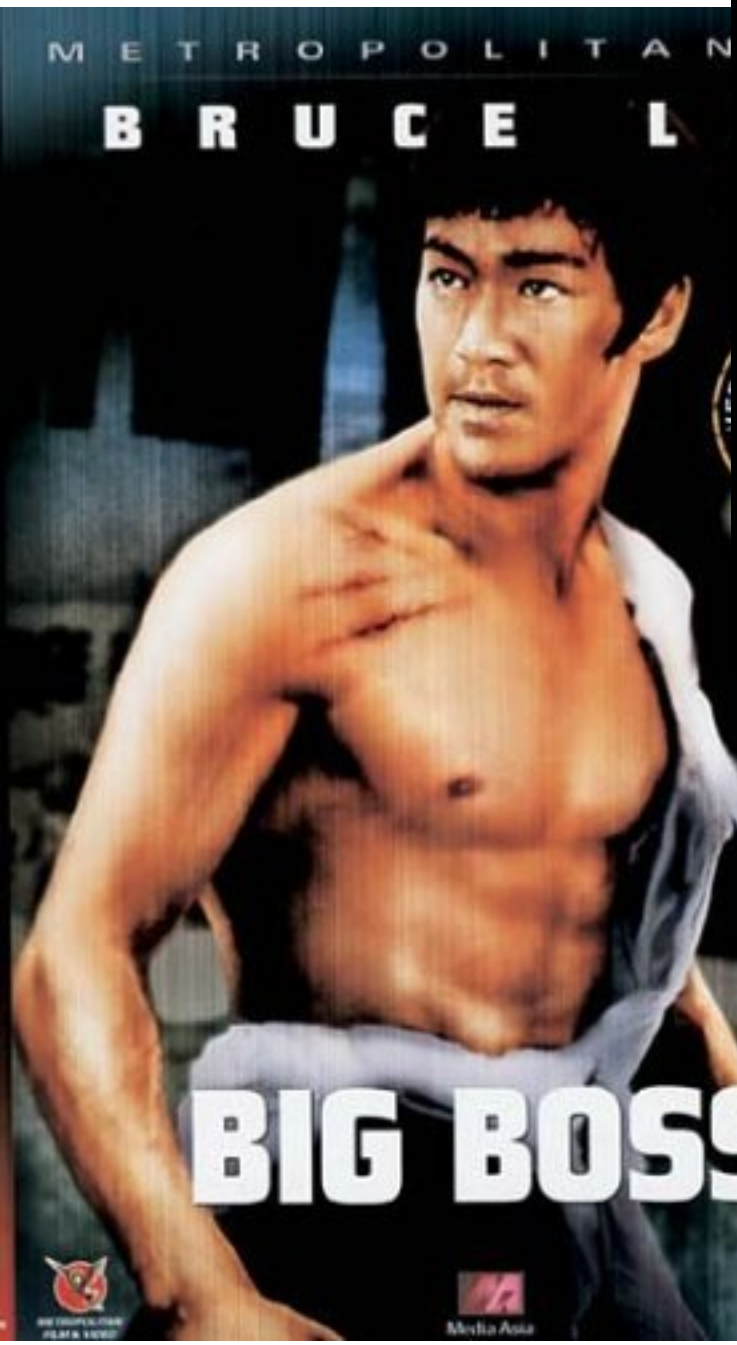

Community Extragalactic Science with BigBOSS

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13 Sep 2011

University of Michigan

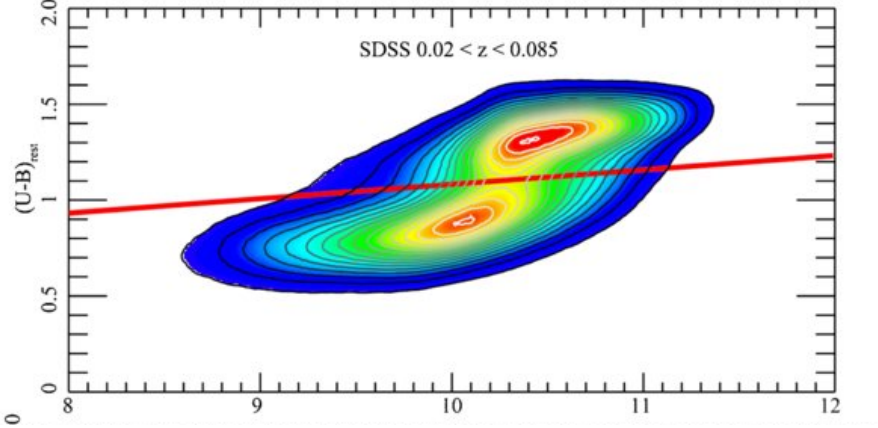
Tiny sample of BigBOSS-relevant science questions

