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&
The GAMA Team
The GAMA Team

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GAMA Consortium Members
- St Andrews
- Edinburgh
- UCLAN
- Nottingham
- LIMU
- Bristol
- Sussex
- Oxford
- Durham
- Portsmouth
- Herfordshire

GROUND-BASED FACILITIES
- AAT, Siding Spring
- SSO, Apache Point
- VLT, Paranal
- UKIRT, Hawaii
- VST, Paranal
- GMRT, Pune
- ASKAP, WA

SPACE MISSIONS
- Herschel, L2
- GALEX, Earth Orbit
- WISE, Earth Orbit

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GAMA I (II) Outline

• An r-band selected redshift survey:
  – Three (Six) regions each ~ 4x12 deg (5x12 deg)
  – ~1000 targets per sq deg (2dFGRS~120, SDSS~70) ~8 tiles per unit area
  – Testing CDM via HMF, merger rates, and SFE
  – Total allocation 66 (178) nights

• A multi-wavelength study of galaxies:
  – FUV,NUV,ugrizYJHK,mid-IR,far-IR,20cm,21cm,1m (AGN, stars, gas, dust)
  – 1kpc resolution in ugrizYJHK to z<0.1 (structural analysis)
  – Robust halo masses (internal/external environmental markers)
  – Estimated data value A$55 million

• GAMA Team now includes >50 scientist across >30 institutions.
Why do we need all this photometry?

- **GALEX SFR**
- **VST S.Pop (IMF)**
- **VISTA S.Mass**
- **WISE pAH**
- **HERSCHEL Dust**

Smith et al (2011)
Why do we need all this spectroscopy?

Photo-z versus spectro-z

Photo-z credit: Hannah Parkinson
Why do we need all this spectroscopy?

Photo-z versus spectro-z

Photo-z credit: Hannah Parkinson
GAMA Galaxy Group Catalogue

Alias: G³C (Robotham et al. 2011)

- Tried various implementations of FoF and halo based grouping

  - FoF:  - Links built between individual galaxies
           - Groups built from finding common links

  - Halo:  - Cores of groups found by constructing the voronoi tessellation
           - Scale core membership to define group extent

- FoF grouping much more flexible and successful when tested against mocks, used as the basis of the final group catalogue algorithm.
At the simplest level we:

- Calculate the GAMA luminosity function (LF).
- Require that galaxies are significantly linked when they are locally overdense.
- Do this separately radially and in projection.
- We then construct groups out of common linking.

Robotham et al. 2011
MNRAS in press
Some technical points...

- To create meaningful group catalogues we need to understand the biases expected by choosing different approaches to grouping.

- Solution is to test on mock catalogues - created by Alex Merson (Durham) and Peder Norberg (Edinburgh). This is a combination of the Millennium Simulation plus a GALFORM semi-analytic (Bower et al. 2006) galaxy formation recipe on top.

- 27 GAMA like volumes (z= 0 -> 0.5, 48 sqdeg) exist with known associations between dark matter halos and semi-analytic galaxies.

- In some sense, we need an approaching to grouping that does “the best job” at recovering correct groupings – lots to say on that subject, interested parties should read the G3C paper.
How good do we expect our groups to be?
$M \propto \sigma^2 r$
Group Dynamical Mass and Luminosity using global correction

Robotham et al. 2011
MNRAS in press
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Fossil Group

$Z \sim 0.11$

22 w. GAMA

1 pre GAMA
Cluster

Z ~ 0.24

34 w. GAMA

5 pre GAMA

Perfect cluster!
Small Group

$Z \sim 0.32$

4 w. GAMA

0 pre GAMA

All within 2dF fibre collision radius.
Small Group

$Z \sim 0.14$

3 w. GAMA

1 pre GAMA

Mergers?
How do we do overall?
So what is going on at low mass?

- Problem appears to be that the mocks (MS + SA) produce far too many compact groups.

- A few possibilities:
  - CDM clustering
  - Dynamical friction recipe

Robotham et al. 2011
MNRAS in press

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What next…

GMRT/GAMA
WISE
Herschel/ATLAS
VISTA/VIKING (GAMA regions)
VST/KIDS (GAMA regions)
GALEX/GAMA
AAT/GAMA I/II

2010
Sep 2010: GAMA II SGP observations Hopkins
May 2010: Completion of GAMA I observations Driver
Dec 2010: GAMA I final DR Liske

2011
Jun 2011: GAMA II EQ observations Driver
Mar 2011: GAMA II EQ observations Driver

2012
Sep 2012: GAMA II SGP observations Hopkins
Mar 2012: GAMA II EQ observations Driver

2013
Sep 2013: GAMA II SGP observations Hopkins
Mar 2013: GAMA II EQ observations Driver

2014
Sep 2014: GAMA II SGP observations Hopkins
Dec 2014: GAMA II final DR Liske

Sep 2015: GAMA II final DR Liske
GAMA Database/Website
http://www.gama-survey.org/

- GAMA website is up and running.
- It includes the first public release of data.
- We have SQL server to search catalogues.

Other data products:
- Spectra
- Swarp mosaics
- 2D profiles
- SFR
- Stellar Mass
Conclusions

• GAMA is offering the astronomical community the definitive low-z galaxy database.

• Phase I is complete, and many papers based on this data are about to be released.

• My work has included producing the GAMA Galaxy Group Catalogue (G$^3$C) see arXiv:1106.1994 (MNRAS in press).
  - We find discrepancies between the data and the MS-SA mocks. Work ongoing to discover origin.

• Now moved on to observing GAMA-II (N+S).

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