

# WFCAM survey of Local Group galaxies



Mike Irwin



using WFCAM to probe the near-infrared  
properties of Local Group galaxies

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# THE LOCAL GROUP

Mass  
Length  
Time

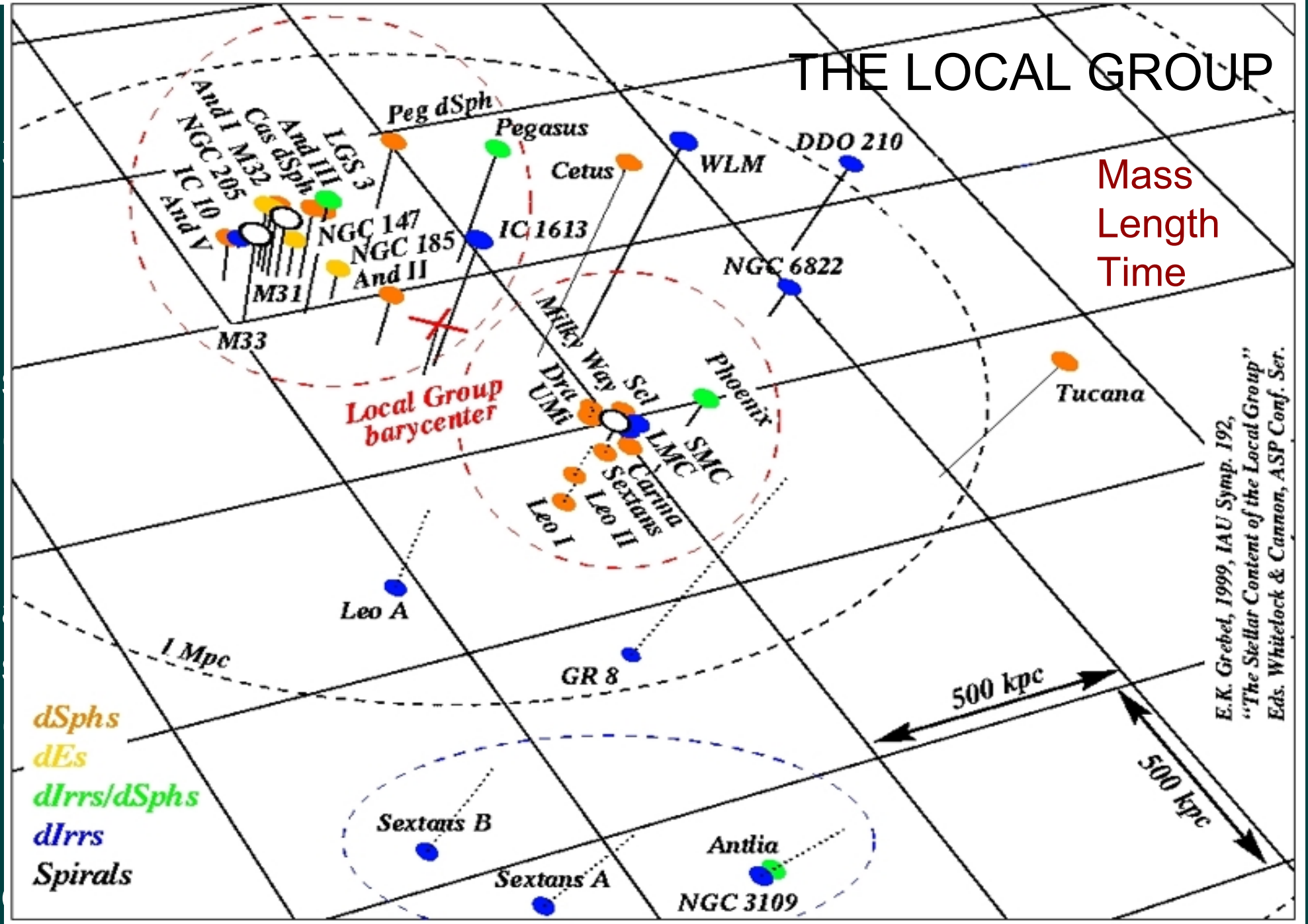
Local Group  
barycenter

1 Mpc

500 kpc

500 kpc

- dSphs
- dEs
- dIrrs/dSphs
- dIrrs
- Spirals



E.K. Grebel, 1999, IAU Symp. 192,  
"The Stellar Content of the Local Group"  
Eds. Whitlock & Cannon, ASP Conf. Ser.

## WFCAM LG JHK data

M31, M33, N205, M32

N147, N185, N6822

SextansA,B, LeoA, WLM

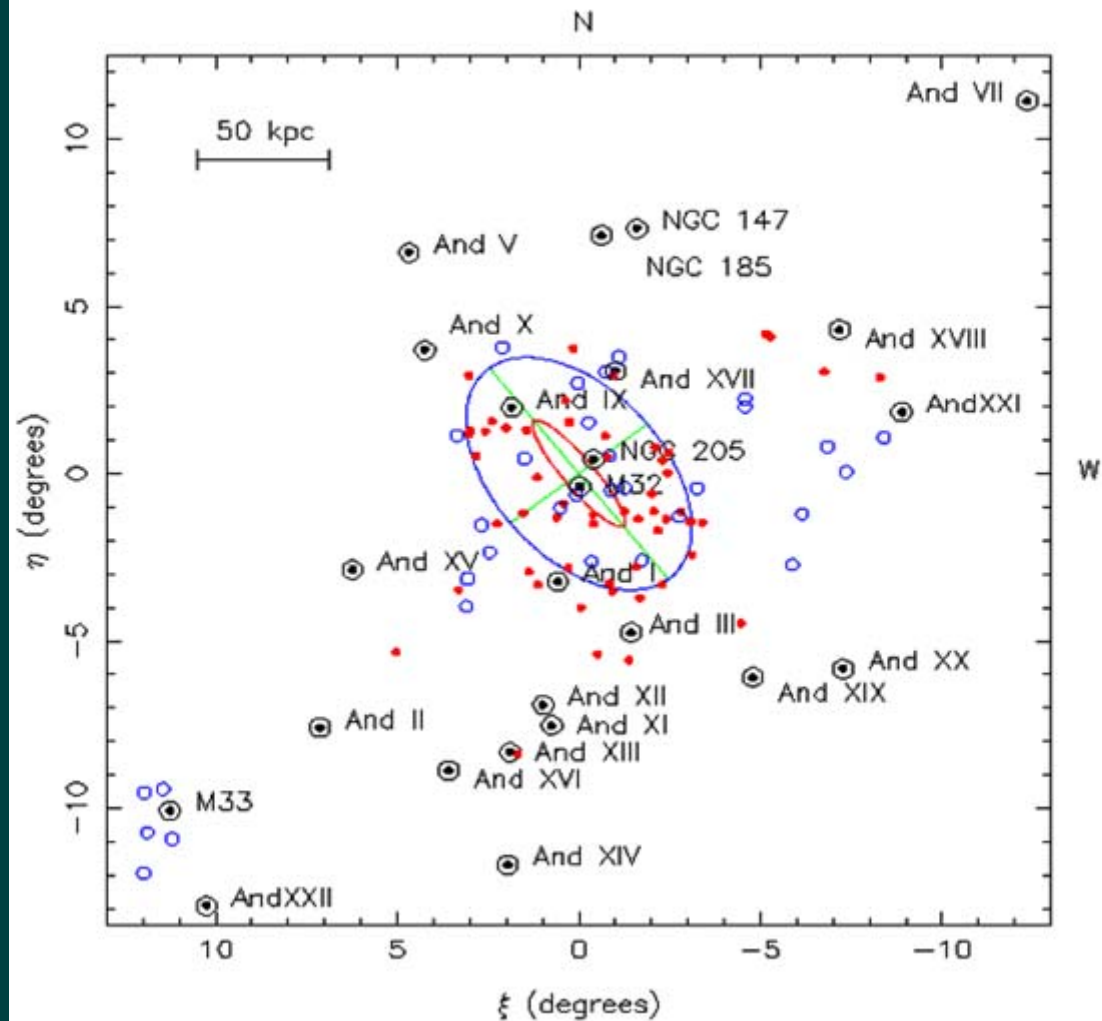
IC1613, IC10, Pegasus

Cetus, Aqu, LGS3

And:I,II,III,VI,VII,IX,X

XIV,XV,XVI,XVII

XVIII,XIX,XX

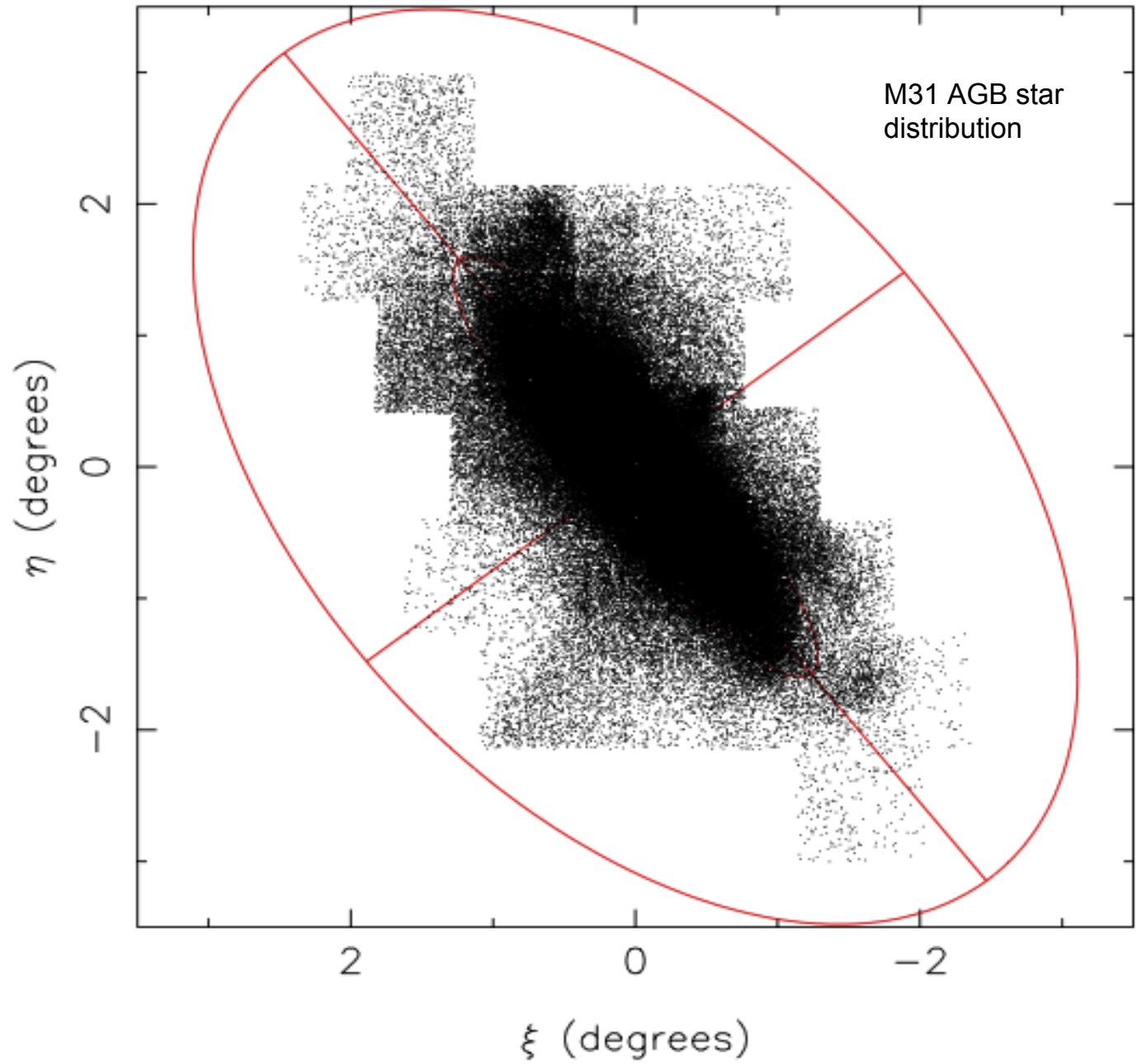
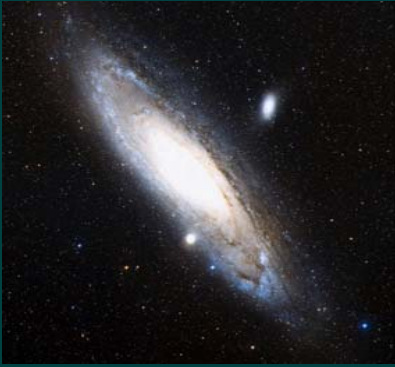


