ULTIMATE-Subaru Meeting
# 15-16 Jan 2018
NAOJ, Mitaka

Blair Conn

RSAA

RSAA Research Interests

- Brent Groves
  - Using ULTIMATE to access high-z galaxies for line mapping.

- Rob Sharp
  - Using ULTIMATE's high resolution imaging to investigate distant galaxy clusters

- Blair Conn
  - Probing the cores of ultra-faint dwarf galaxies.

Brent Groves

Subaru MOIFS

- Quick leap through possible projects with MOIFS
- Assume here
  - ULTIMATE
  - MOIRCS spectrograph (ie 0.8 - 2.0 m, R~3000)
  - Starbug system with 61 (37) fibres with 0.2" diameter
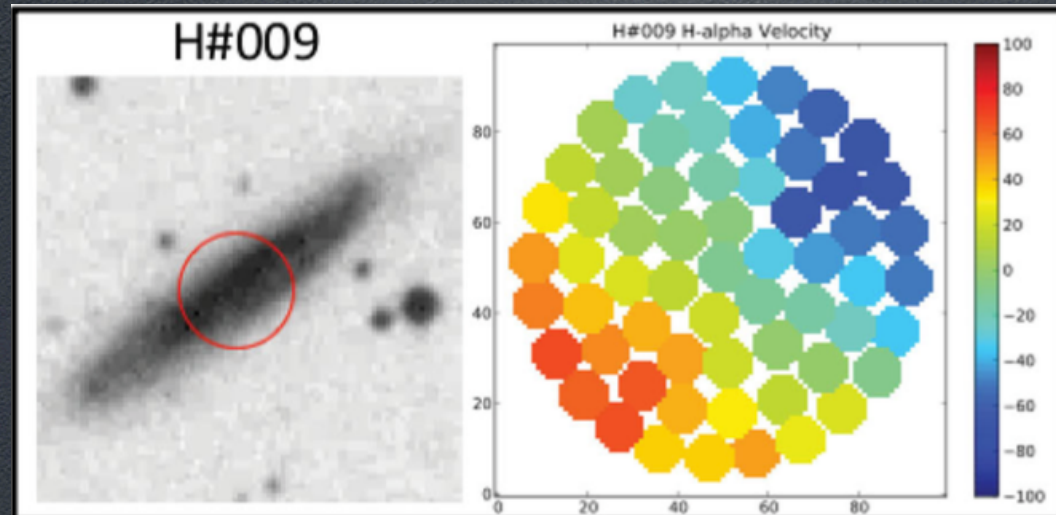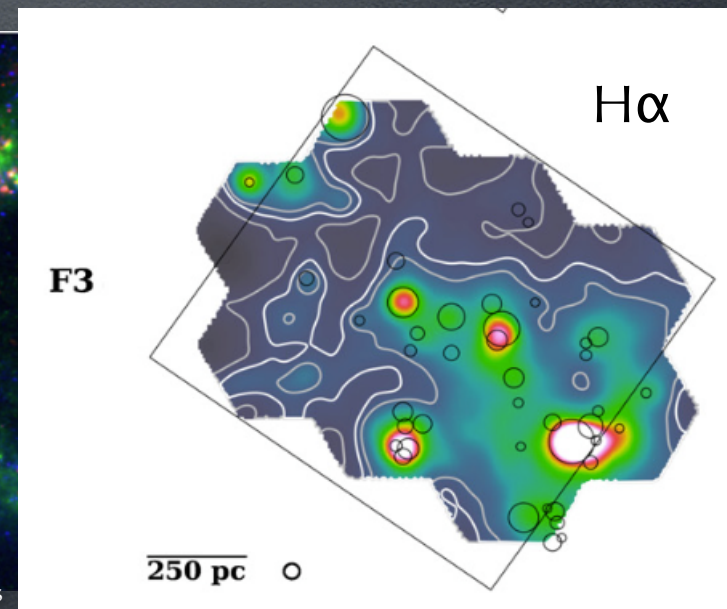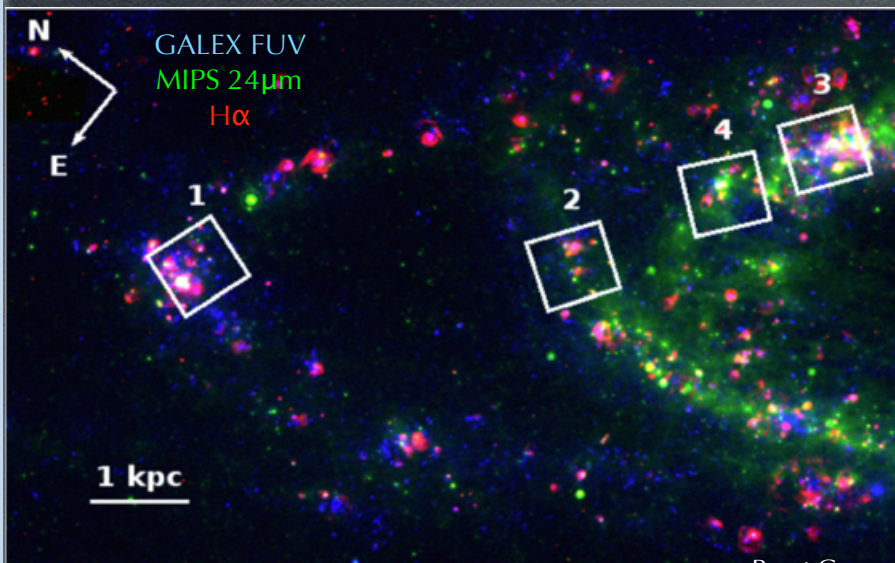