- Want to have a complete empirical picture of how galaxies evolve in their halos
  - Surveys, with environment, plus sophisticated modeling
  - Key boundary condition, telling theorists what they're aiming for
- Still pushing after physics of feedback
  - Small scale feedback that regulates conversion of gas to stars
  - Large scale SF ejective feedback
  - Large scale AGN ejective feedback
  - Heating of hot gas atmospheres with AGN jets
- Stellar populations
  - Increasingly sophisticated, hungry for high S/N large wavelength coverage spectra
  - IMF, SFH, chemical compositions – constraining the ingredients of analysis framework, archaeological constraints

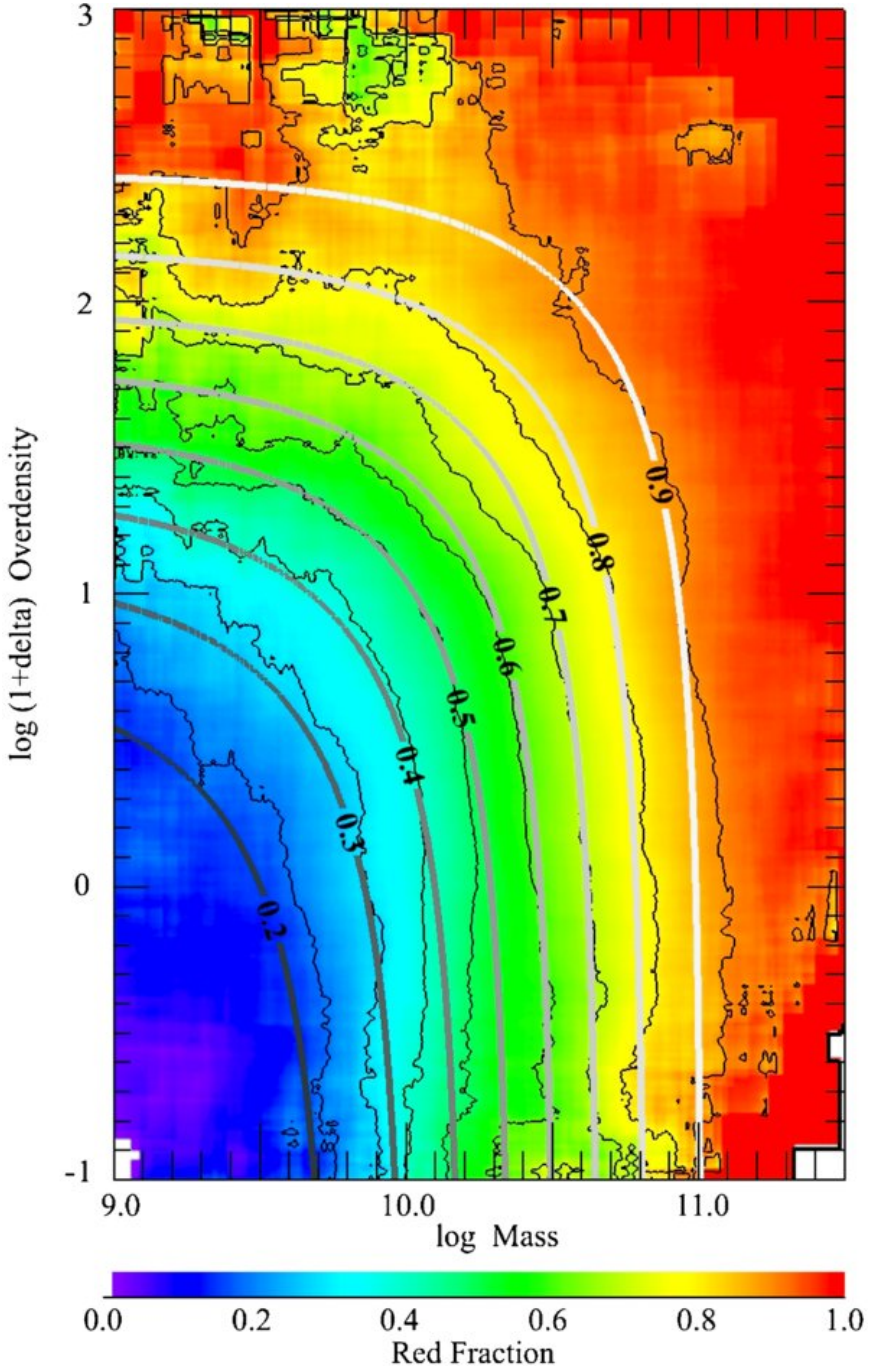
Evolution of galaxies with M*>1e10 at lowish redshifts