- benefits of NIR imaging of LG galaxies:
  - penetrates regions affected by dust extinction
  - easier to analyse nuclear regions
  - leverage on age-metallicity-extinction degeneracy
  - sensitivity to AGB population types
  - accurate global astrometric and photometric calibration
  - good discrimination against foreground dwarfs stars
  - and background compact galaxies (seeing/colour)
- drawbacks of NIR surveying:
  - interesting detector characteristics
  - complexity of data processing
  - insensitivity to young MS/old MS stellar populations

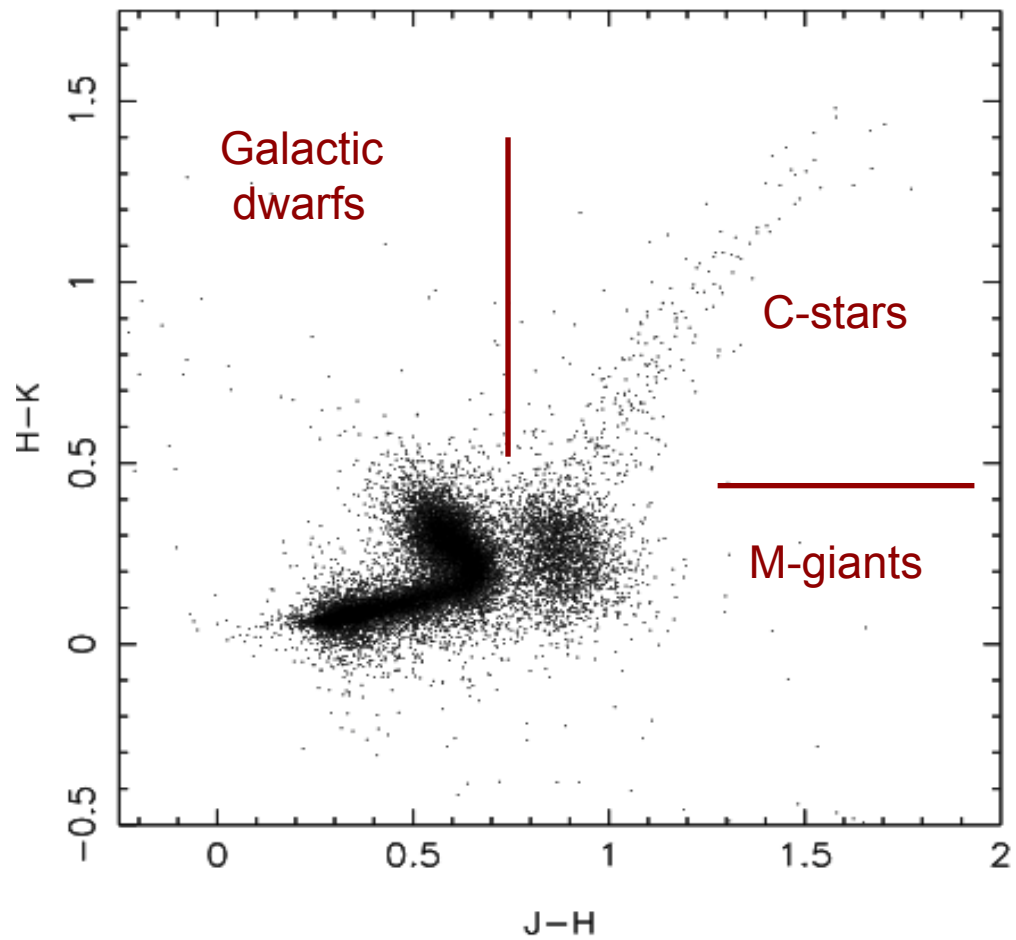
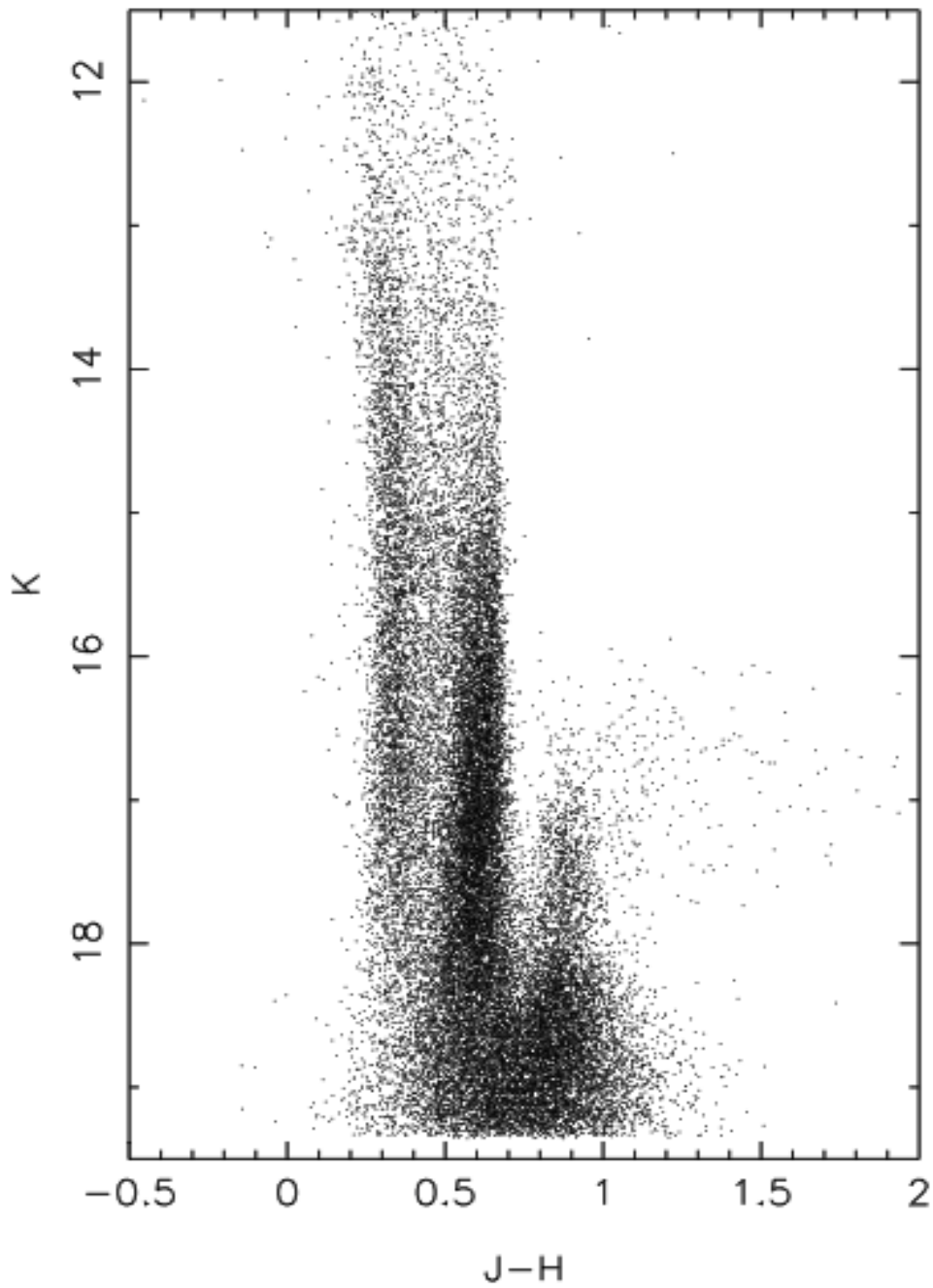
# Some LG science using WFCAM data

- northern MW satellites using UKIDSS LAS + PI data - Teff, logg for HR abundance determination (DART)
- tracing M33, WLM, IC1613, N6822 metallicity/age distributions - MRC + students (Herts)
- age/metallicities of M31 GC population - AH (Bristol)
- NIR/optical properties of dEs N148, N185 - NN (IfA)
- extinction mapping of M31 and M33 - MI (IoA)
- M31/M33 luminosity profiles and extent - AF (IfA)
- NIR properties of M32, N205 - MI/AF + students
- interpreting deep Keck spectroscopy of M31 disk populations - SC/RI + students (IoA/Strasbourg)

