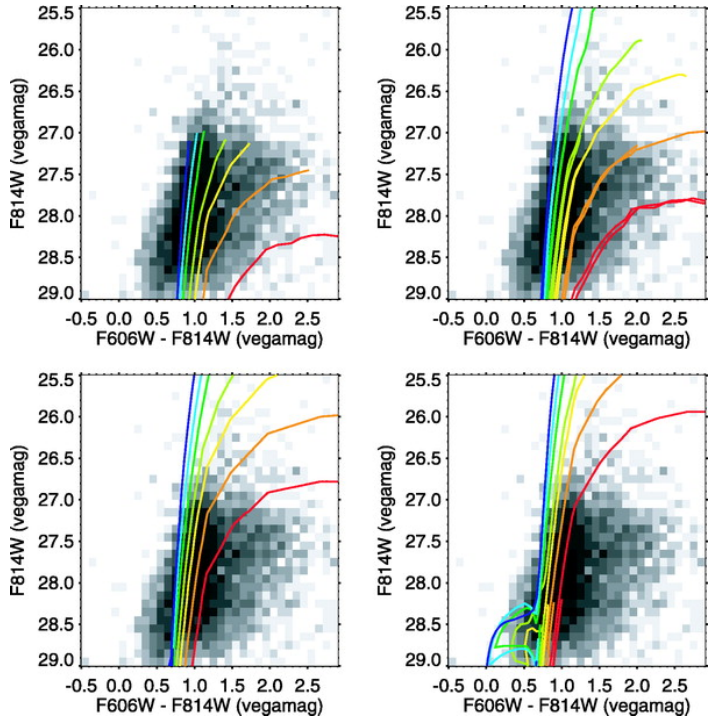
RSPs in Virgo!