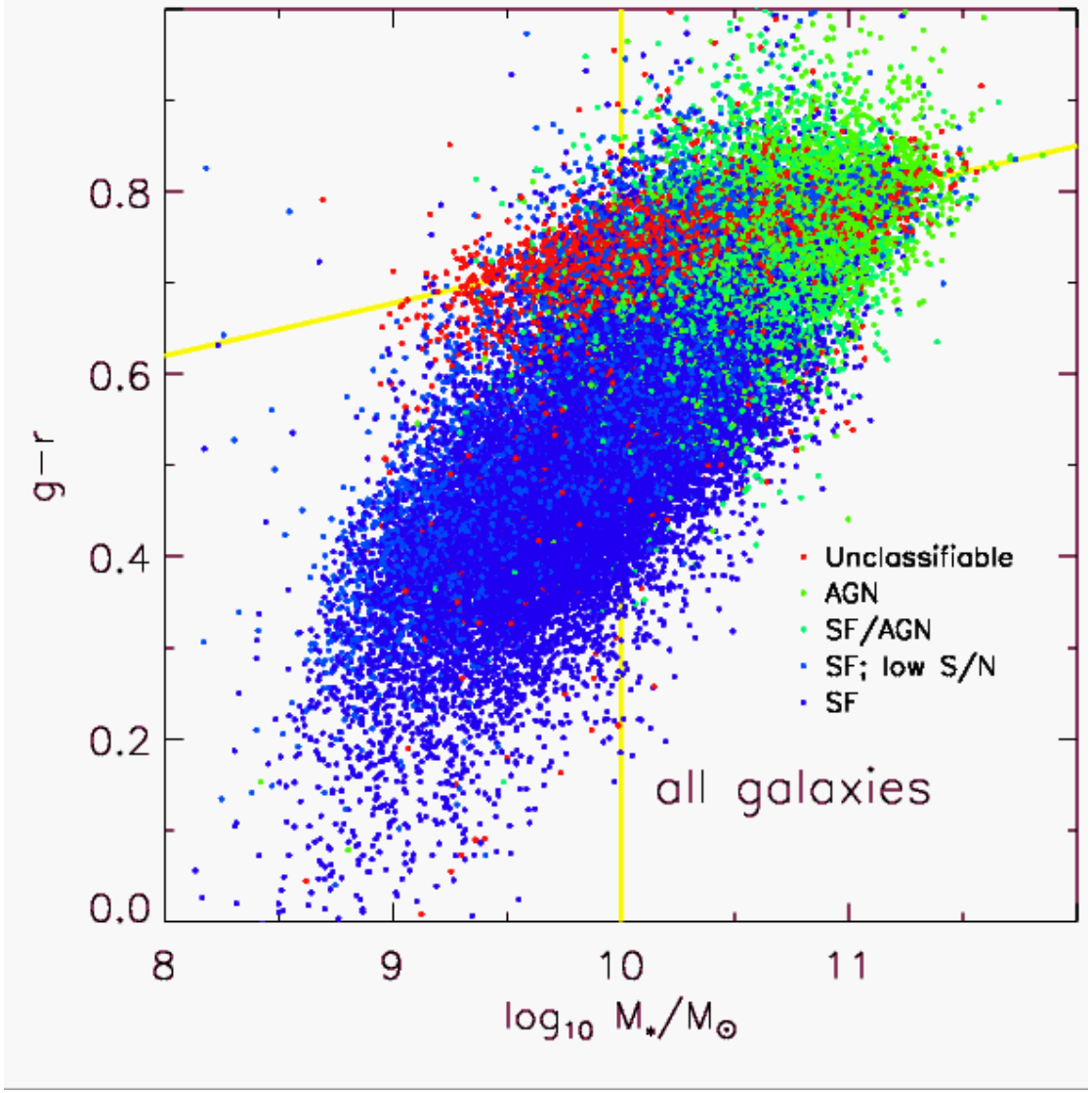
- M*, SFR, [Fe/H]*, [O/H], AGN diagnostics, velocity dispersion, environment (central/sat + halo mass)
- Requires massive samples, long wavelength coverage, R~few thousand, good S/N, dense sampling
  - Claim is calibration sample will help; in practice seems 16x1000s available per field (so factor of a few more than standard depth)
  - Z~0.3 – r<22 / 21 (>1e10 / >3e10) (600 / 300 per sq. deg for delta z=0.1) - 3Gyr ago
  - Z~0.5 – r<23 / 22 (>1e10 / >3e10) (1400 / 600 per sq. deg for delta z=0.1) - 5Gyr ago
  - Advantage – very good ground-based seeing can get useful morphologies…