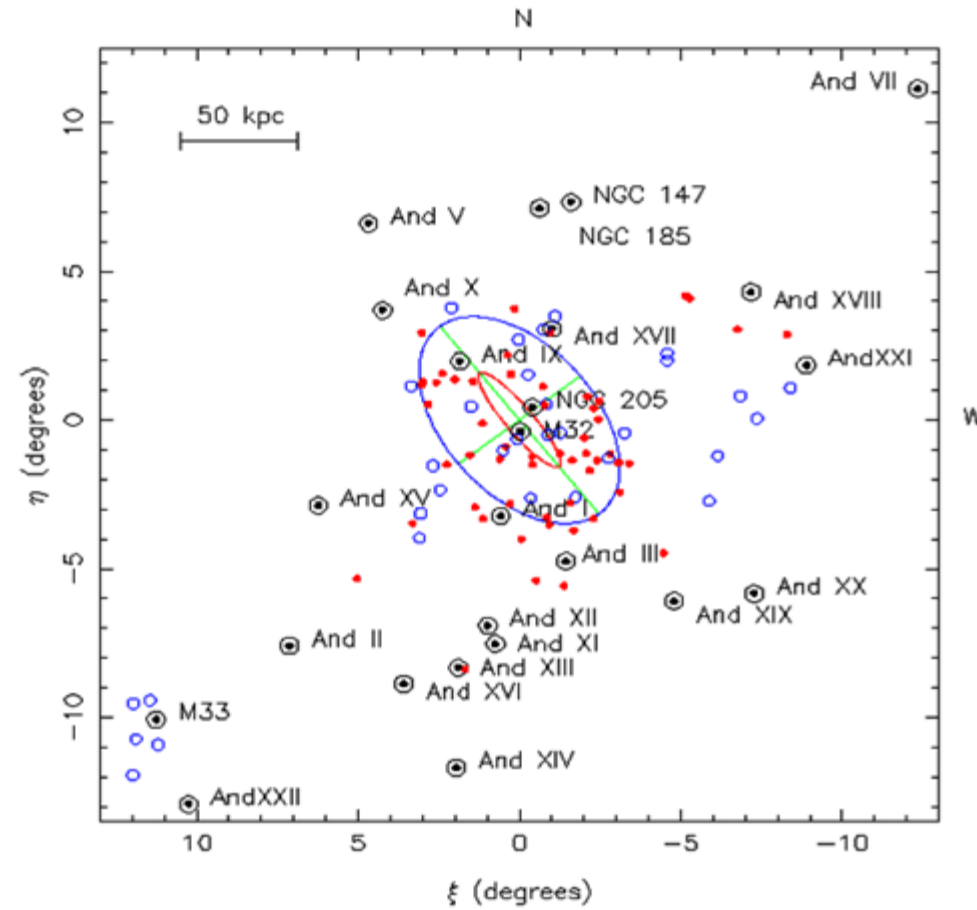
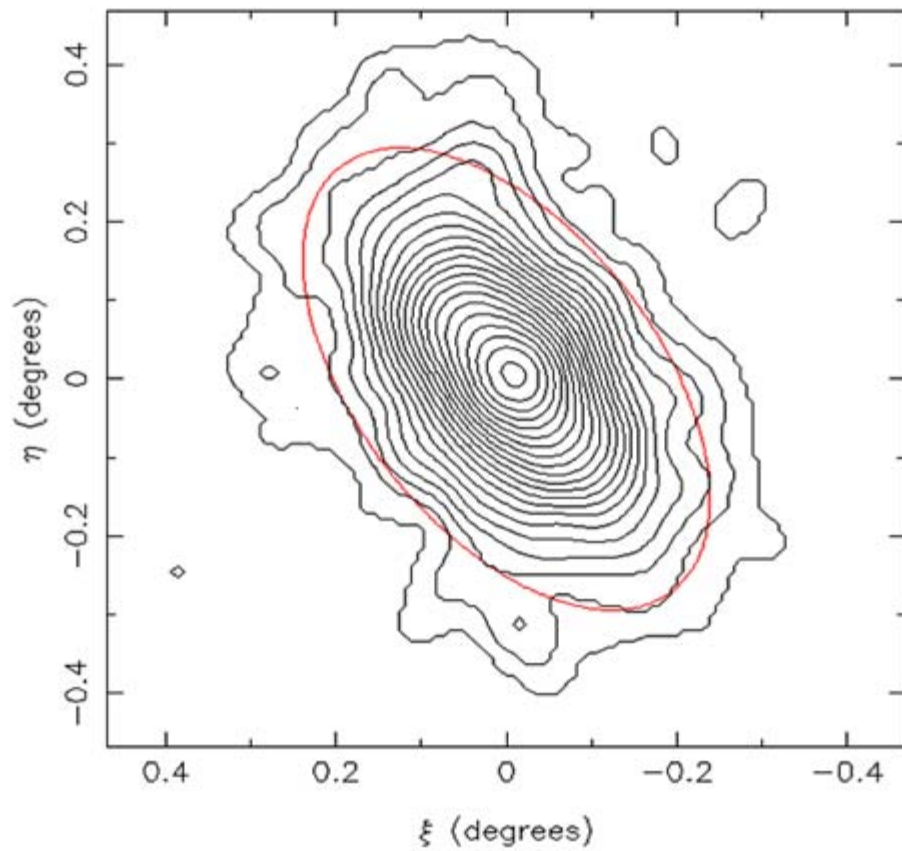
WFCAM  
M31  
survey



N147

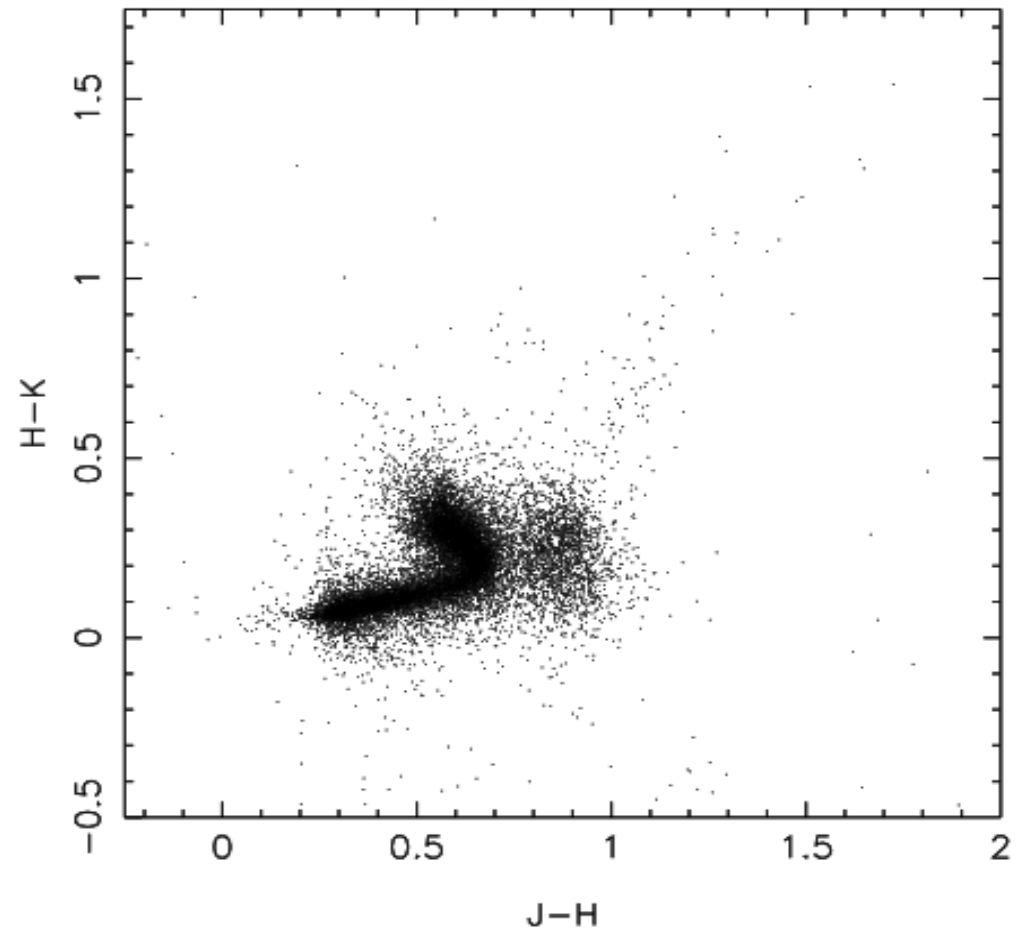
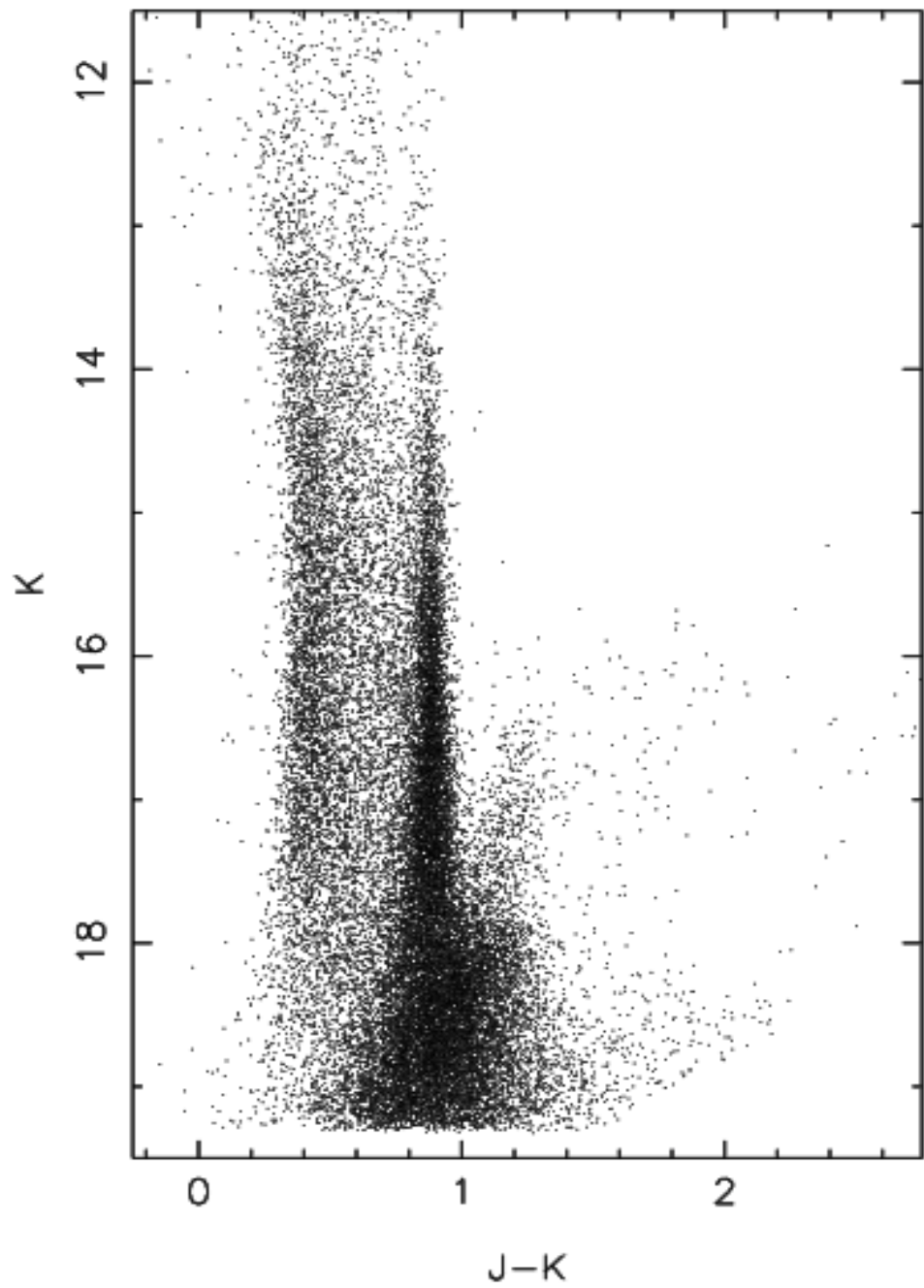