Croom et al. (2012)

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Nearby Universe

- Using IFS to map out HII regions, diffuse ionized gas
- can map extinction, local metallicity variations
- eg PPaK in M31, MUSE of nearby galaxies

Kapala, BG, et al. (2015)

GALEX FUV
MIPS 24µm
Hα

N
E

1

2

3

4

1 kpc

Brent Groves

F3

Hα

250 pc

Brent Groves

Nearby Universe

- Using IFS to map out HII regions, diffuse ionized gas
- can map extinction, local metallicity variations
- Can do the same using eg Paschen α on *individual* HII regions in nearby galaxies

- Using the combination of high-res optical MOS and near-IR high spatial ULTIMATE/MOIFS we can measure shape, central star, and ionisation structure of individual HII regions in nearby galaxies

Brent Groves

Small to Large

- SAMI has mapped the greater extent of galaxies at z=0.02 - 0.06
- A fraction show clear AGN contribution to the ionization (including a few Type I AGN with BLR

NGC 3627
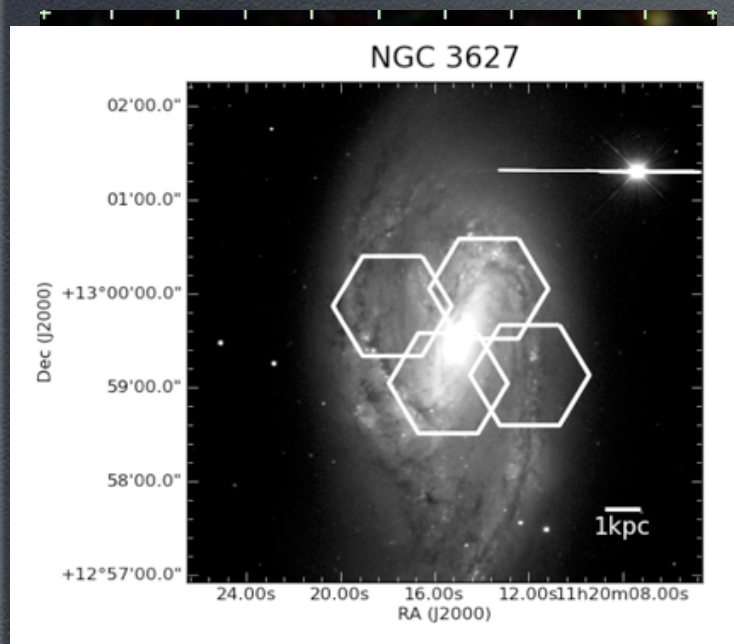
Kreckel, BG, et al. (2013)