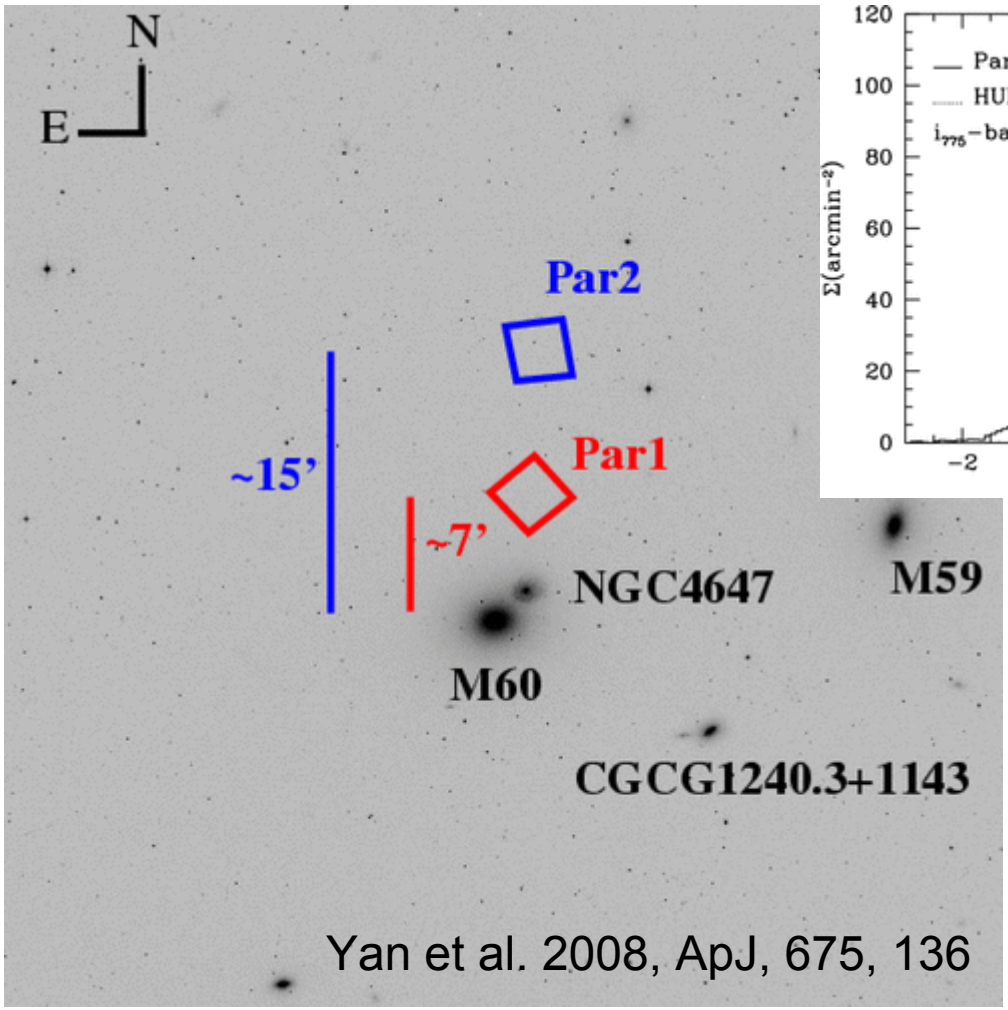




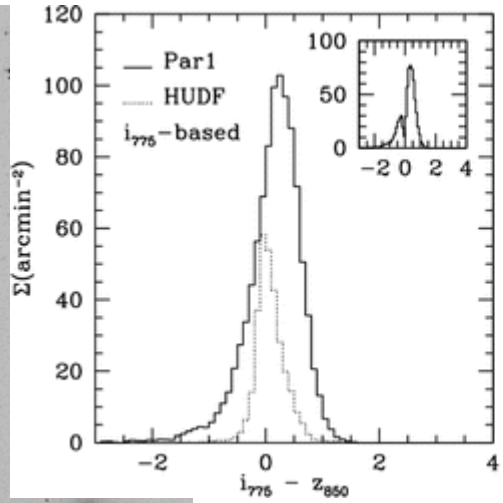
Williams et al. 2007, ApJ, 656, 756

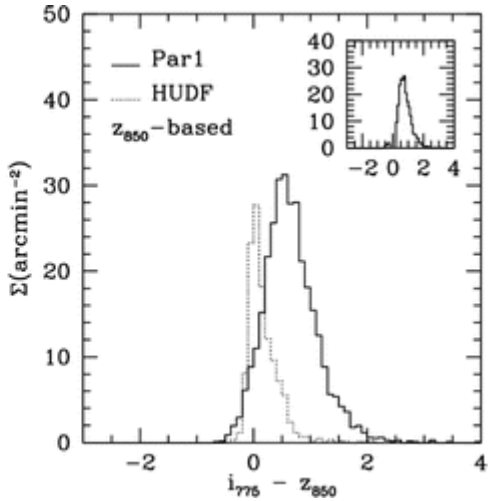
- The Virgo IC stars are mostly old (≥10 Gyr)
- The population span a wide range of metallicities (-2.3 ≤ [M/H] ≤ 0.0)
- The younger component is more metal-rich with [M/H] > -0.5.

RSPs in Virgo – cont.



Yan et al. 2008, ApJ, 675, 136





2.65 hrs in I - HST & ACS
4.28 hrs in z
2.13 hrs in J* - HST & NIC3
3.56 hrs in H*
Only 2 sub-regions in Par1.

DRM for RSPs in the Virgo cluster

- 2’ diameter field in the halo of M87, $\mu_V \approx 27$ mag/□”, with 3 NGS (Jmag = 13). Photometry is not so affected by crowding.
- Tip of the RGBs at $m_J=26.5$. Stars have NIR J-H = 0.
- Deep image with 50% completeness at $m_K=28.2$, then we expect about 1400 RGBs.
- Current observations with MAD are complete to $m_K=21$ for 700 sec tot integration. To reach the tip of RGBS needs to integrate ~ 20 hrs in J and K …