N147  $l, b = 119.8, -14.3$

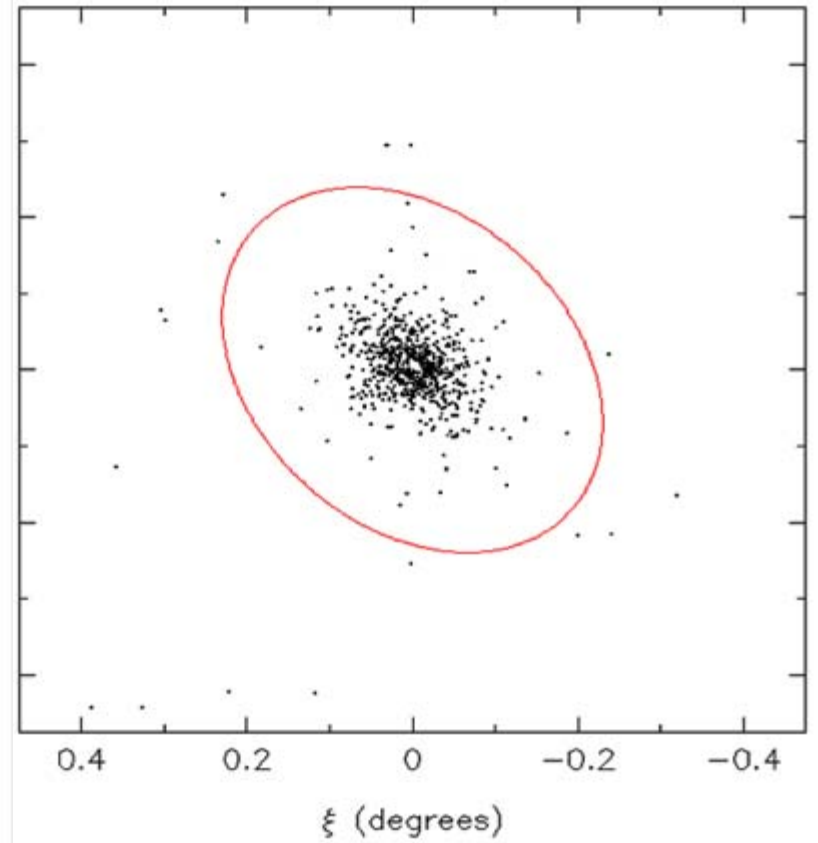
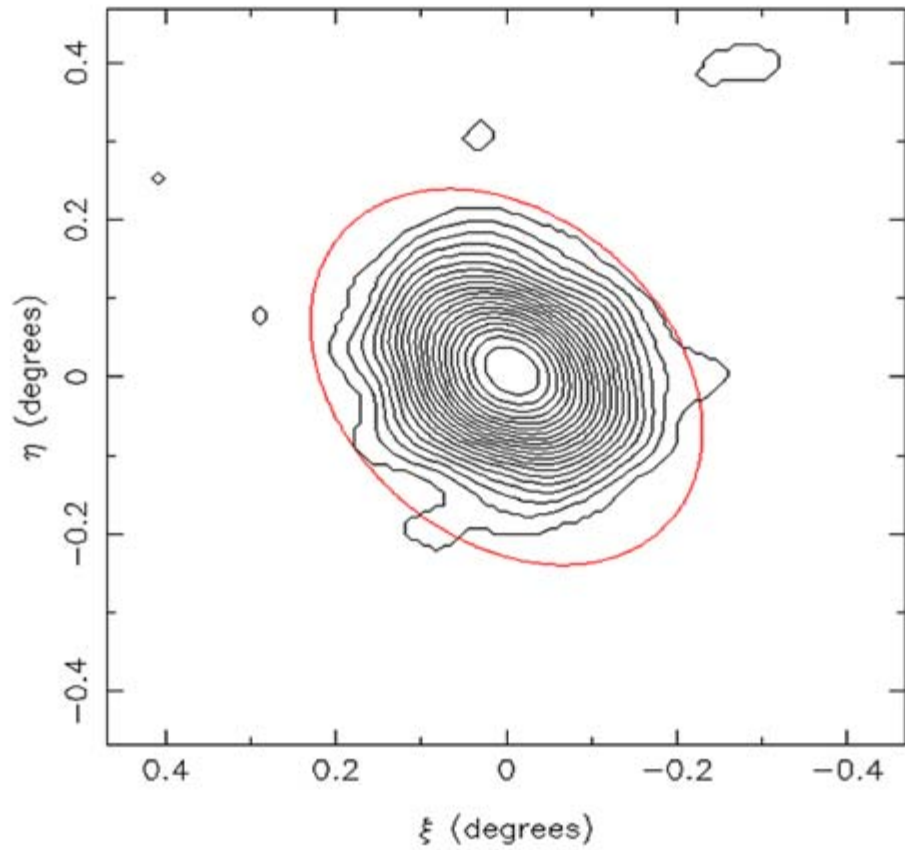