Calibration fields



- Peng et al. 2010
- SDSS – red (~non-SF) galaxy fraction as a function of stellar mass and environment
- Well-modeled as a separable function
  - Effects of environment independent of stellar mass
  - Effects of stellar mass independent of environment




0.8
0.6
0.4
0.2
0.0
g−r
8
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10
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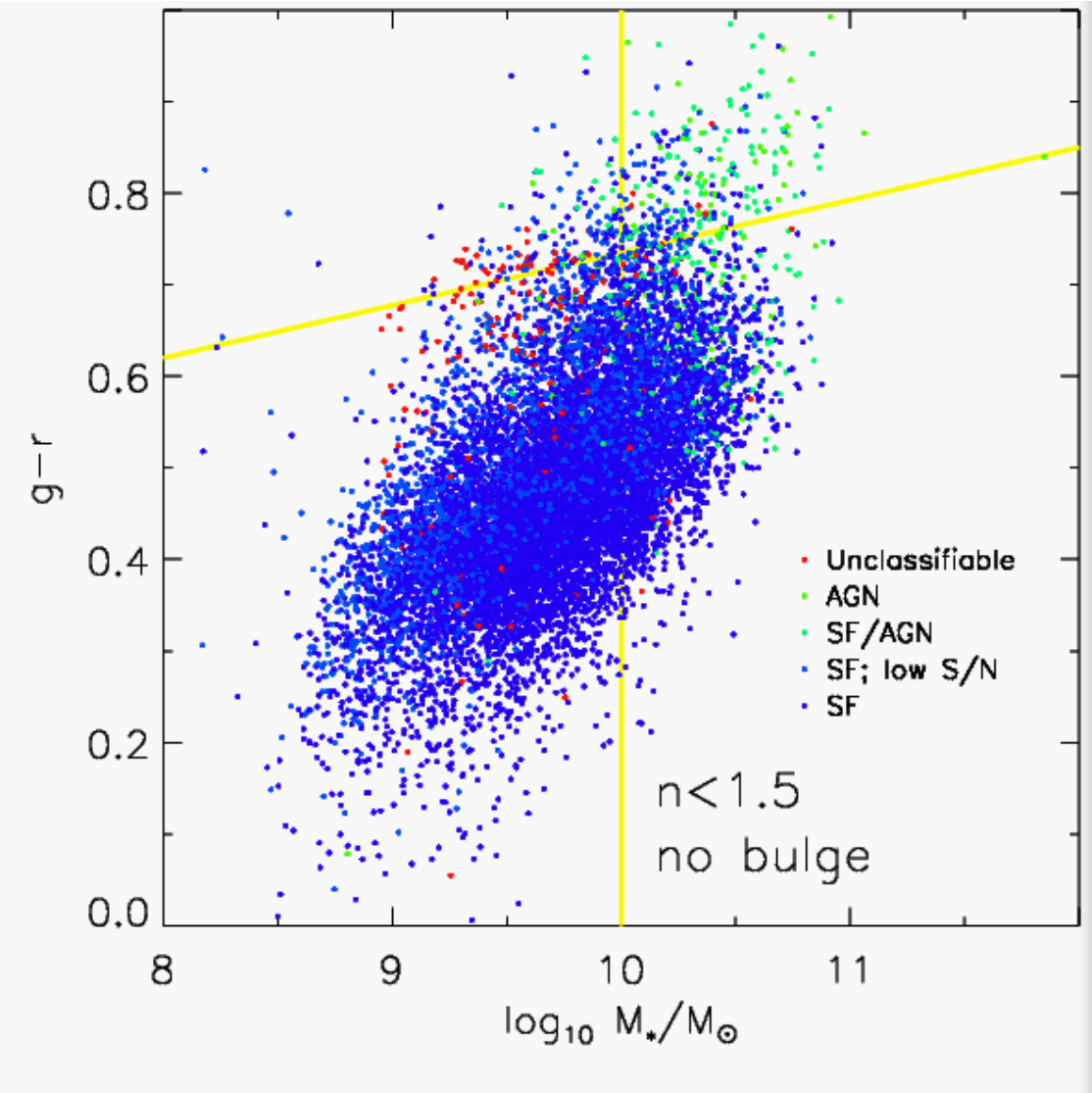
log10 M*/M⊙
Unclassifiable
AGN
SF/AGN
SF; low S/N
SF
all galaxies