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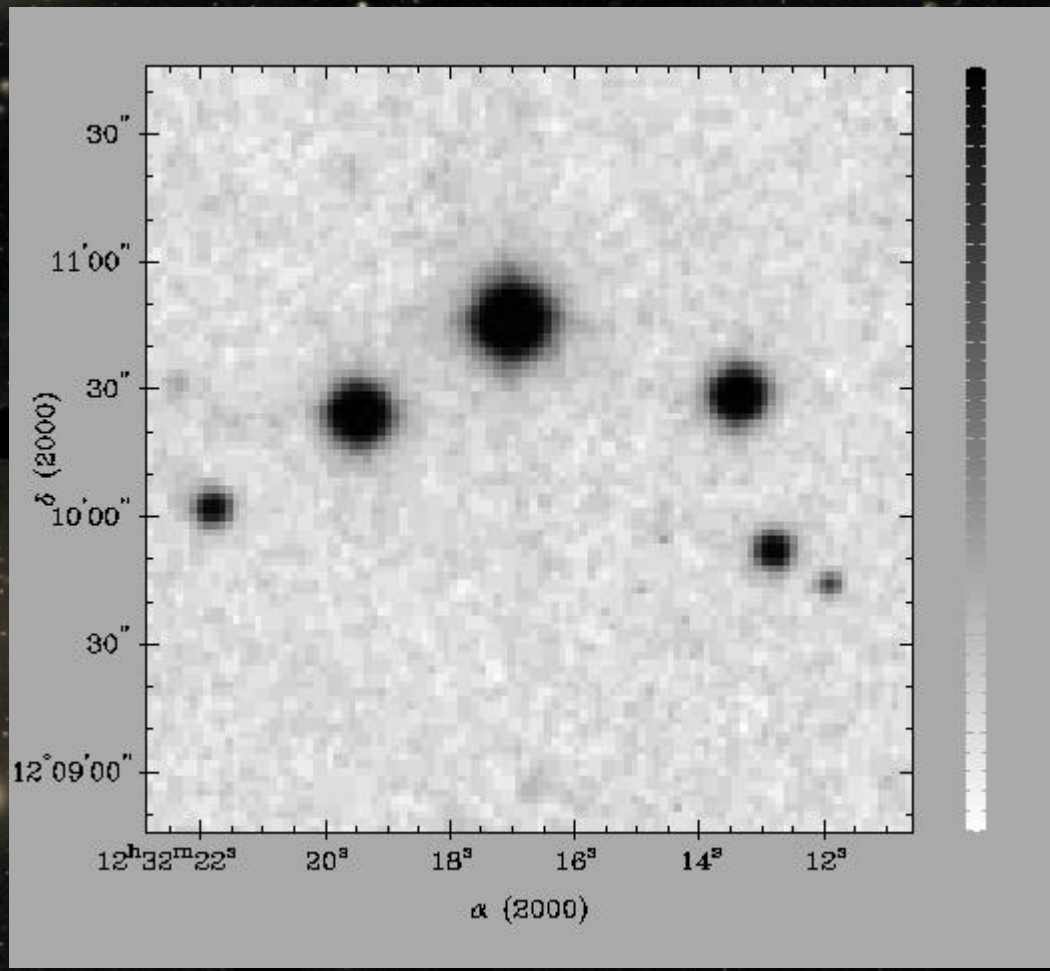

