Obvious science areas

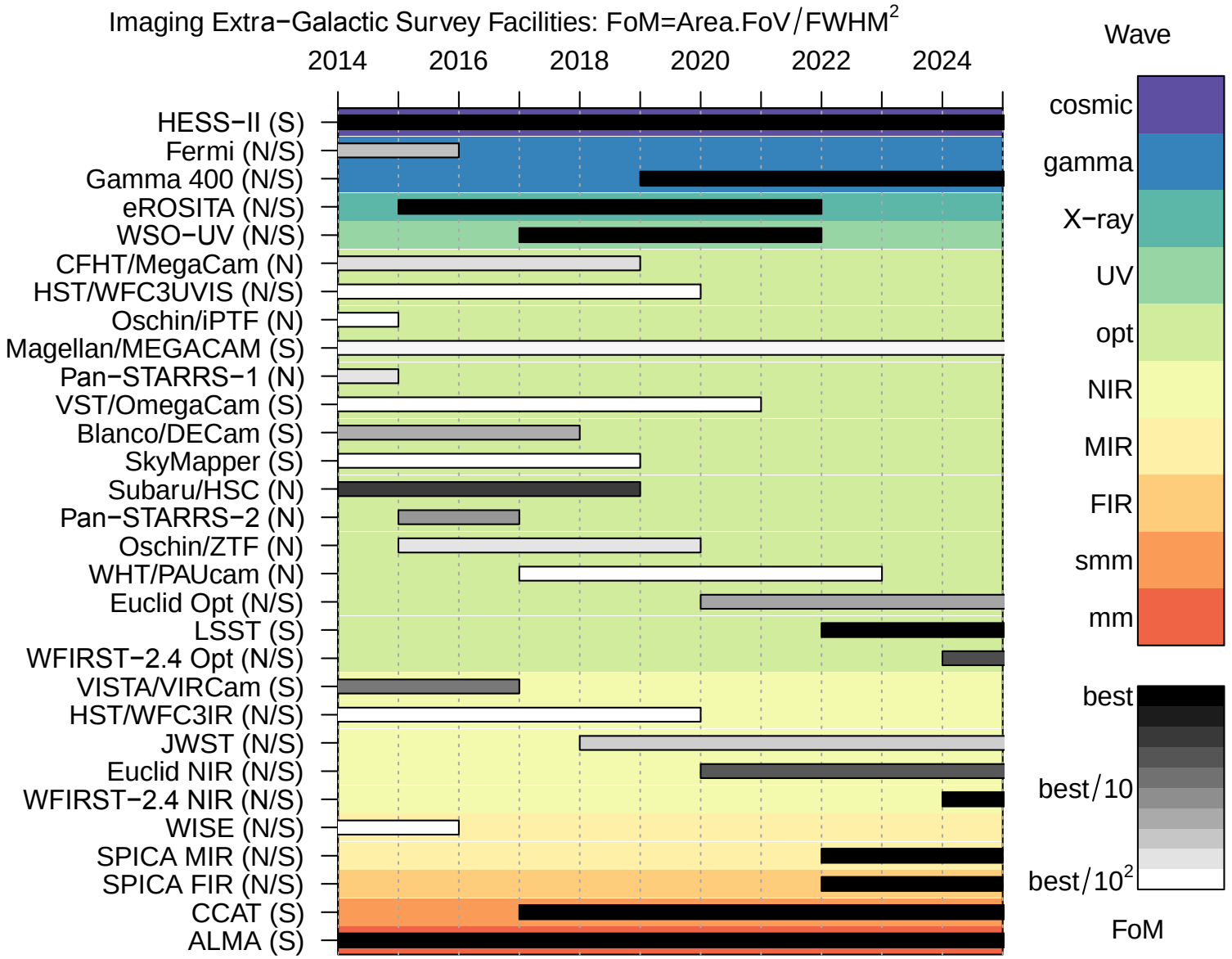
- SkyMapper competitive where 20,000 gives edge over 1,500 sq deg, i.e., z<0.05

- ~50 million galaxy redshift survey at z<0.1 with Δz = +/-300km/s
  - With TAIPAN: group finding, 50k groups, 5k with N>4 with M>10^{12}M, HMF etc.
  - Refined photo-z to r~22 mag using group priors

- Surface analysis of z<0.05 galaxy population
  - Nucleus,bulge,bard,disc decomposition of 10,000 systems to r<??? With z<???
  - Investigation of outer halos of galaxies
  - Photometric-IFU analysis

