



RESOLVE & ECO: Survey Design

Sheila Kannappan UNC Chapel Hill The Robert C. Byrd Green Bank Telescope









GALEX Galaxy Evolution Explorer

REsolved Spectroscopy Of a Local VolumE



- volume-limited, unusually complete census of dynamical, stellar, and gas mass, plus star formation/merging/chemical evolution, from dwarf galaxy to cluster scales
- >50,000 cubic Mpc
- >1500 galaxies
- baryonic mass limit $\sim 10^9 M_{sun}$
- 1" = 0.3-0.5 kpc
- volume-limited design enables robust metrics of environment
- new 21cm data & 3D optical spectroscopy + superior reprocessed photometry

http://resolve.astro.unc.edu

Cosmic Variance and Completeness



ECO: "Environmental COntext catalog" (~10x larger, all same pipelines for stellar mass, envt; Moffett+ 2015)

Contains **RESOLVE-A**; enables calibration of cosmic variance. More complete than SDSS.

RESOLVE-B:

Stripe 82: extra deep; hyper-complete – cz campaign for galaxies lost by SDSS (dwarfs, pairs, shredded spirals)

Find empirical completeness corrections larger than predicted by Blanton et al. (Eckert+ 2015b).





Why go down to 10⁹ M_{sun} across environments? *baryonic physics should change at key halo/galaxy mass scales*



halo mass scales translate to (central) galaxy mass scales



"cold" accretion shuts down from the inside out over a range in halo mass (e.g., Dekel & Birnboim 2005) Why go down to 10⁹ M_{sun} across environments? *baryonic physics should change at key halo/galaxy mass scales*



Key scales imprinted on RESOLVE HI census (>95% complete, Stark+ in prep)



crucial survey design features:

- complete to well below key gas content transition scales
- HI data fractional-mass limited (5-10% M_{stellar} upper limits).

(Exciting!) reprocessed photometry (Eckert+ 2015a for RESOLVE; Moffett+ 2015 for ECO)

Improvements (*not* standard!):

- Blanton sky subtraction
- gri coadds define ellipses
- color gradients allowed
- flux extrapolation 3 ways



Eckert+ 2015a

brighter, bluer, larger galaxies with more real scatter in color (SFH implications: see Kannappan+ 2013 & poster)

RESOLVE's 3D Optical Spectroscopy Census (dynamics, metallicity, star formation history, AGN...)

- cz's: SOAR, SALT, WIRO (redshifts)
- broad: SOAR (stellar pops, obs. planning, 310-710nm)
- blue: SOAR/Gemini/AAT (stellar kinematics, σ~27km/s)
- red: SOAR/Gemini/SALT/AAT (gas kinematics, δ~5km/s)



Gemini GMOS-IFU



SALT Fabry-Perot & longslit



more info: Eckert, Snyder talks & poster

Summary

• Key advantages of RESOLVE & ECO:

- M_{bary} limit ~10⁹ M_{sun} below key gas transition scales
- volume-limited for diverse & robust environment data
- more complete than parent SDSS
- superior photometry (accurate colors & SFHs)

Additional benefits of RESOLVE:

- fractional-mass limited HI census (5-10% M_{stars})
- 3D optical spectroscopy in kinematic & broad setups
- superior depth and archival data in equatorial strips

And there's more!

Poster Session #333:

* Exploring the Origin of HI Profile Asymmetries in the RESOLVE Survey

* Probing Cosmic Gas Accretion with RESOLVE and ECO

D. Stark S. Kannappan * Detailed Analysis of Starburst and AGN Activity in Blue E/S0 Galaxies in RESOLVE A. Bittner

C. Ray

- * Status of the Dynamical Census of Galaxies and Groups in the RESOLVE Survey K. Eckert
- * Simulating cE Galaxy Formation by Tidal Stripping for Comparison to RESOLVE