N185

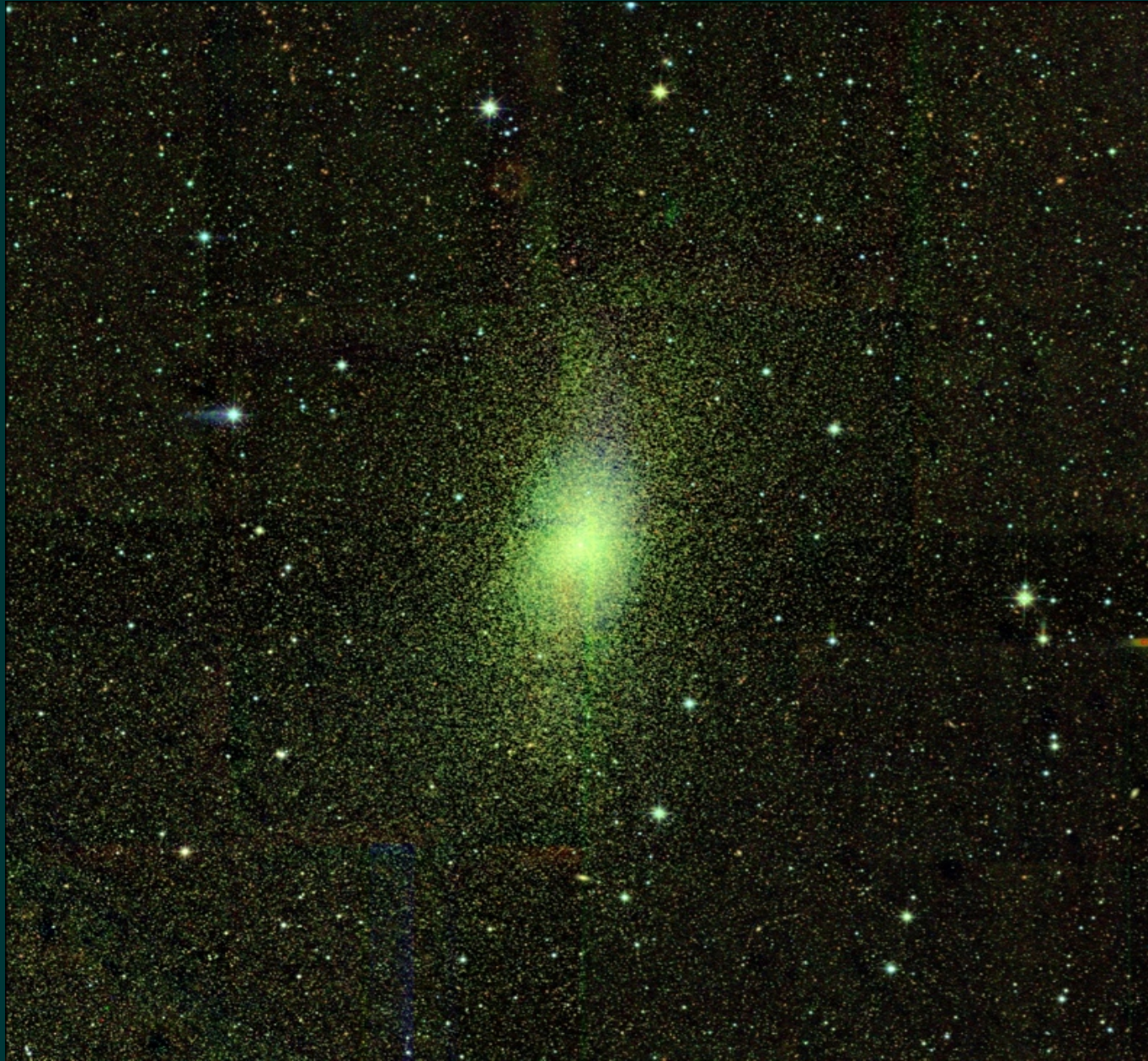


N185  $l, b = 120.8, -14.5$

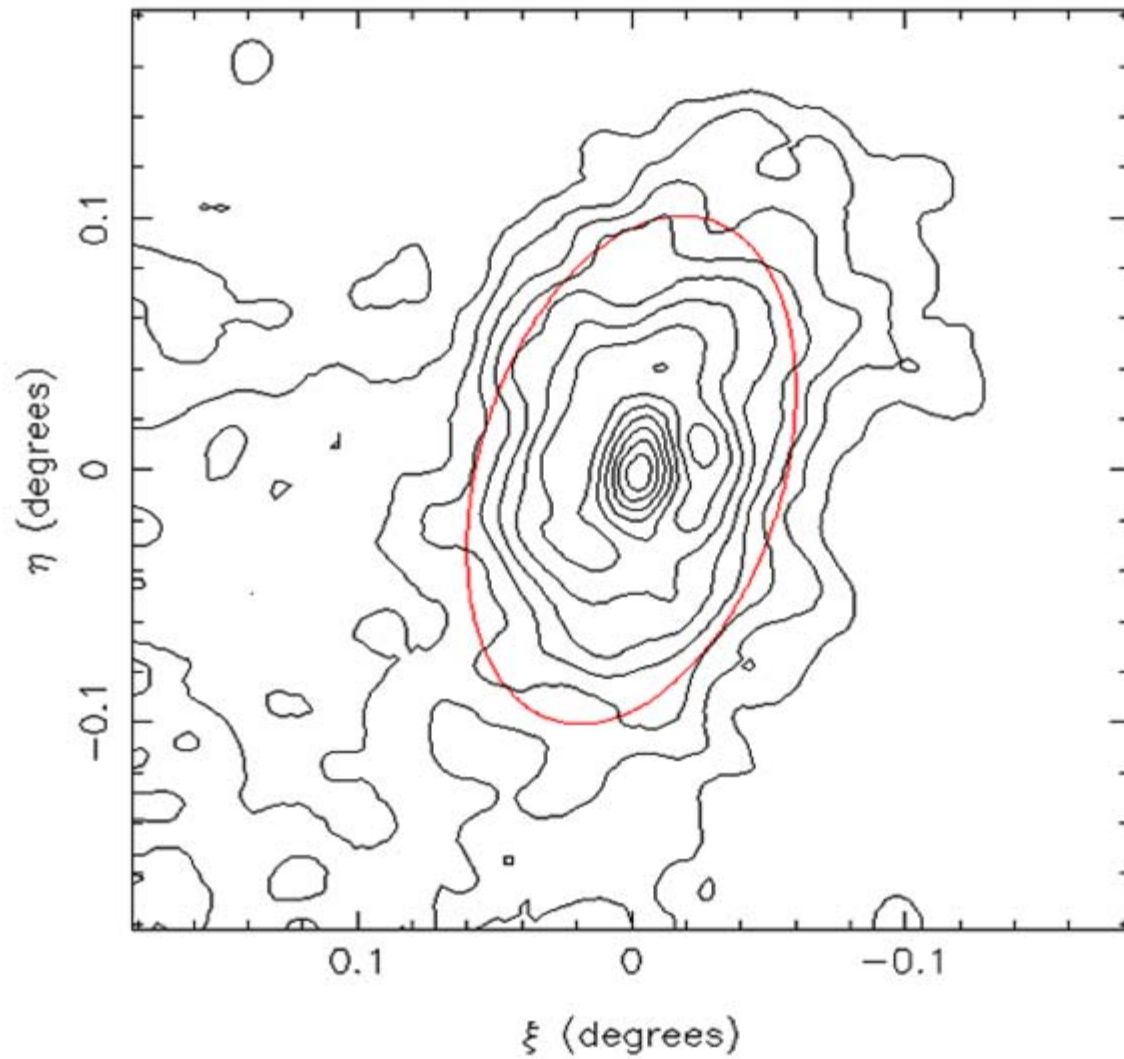


# N205 - JHK extracted from M31 survey

20'

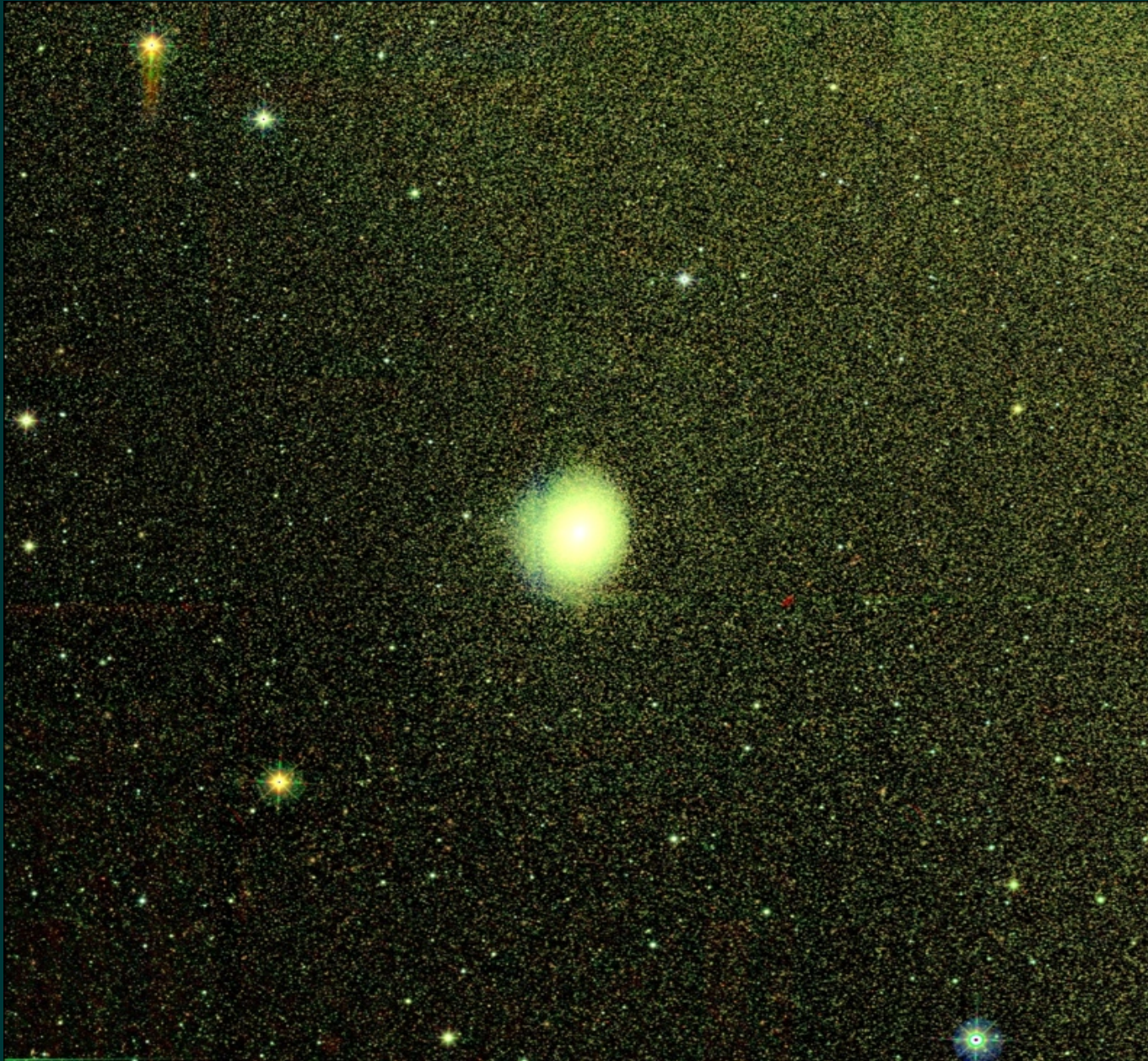


## N205 AGB star distribution

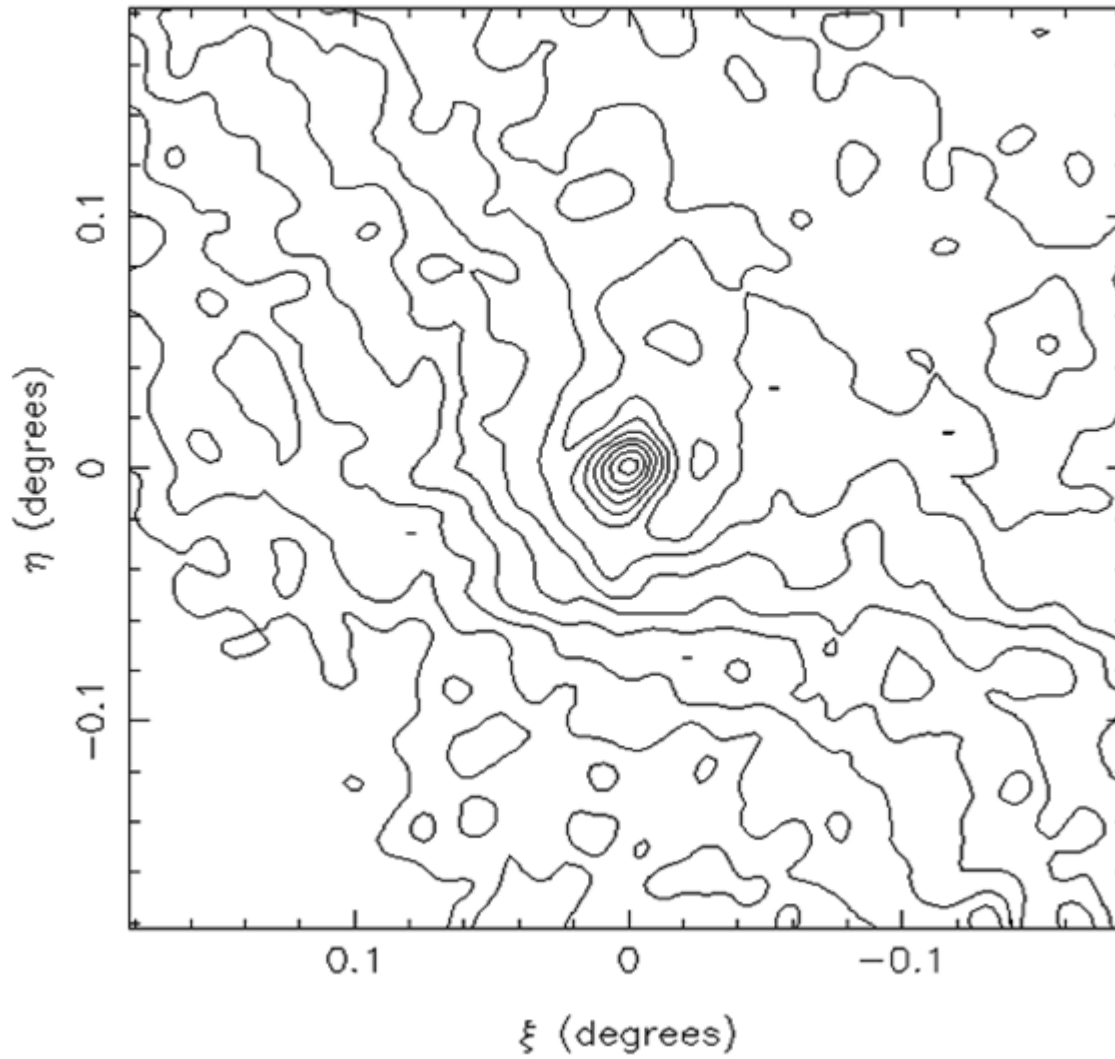


# M32 - JHK extracted from M31 survey

20'