- Subaru MOIFS/Ultimate could measure the AGN at the centre & Ionisation and outflows
- For a subset we could even map the galaxy using a stepping pattern with MOIFS and trace the ionisation cones
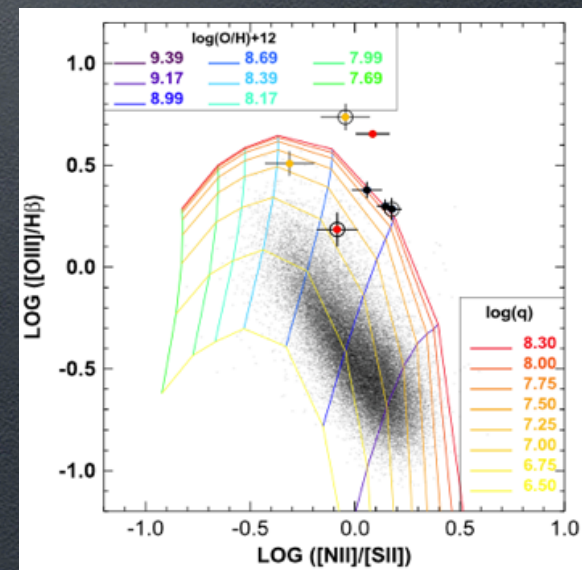
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and to Distant Galaxies

- On distant clusters (*HSC²?*), Subaru Ultimate/MOIFS could:
  - map rotation & kinematics of cluster galaxies
  - map SFR & metallicities across galaxy disks (eg Schaefer et al (2016)
  - map lensed galaxies for even higher spatial resolution of most distant galaxies

Yuan et al. (2014)
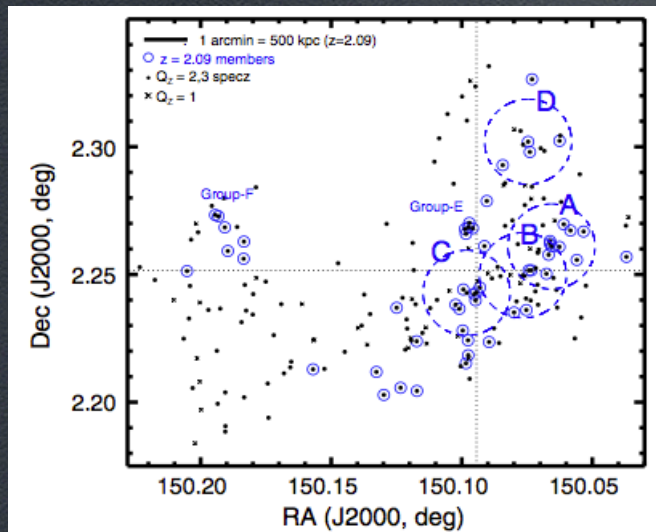
Kewley et al. (2016)

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The Ultimate possibilities of MOIFS

- By combining Subaru's sensitivity with the resolution possible with Ultimate, a MOIFS provides endless possibilities to:

  - map the structure of nearby star formation regions in unprecedented detail
  - classify individual stars in clusters in nearby galaxies
  - probe the inner workings of AGN across large samples
  - map the SFR in distant cluster members tracing the evolution of ionisation and gas towards the cluster centres
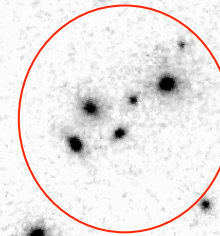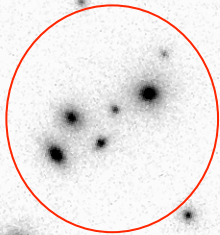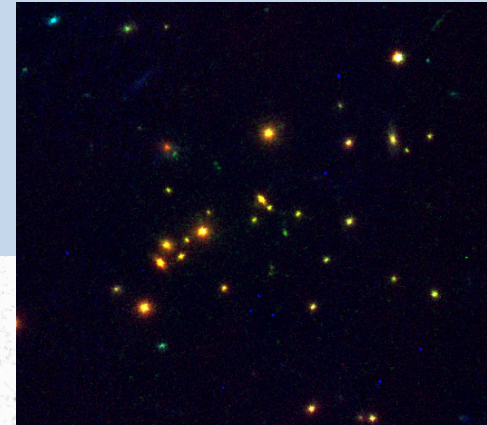
Rob Sharp

