A crucial test in stellar halo physics: 
star counting versus integrated photometry techniques

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Motivation

Star Counting with HST
\( D \leq 16 \) Mpc
(Zackrisson et al. 2012)

Are they in agreement?

Integrated photometry
\( D \gtrsim 150 \) Mpc
(Trujillo & Fliri 2016)
Ultra deep imaging with WHT

William Herschel Telescope (4 m)  
La Palma  
+  
PAUCAM Camera

SDSS Filters

g ~ 4.8 h  
r ~ 3.1 h  
i ~ 4.4 h

RAW data

18 CCDs  
4 Channels/CCD  
FOV ~ 1 degree
NGC4565 color image

Limiting magnitudes

3-sigma 10”x10” arcsec$^2$ boxes

g ~ 30.5 mag/arcsec$^2$

r ~ 29.9 mag/arcsec$^2$

i ~ 29.3 mag/arcsec$^2$

1-sigma 30”x30” arcsec$^2$ boxes

g ~ 32.9 mag/arcsec$^2$

r ~ 32.3 mag/arcsec$^2$

i ~ 31.7 mag/arcsec$^2$
NGC4565 color image (g+r+i)

Scatter light field (stars g-mag < 16 mag)
Modeling NGC4565 (r-band)

Major axis profile: NGC 4565

Model conv. PSF
Bulge conv. PSF
bar conv. PSF
Disc conv. PSF
Halo conv. PSF
Deconvolved models
Observed galaxy

Observed
PSF-Deconvolved

Radburn-Smith et al. (2013)
We found a young (ages between 100 and 400 Myr) and metal poor structure ([M/H] between -1.71 and -0.4).

Radburn-Smith et al. (2013) found similar values: age < 600 Myr and [M/H] ~ -1.
For the halo region we found ages between 2.0 and 10.0 Gyr, and metallicities $[\text{M}/\text{H}]$ between -1.31 and -0.71.

Monachesi et al. (2016) obtained age $\sim 10$ Gyr and $[\text{M}/\text{H}] \sim -1.2$ using star counting techniques.
Conclusions

• With these preliminary results we can say that counting star and deep integrated photometry techniques are in agreement.

• This allows us to use integrated photometry where star counting technique is unfeasible.