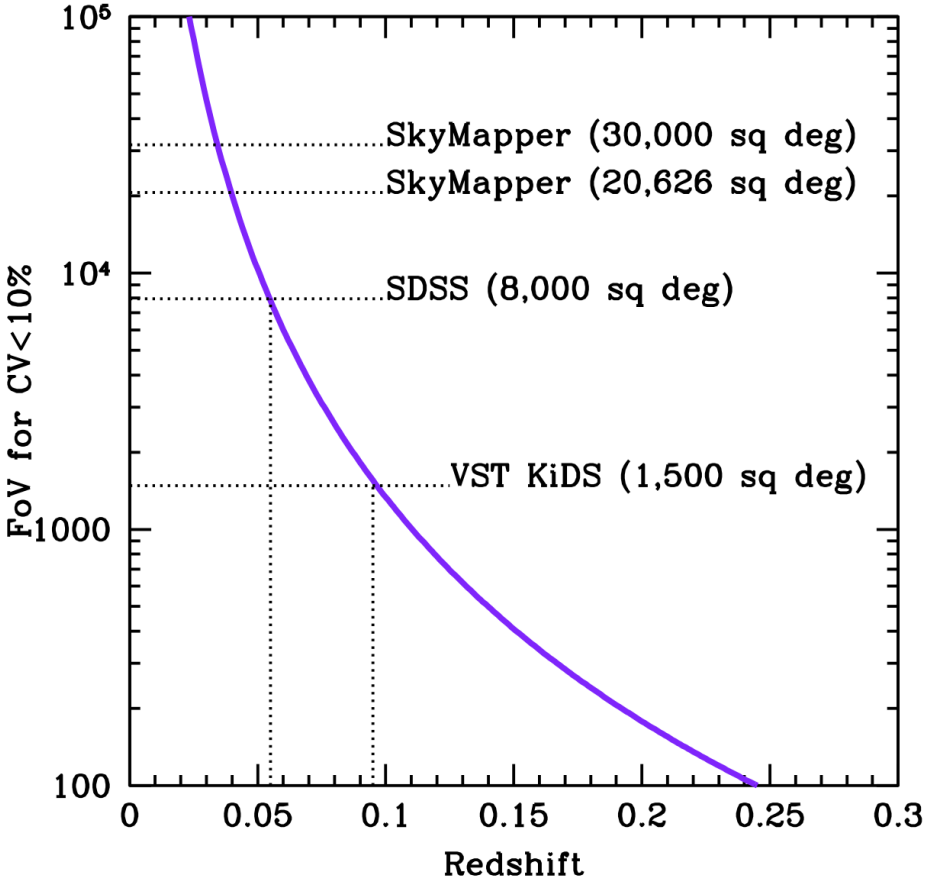
- Coordinated HI/SkyMapper analysis
  - Use of optical priors
  - Optical inclinations for TF
  - HI stacking