NGC 4038/9
The Antennae galaxies

HST WFPC2, visible

Gemini GeMS/GSAOI IR (JHKs)
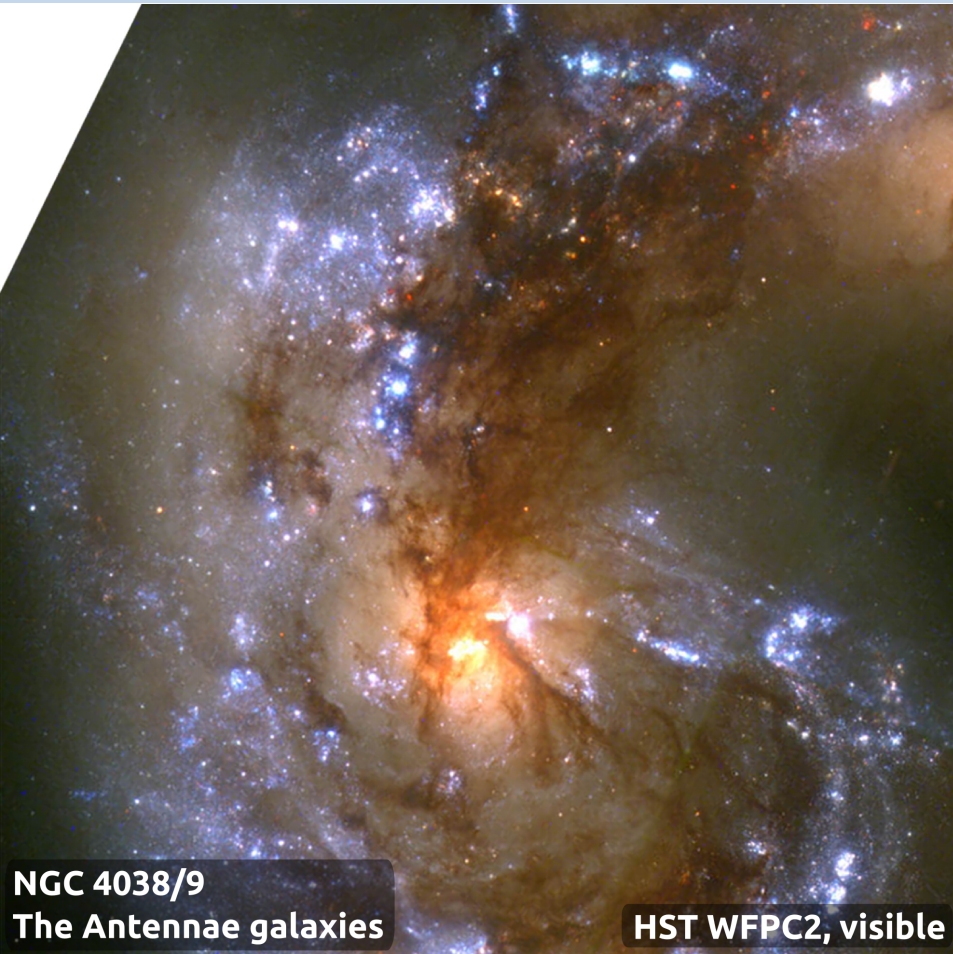
Rob Sharp

K/I ~ 3.1, Gemini/HST ~ 3.3, GMT/JWST ~ 3.8