Bell 2008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Unclassifiable
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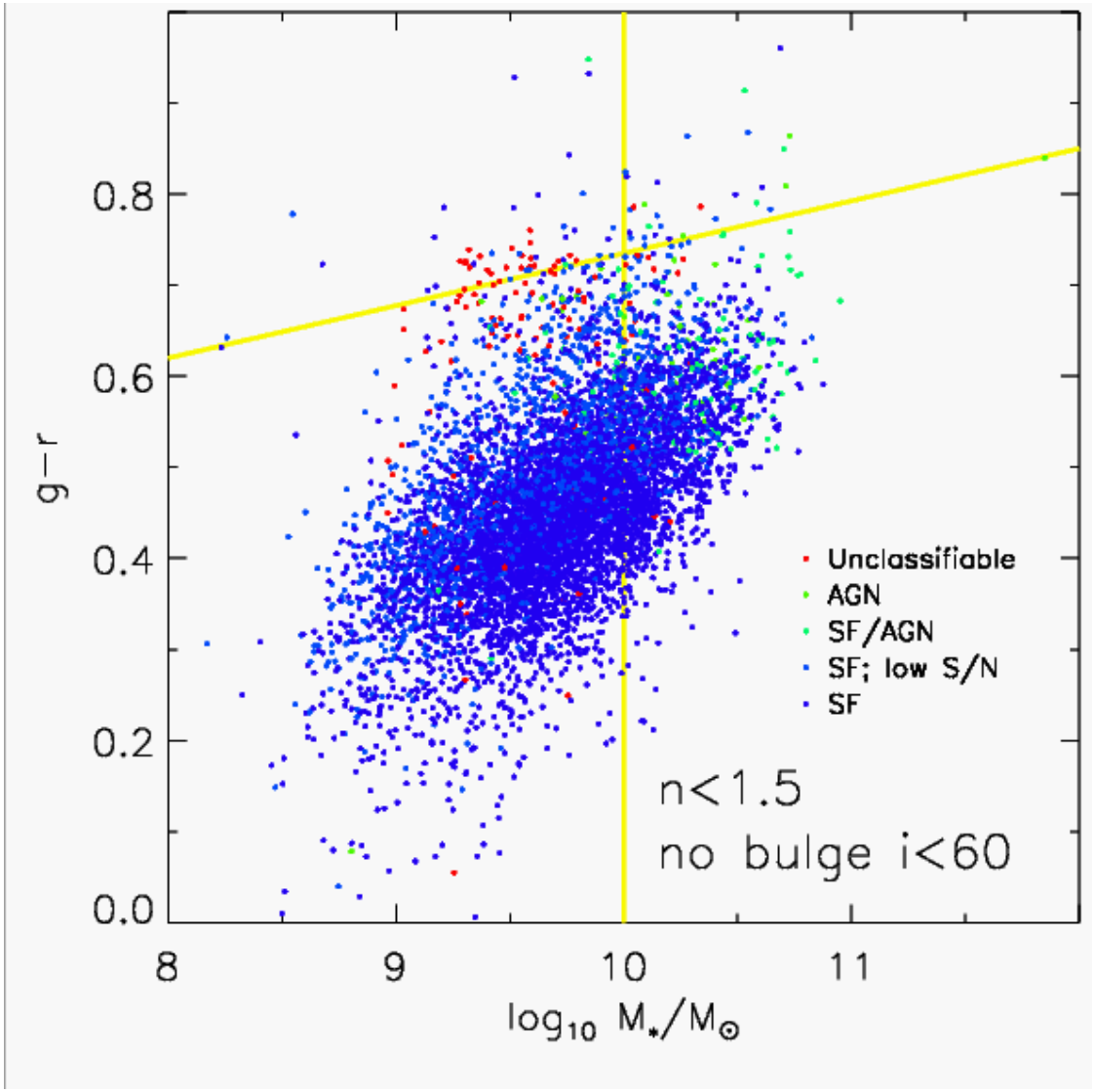
SF; low S/N
SF