## M32 AGB distribution



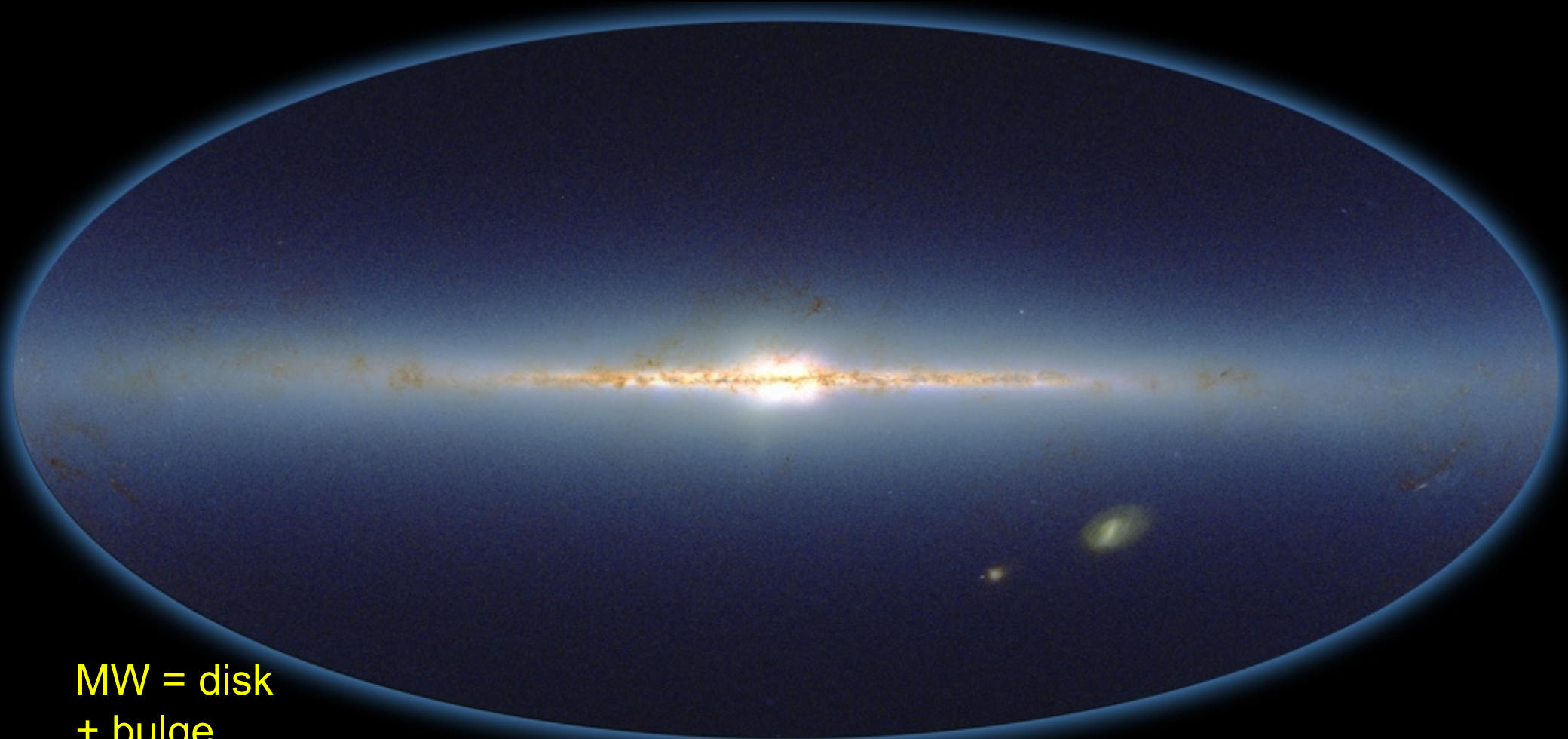
# Summary

- WFCAM well-matched to LG galaxy surveys
  - accurate calibration crucial and feasible
  - depth (K  $\rightarrow$  19.2 in 300s) tile area ( $\sim$ 1 sq deg)
- WFCAM J,H,K combined with optical enables:
  - galaxy AGB population studies
  - better age/metallicity discrimination for RGB
  - and LG globular cluster systems
  - detailed extinction mapping of MW, M31, M33
  - and much more .....





# NIR view of the Milky Way



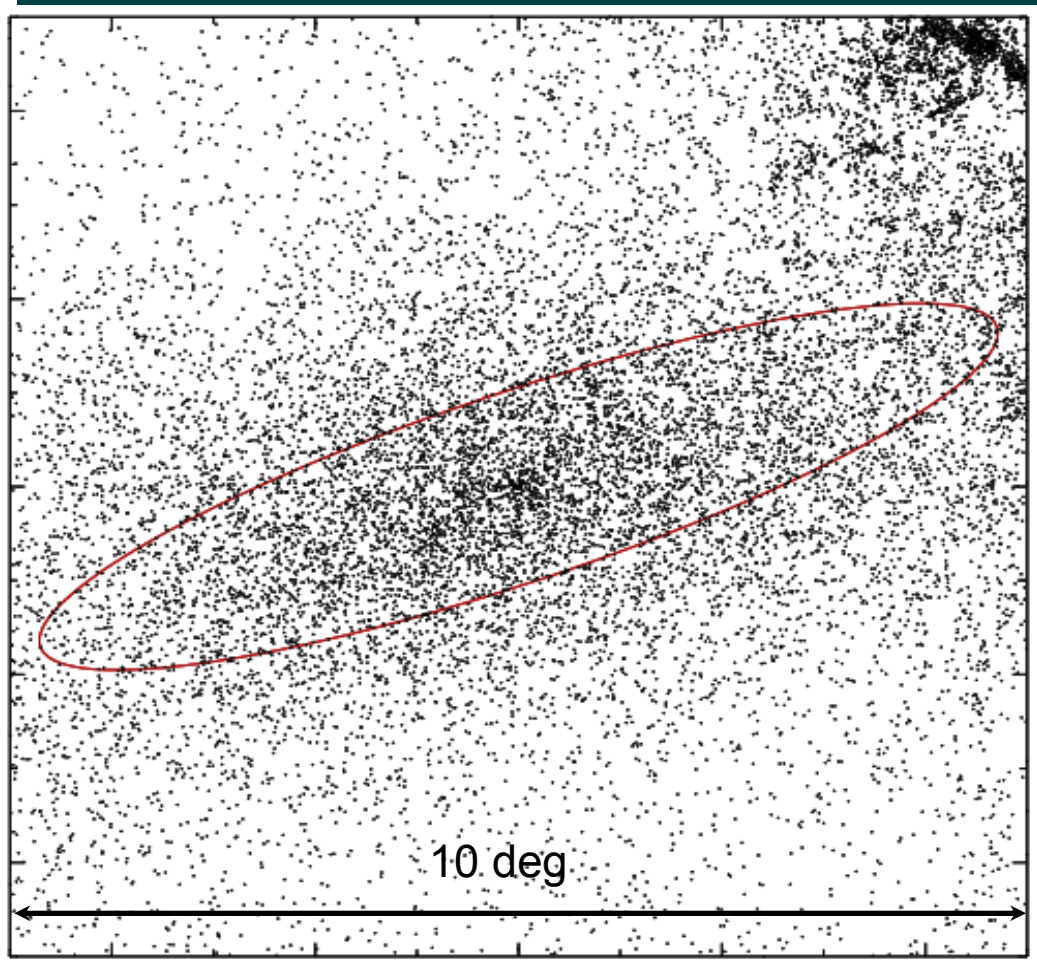
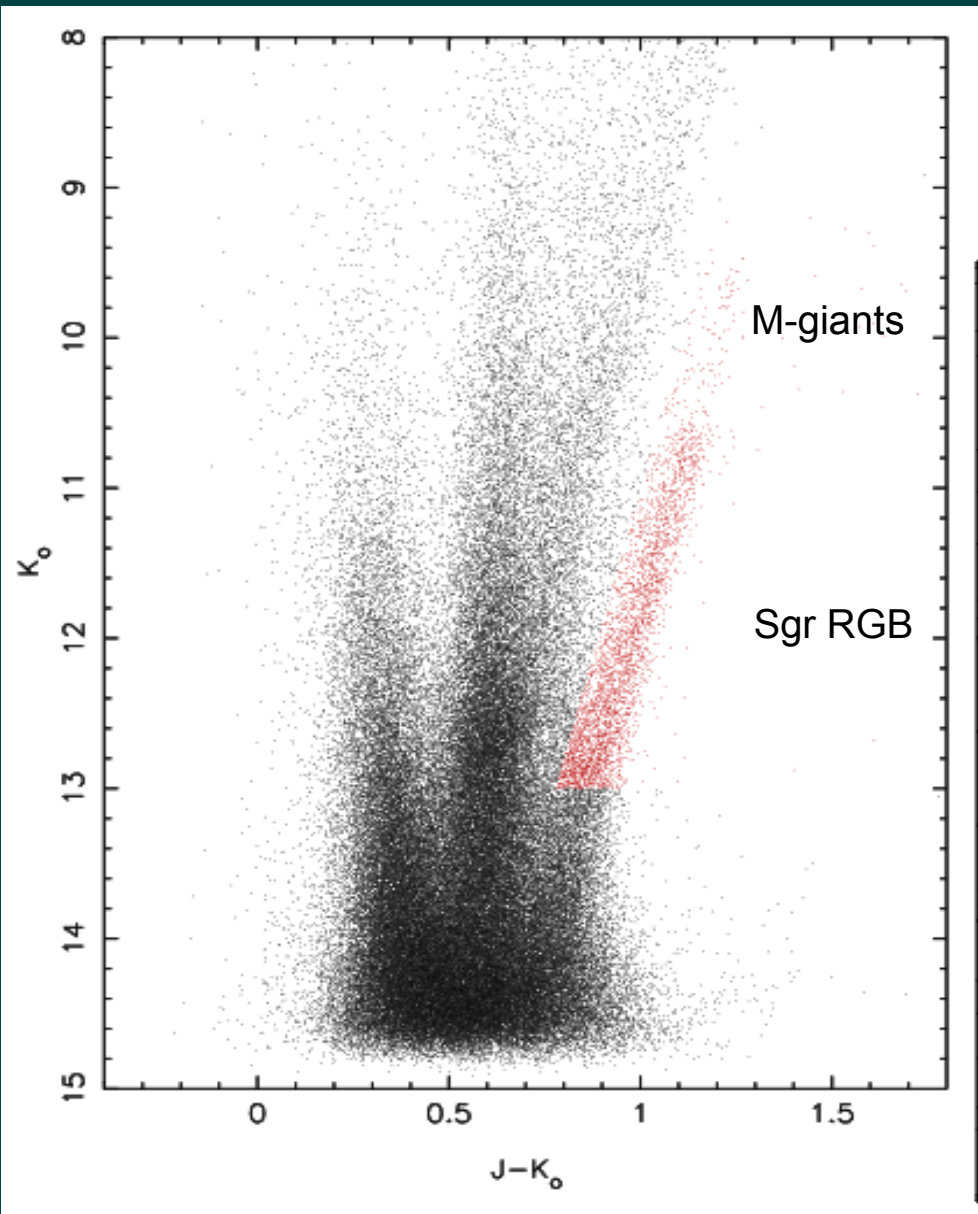
MW = disk  
+ bulge  
+ halo  
+ satellites