z = 1.067 galaxy cluster SPT-CL J0546-5345, Brodwin *et al.* (2010)
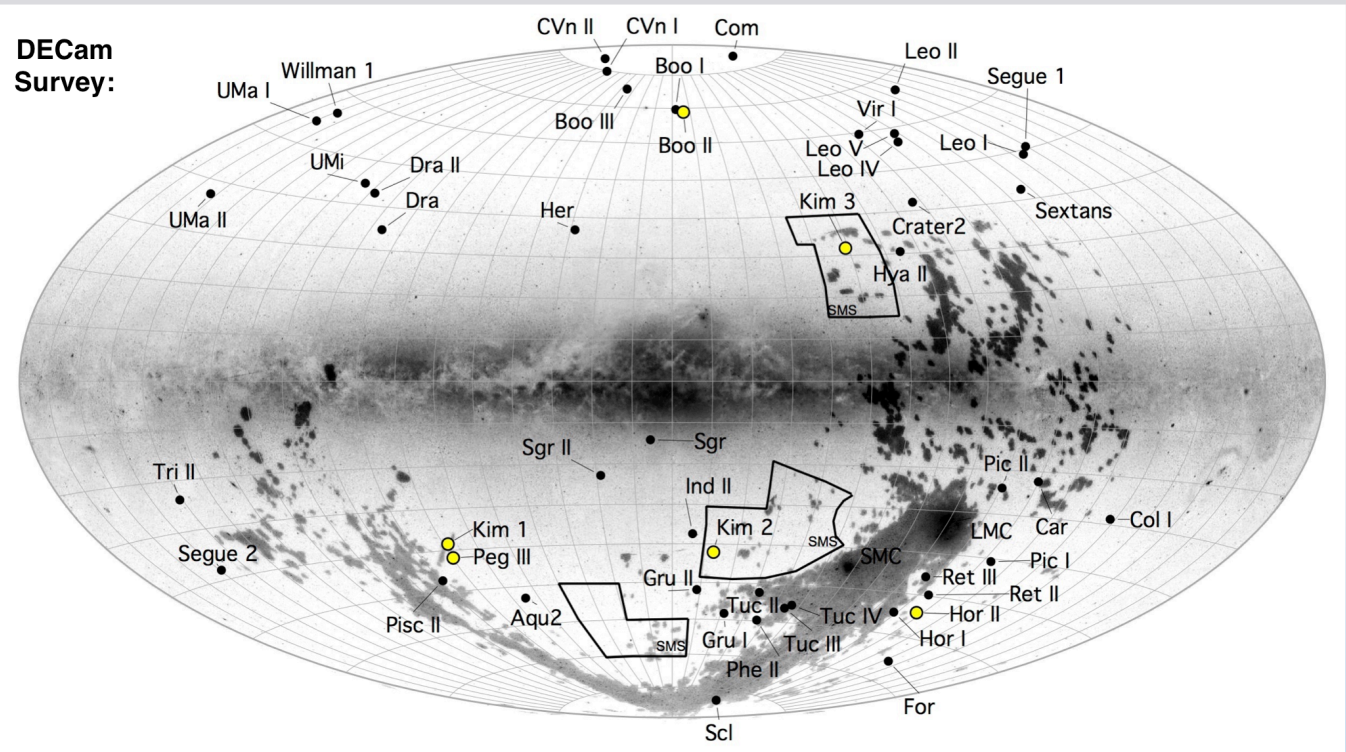Gemini/GeMS guaranteed time: Sweet, Sharp, McGregor *et al.* (2017)