n<1.5
no bulge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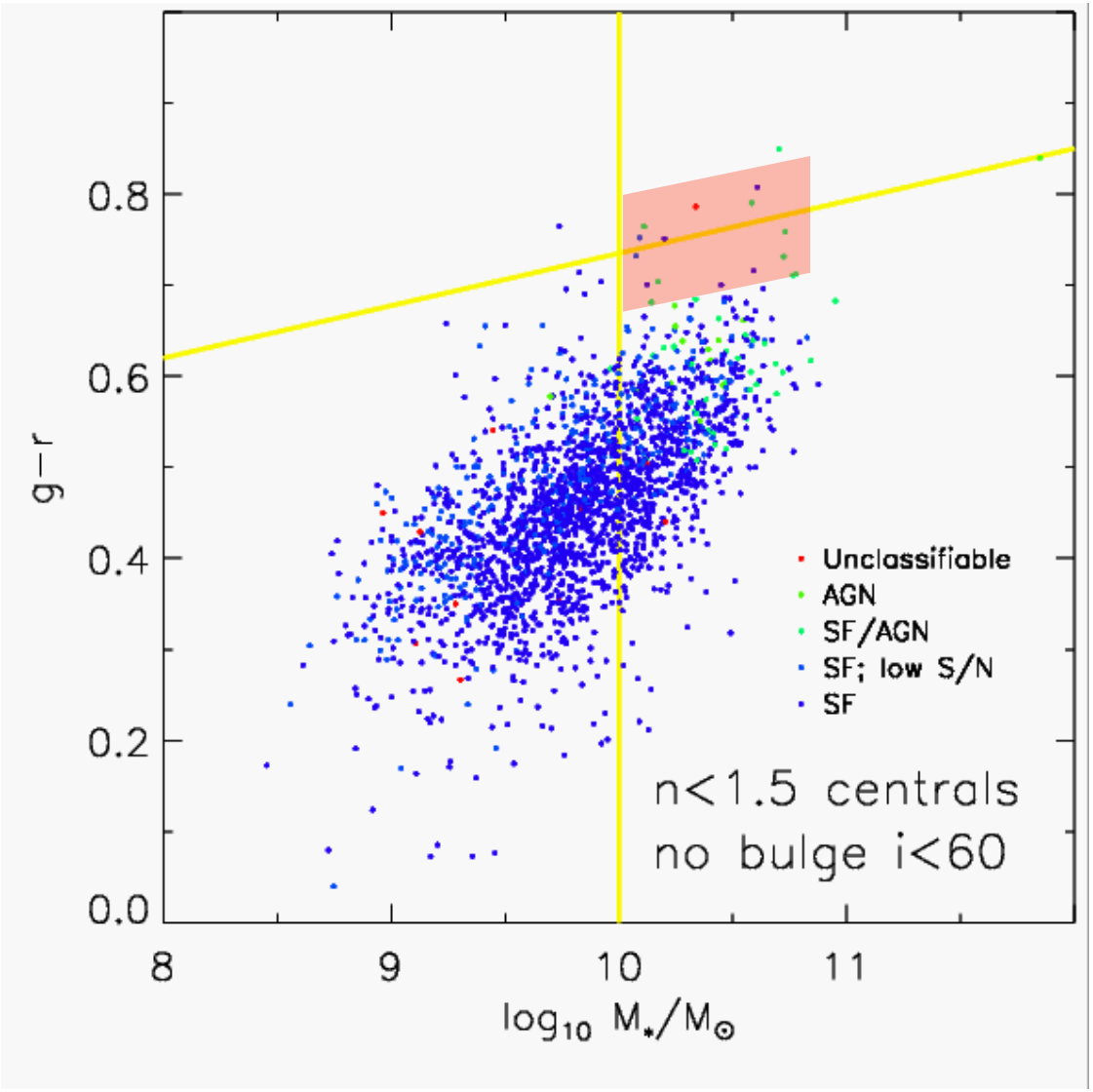
log10 M*/M⊙
Unclassifiable
AGN
SF/AGN
SF; low S/N
SF
n<1.5
no bulge i<60