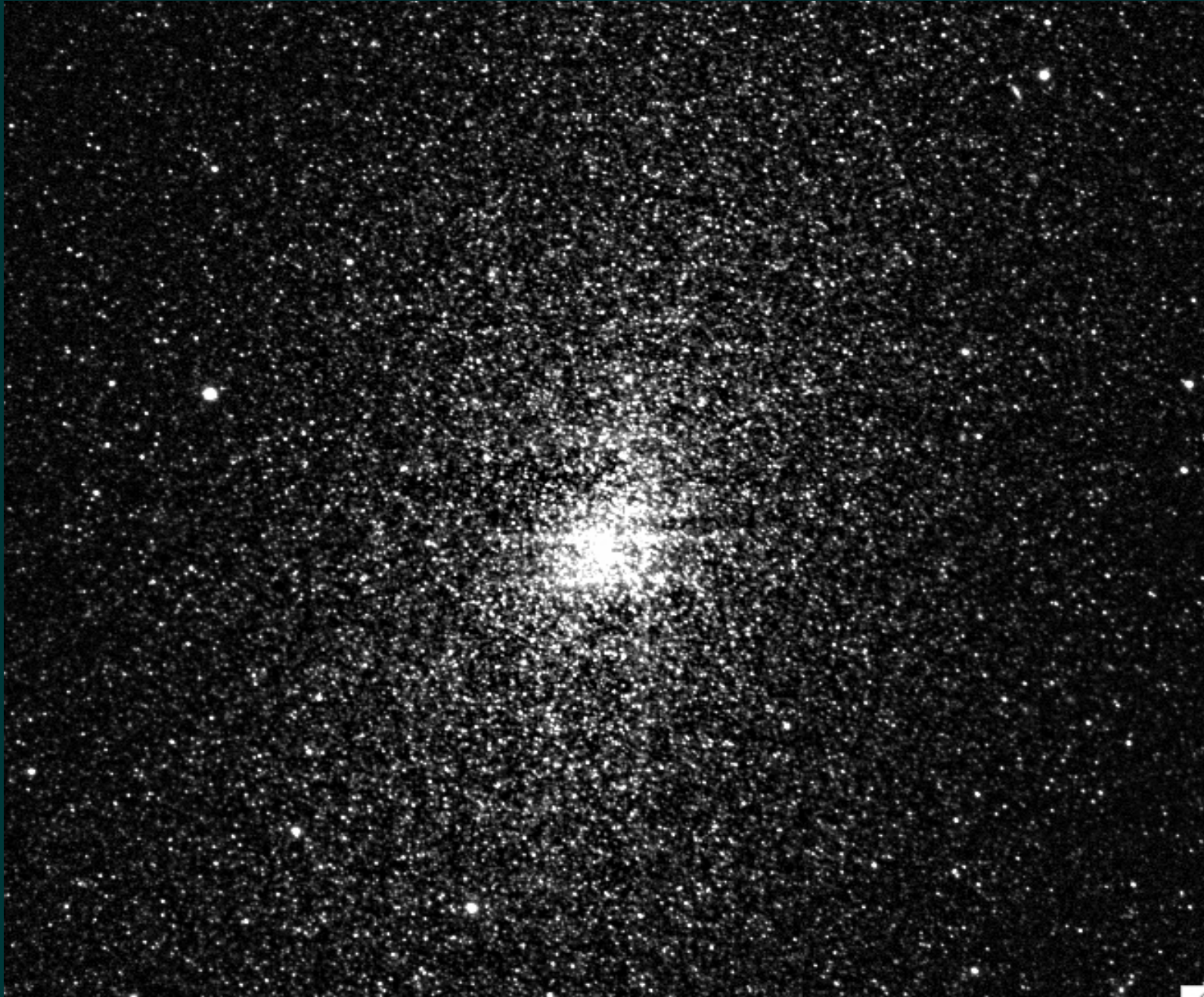
**The Two Micron All Sky Survey**

Infrared Processing and Analysis Center/Caltech & Univ. of Massachusetts

# 2MASS and Sgr dwarf

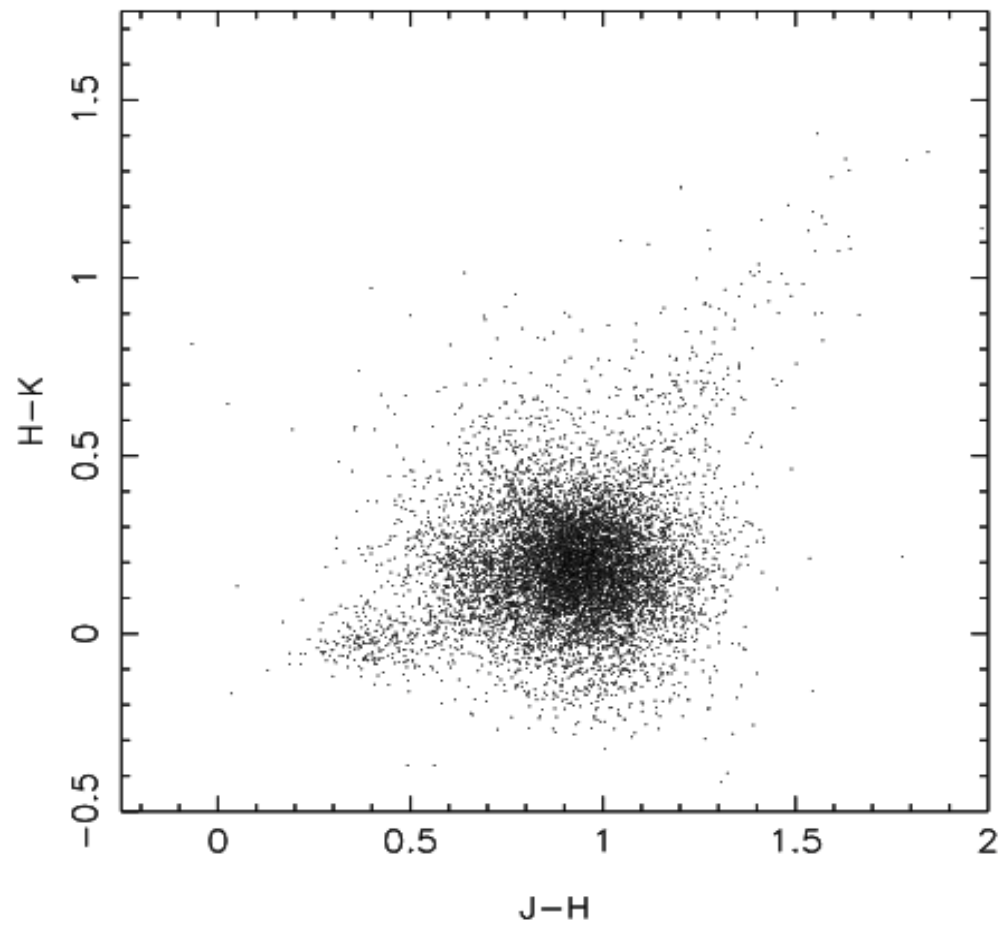
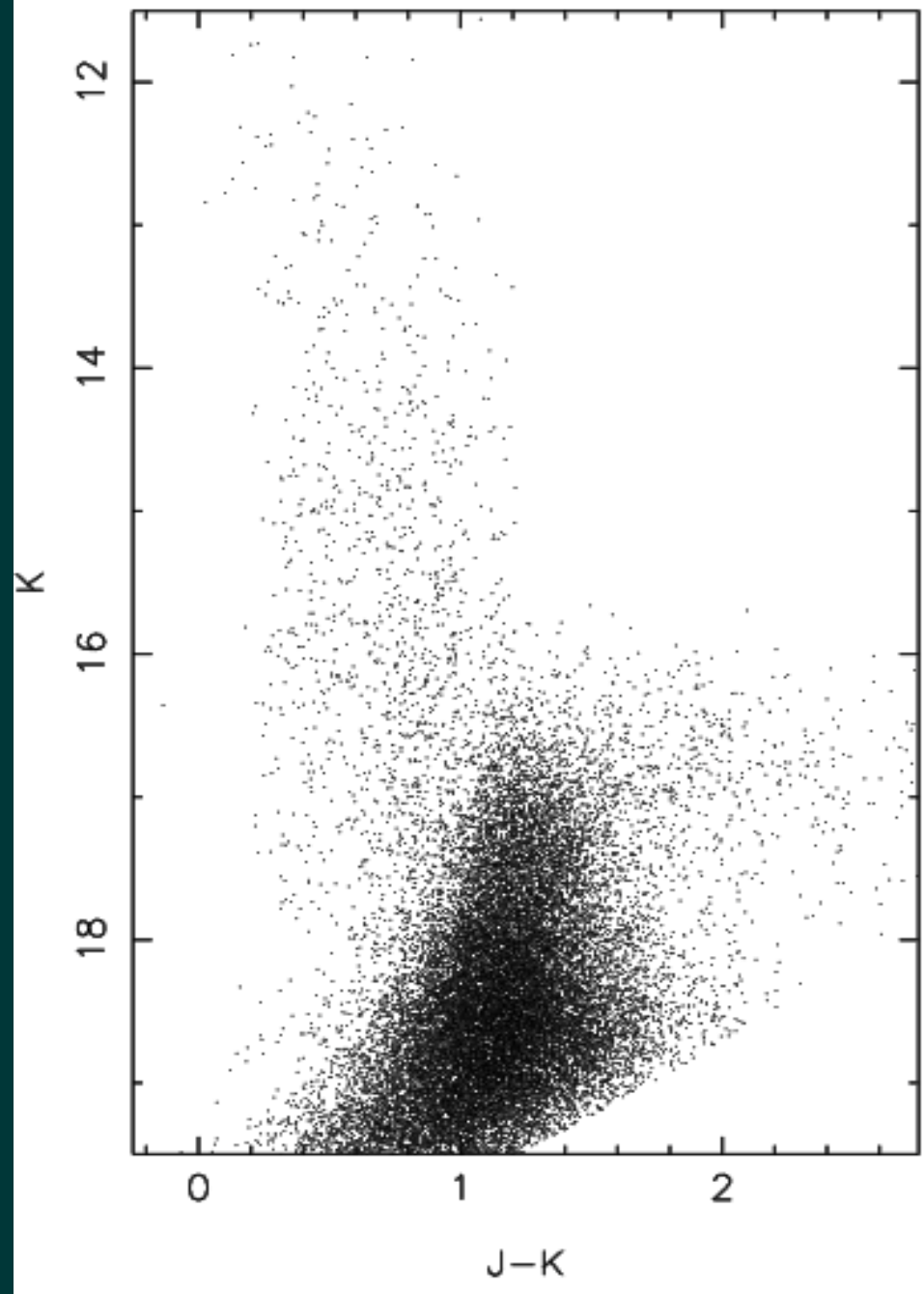