- Determine the stellar mass-size relation for 49 galaxies
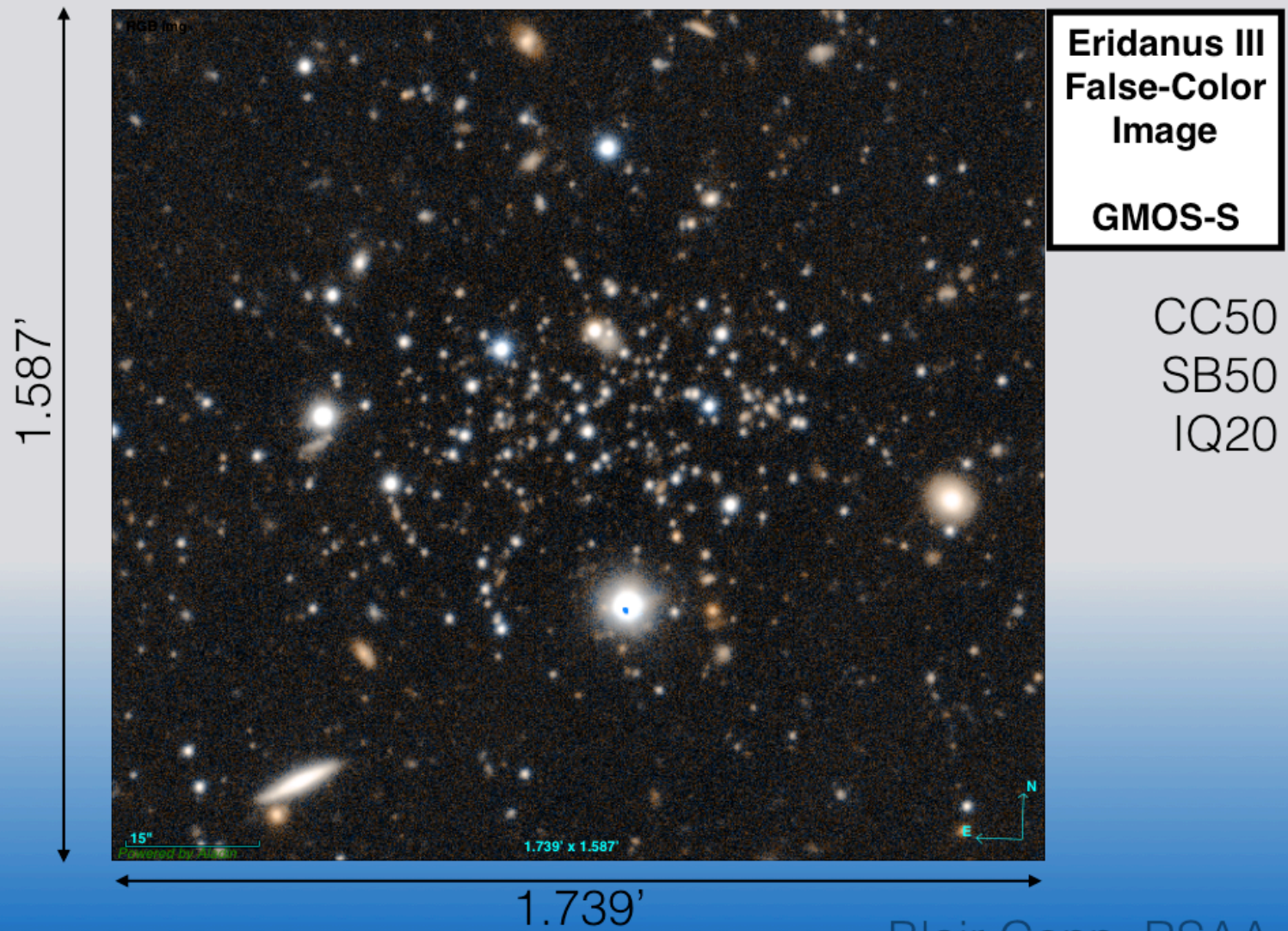- AO is necessary to accurately characterize the size of compact z~1 galaxies