Mihos et al. 2005, ApJL, 631, L41 & ESO PR19/20

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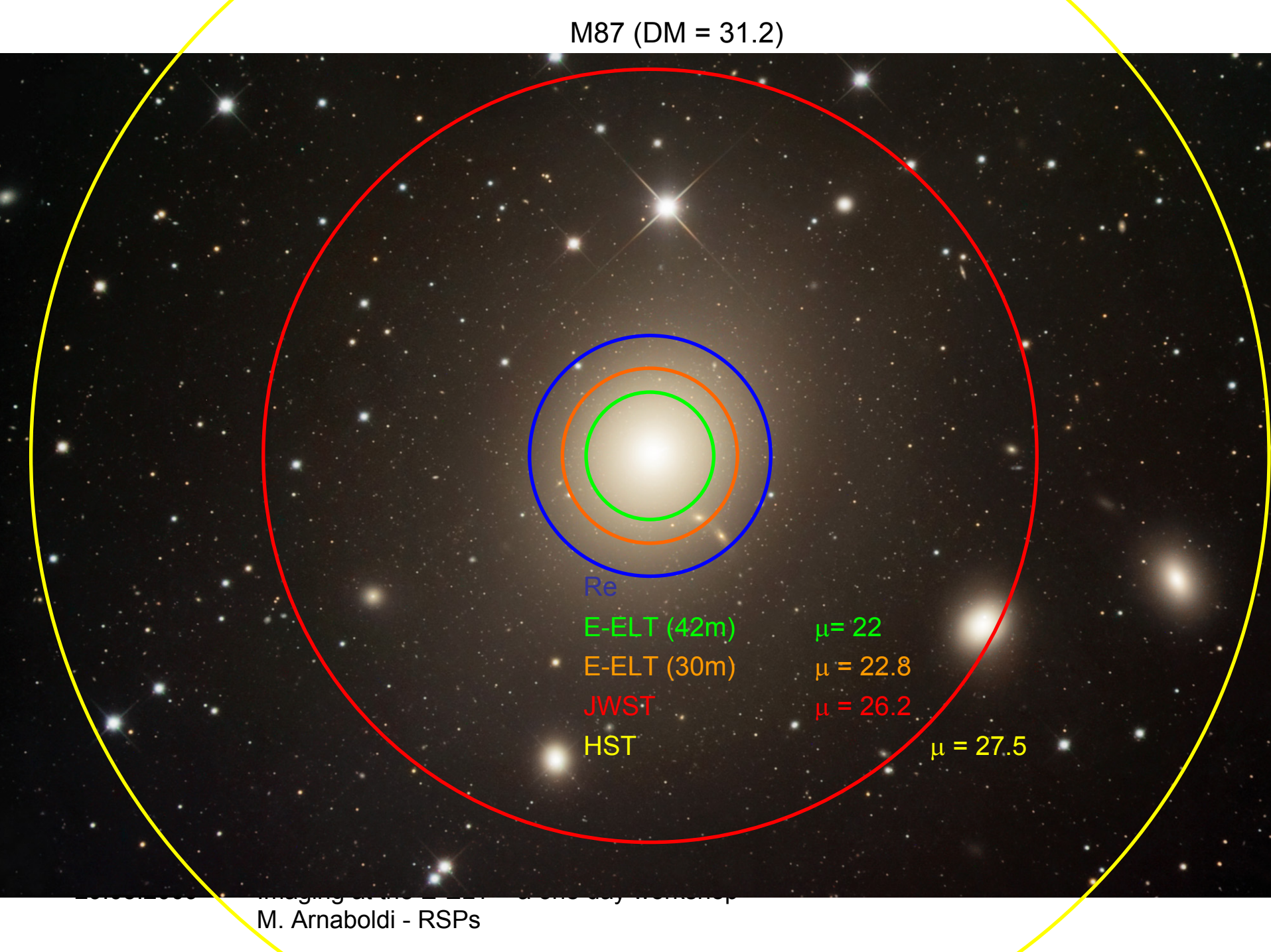
RSPs : developments with the E-ELT

- **From the ground** : the collecting power of a 42 meter telescope + high angular resolution from AO allow photometry + spectroscopy.
- The RSPs in the low surface brightness regions can be detected in GLAO+AO moderately corrected images, in few □' FoV.
- **Address problem of crowding with AO** – extend RSP observations to the inner bright optical regions of Es!
- **Move to CMD in the NIR** - support from theoretical models.
- **Spectroscopy of single RGBs**


M87 (DM = 31.2)
Re
E-ELT (42m)
μ= 22
E-ELT (30m)
μ = 22.8
JWST
μ = 26.2
HST
μ = 27.5