# N205 - K-band extracted from M31 survey

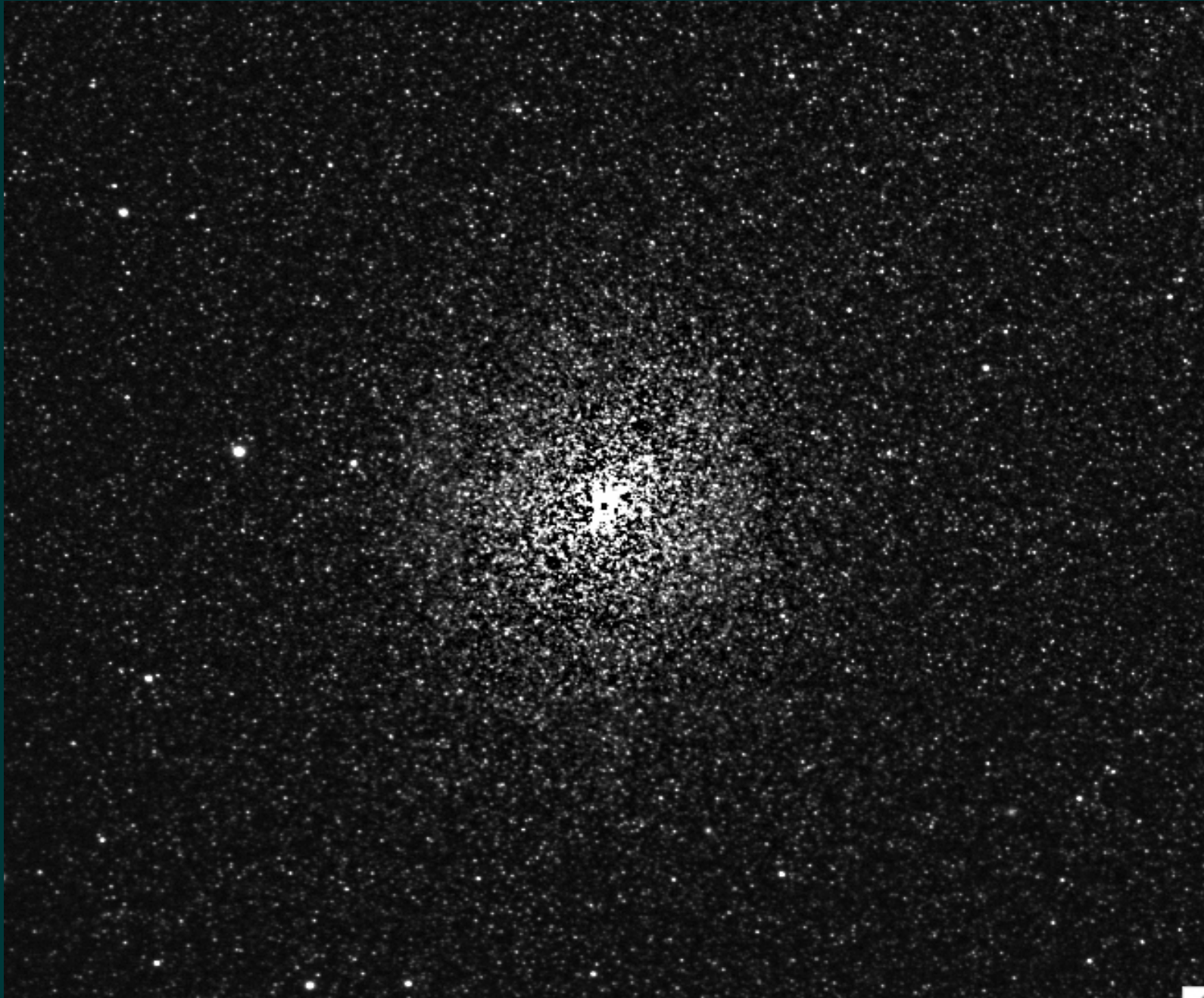


2'

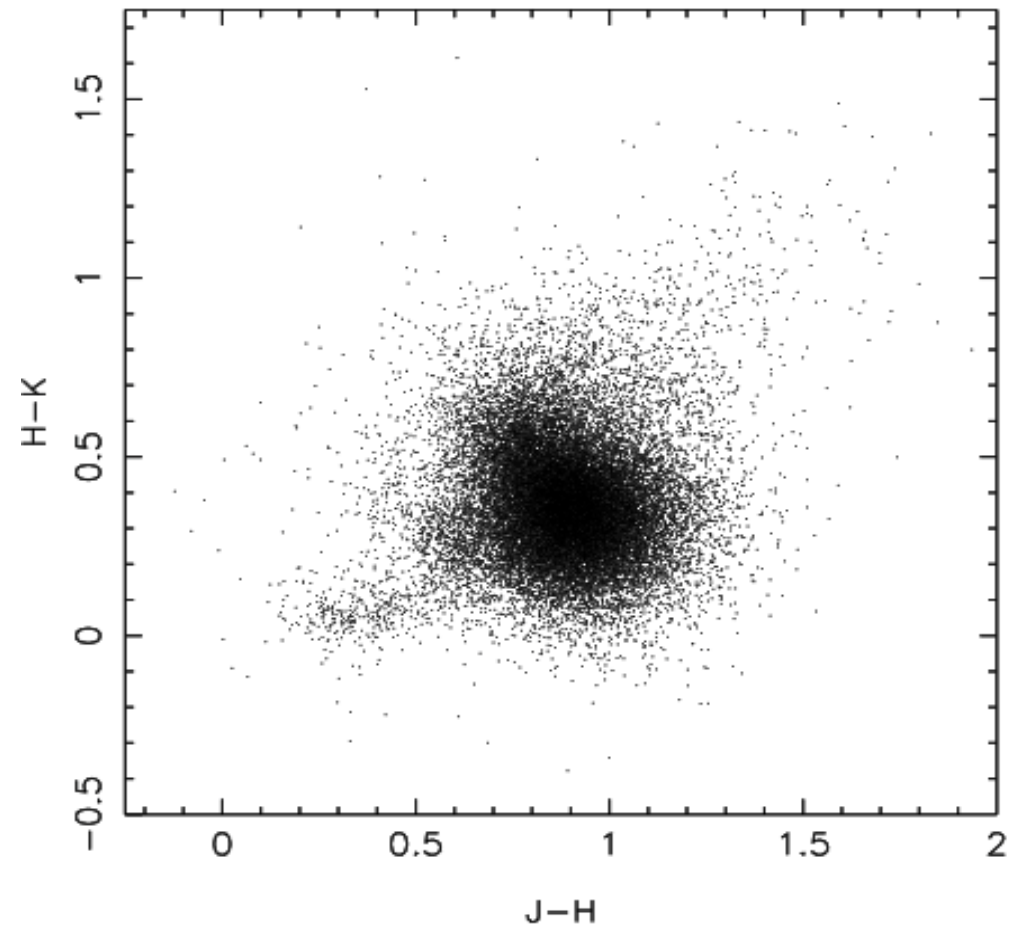
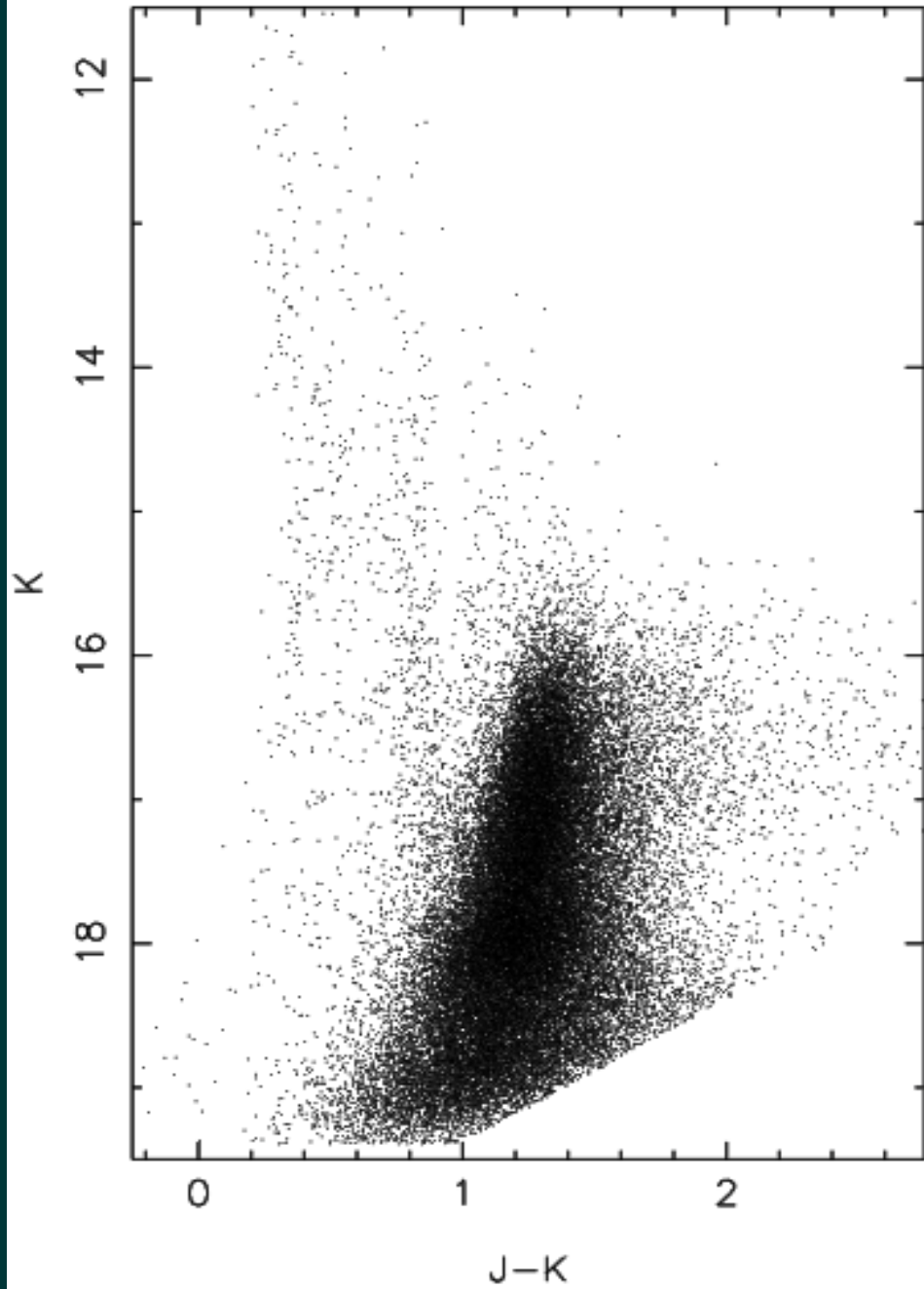
# N205 - JK CMD



# M32 - K-band extracted from M31 survey



# M32 - JK CMD



# WFCAM JHK photometry of M31 + satellites