With 8m AO, we will access only the very brightest source and basic structural parameters
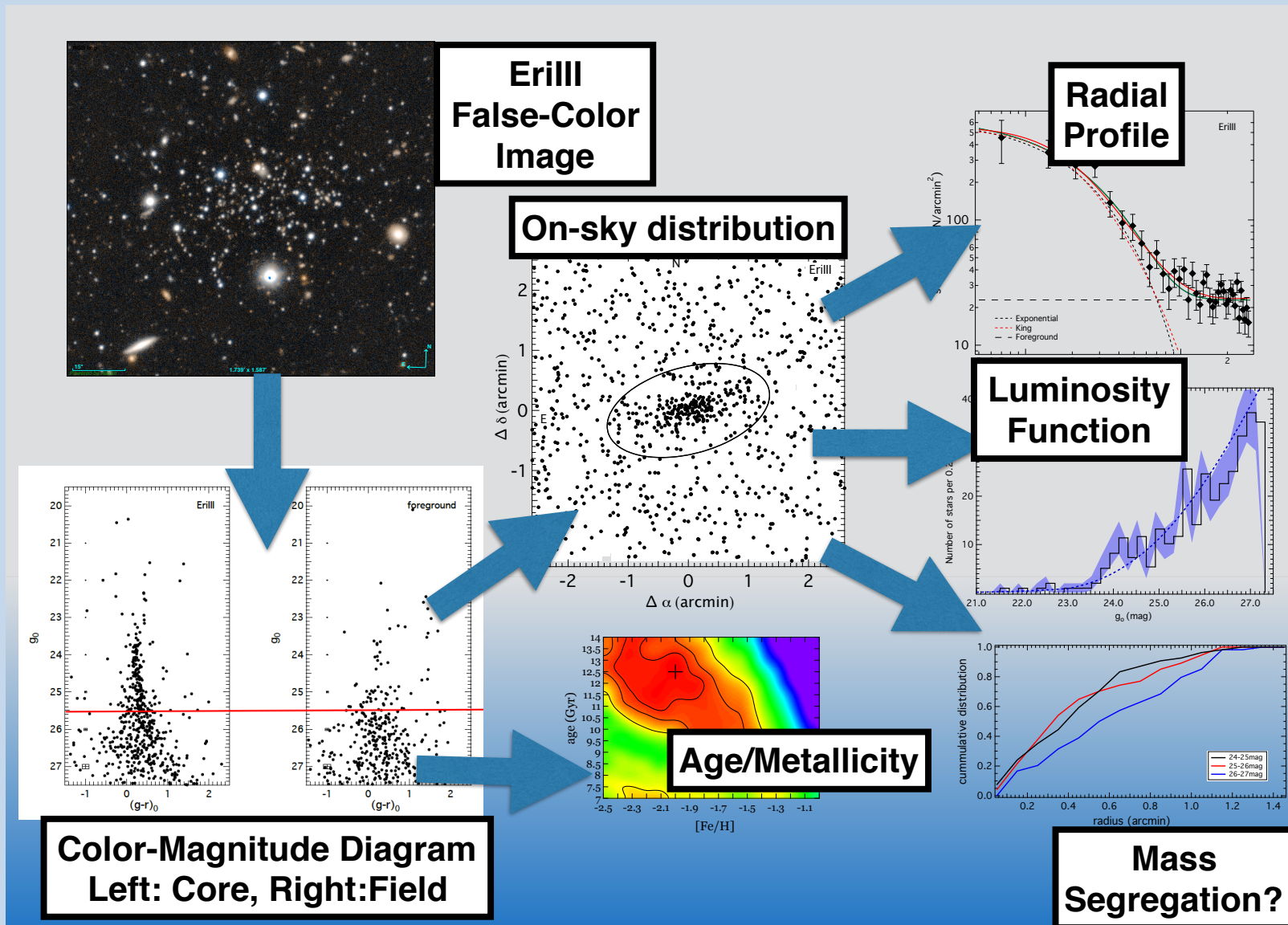
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Stromlo Milky Way Satellites Survey

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Eridanus III
False-Color
Image

GMOS-S

CC50
SB50
IQ20

Blair Conn, RSAA

Blair Conn

EriIII False-Color Image

On-sky distribution

Radial Profile

Luminosity Function

Color-Magnitude Diagram Left: Core, Right:Field

Age/Metallicity

Mass Segregation?

Conclusion

- RSAA has a variety of scientific goals and interests regarding ULTIMATE
  - Detailed studies of nearby galaxies
  - Extending current survey approaches into the high-z domain
  - Probing the cores of the smallest galaxies
- This talk showcases only a small subset of the RSAA interest.
- Thanks again to the Organizers of this meeting for this opportunity to participate.