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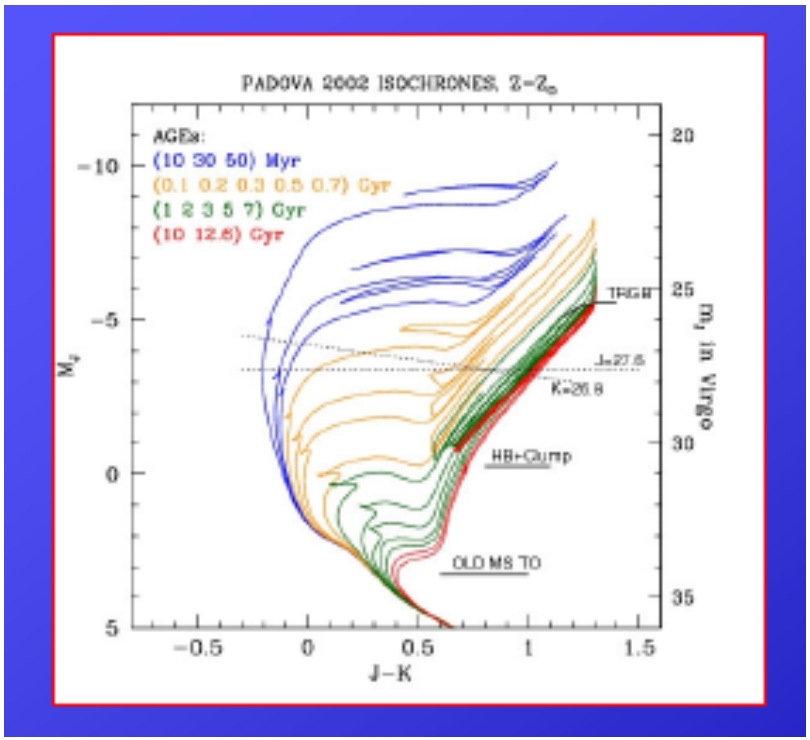
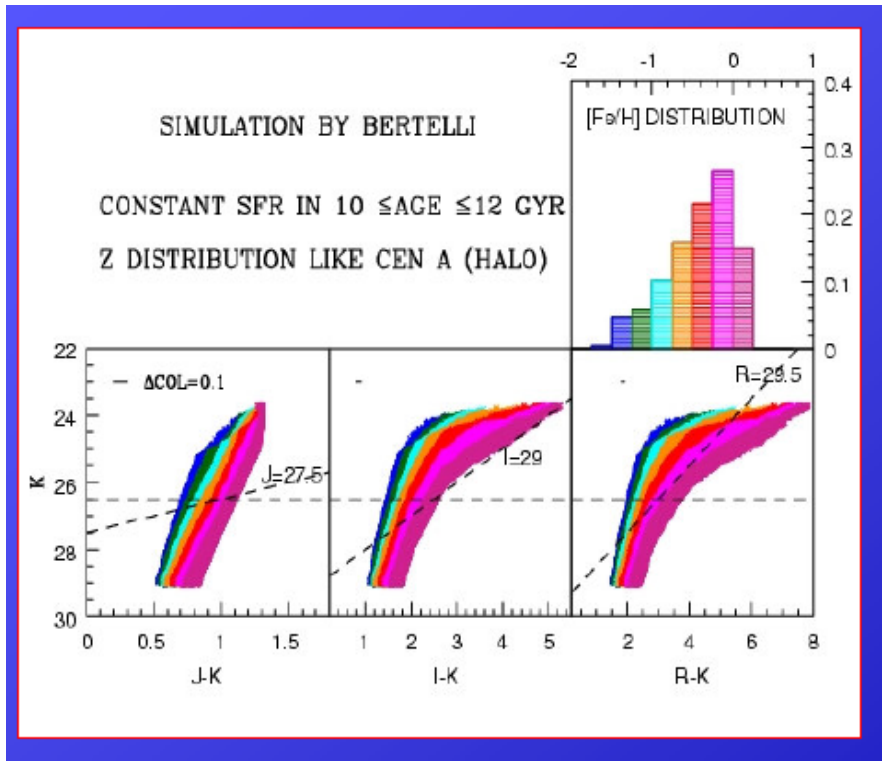
RSPs and the E-ELT





From E.Held - DRM workshop 08 – J-K color may be best for RSP studies in Virgo. Largest color baseline gives better resolving power for Z distribution

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