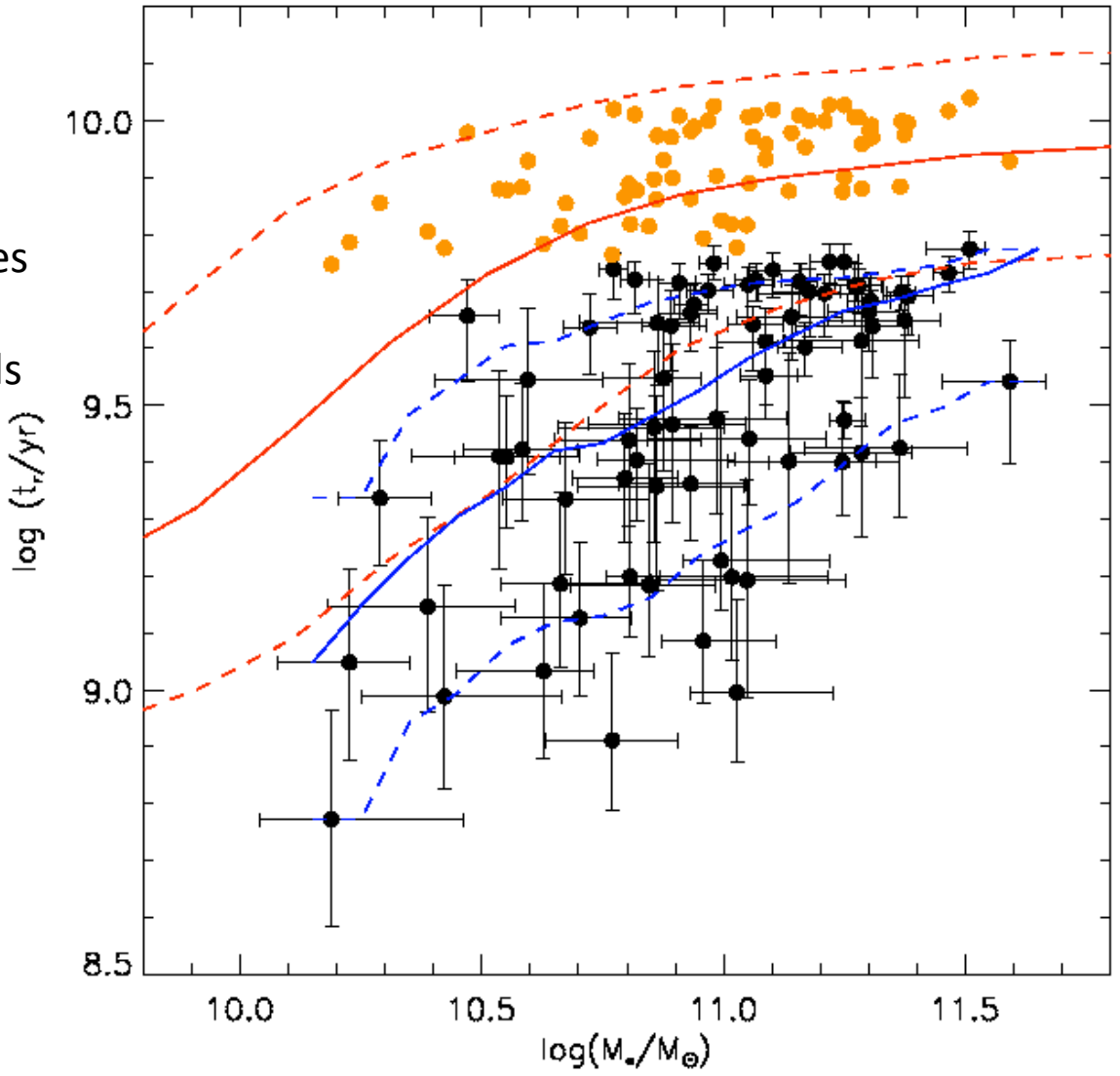
Many red sequence n<1.5 have AGN

Bulge (SMBH) requirement for quenching for central galaxies

Stellar populations

Gallazzi et al. (in prep.)
Ages/metallicities of z~0.7 galaxies
11 hours IMACS/Magellan
~50 hours at z~0.5 with thousands
Galaxies possible with BigBOSS

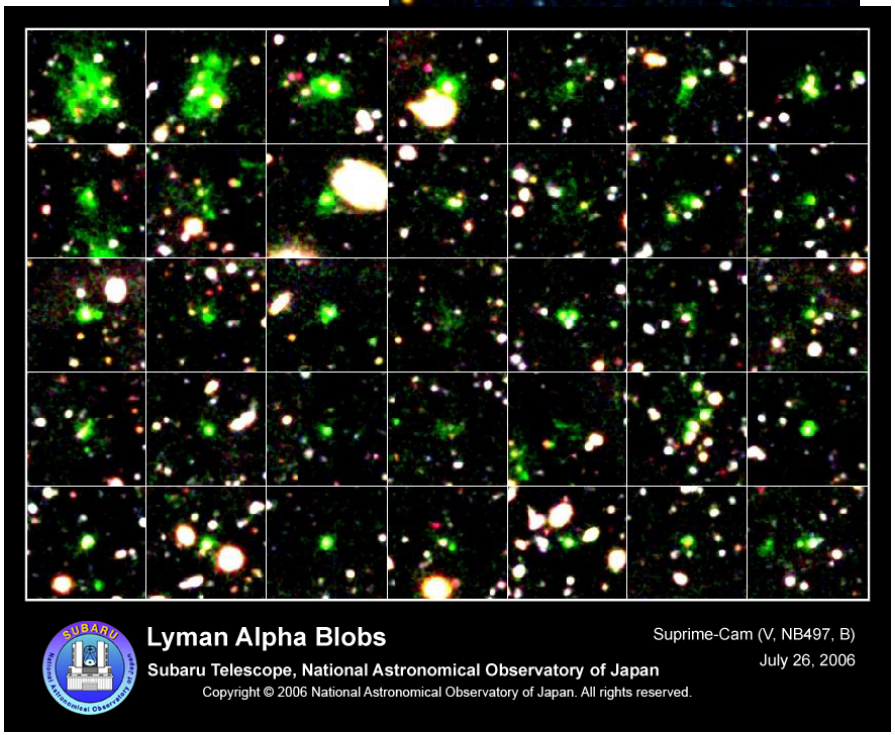
-One field, hit super-hard
-Put together SFH, environment, activity, central/satellite, etc.



PI Project

Identification of rare objects

- Very bright LBGs
- Very IR-luminous starbursts / obscured QSOs
- Lyman alpha blob candidates
- Post-starburst candidates
  - Few-hundred fibres per setup
  - Identifying ideal galaxies for detailed followup (discovering a sample of cB58s), gold plated examples of the physics



Community Fibres

Characterization of clusters (largely for cosmology)

- Massive (>10k) cluster samples from Planck, PanSTARRS-1, DES, LSST
- Want
  - Redshifts – get BCG [Important, BigBOSS is the way to do this], perhaps 'free' if in LRG sample anyway
  - Dispersion/substructure – need many members
- Only have one fibre per 5-6 sq. arcmin, one-four fibres per cluster ☺

Free stuff + community fibres

Things for us to think about

- Obviously good example science projects that are reasonably competitive and span range of use modes and data type, quality requirements

- Trying to influence calibration patch strategy to maximize galaxy evolution science
- <~100 nights available dark
  - Bright time?
  - Pressure (or lack of) to keep BigBOSS on Mayall
- Modes, data quality & pipeline special requirements