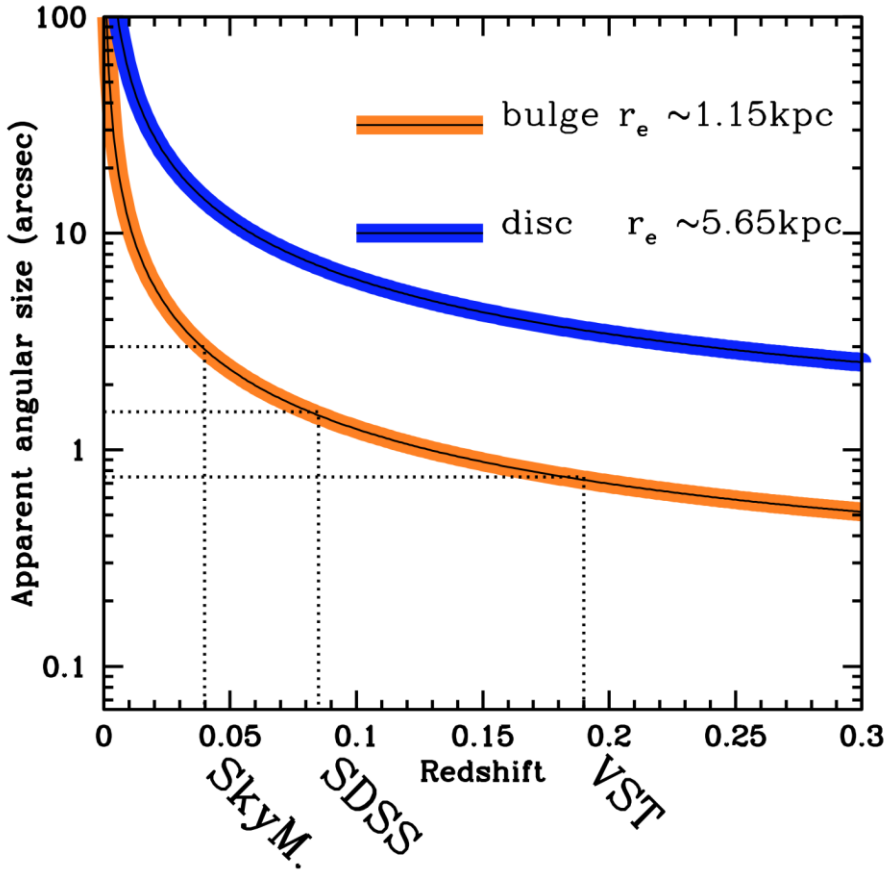
Imaging survey facilities



(ex-gal) Limitations

- CV~10% for volume of $10^7 h^{-3}_{0.7} Mpc^3$ (Driver & Robotham 2010)
- SkyMapper rules for z<0.05 Universe (typical galaxy bulges resolved)
- SkyMapper+VHS rules for z<0.2 Universe (photo-z SkyM, resolution VISTA)



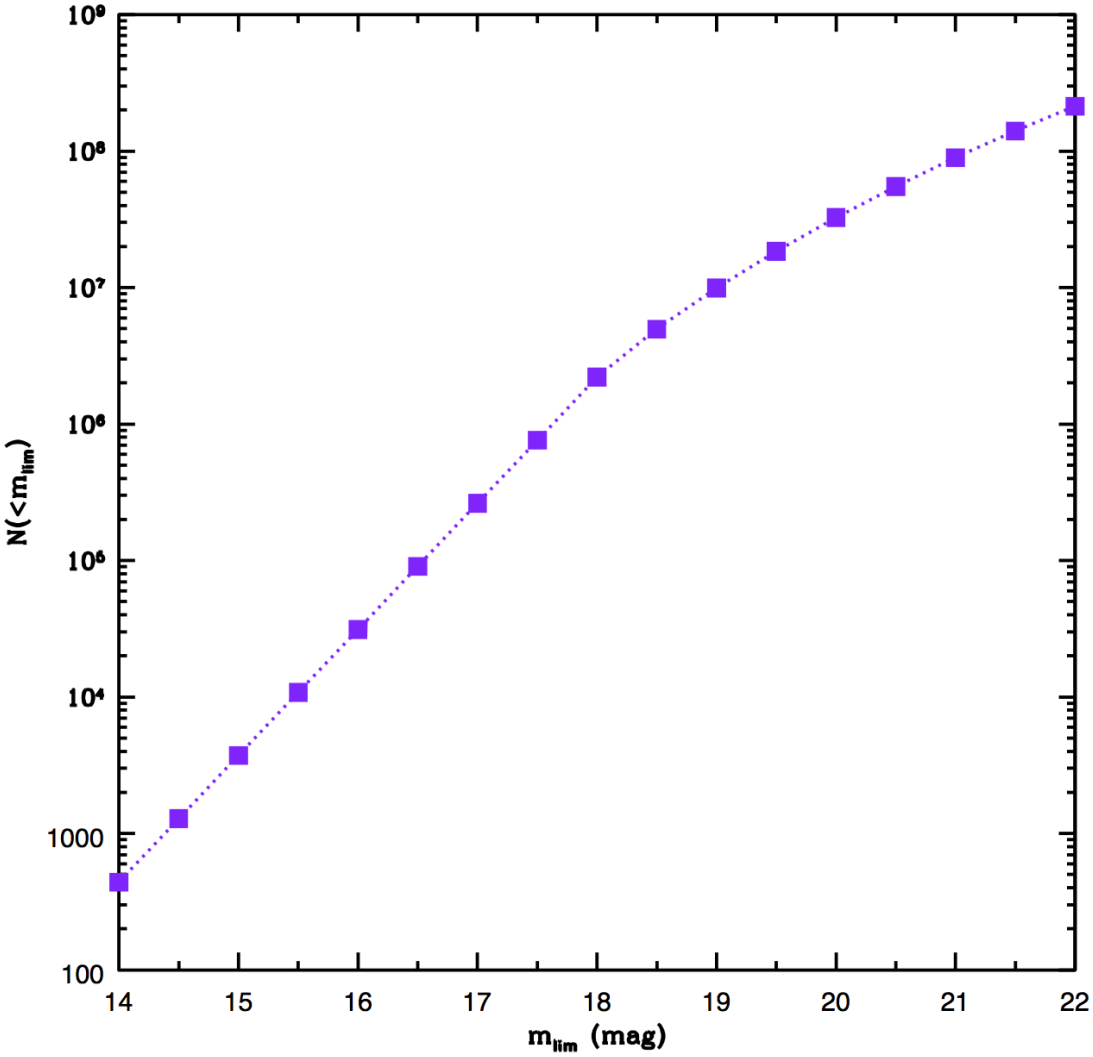


200 million galaxies to r<22mag

10million z<0.05
50million z<0.10

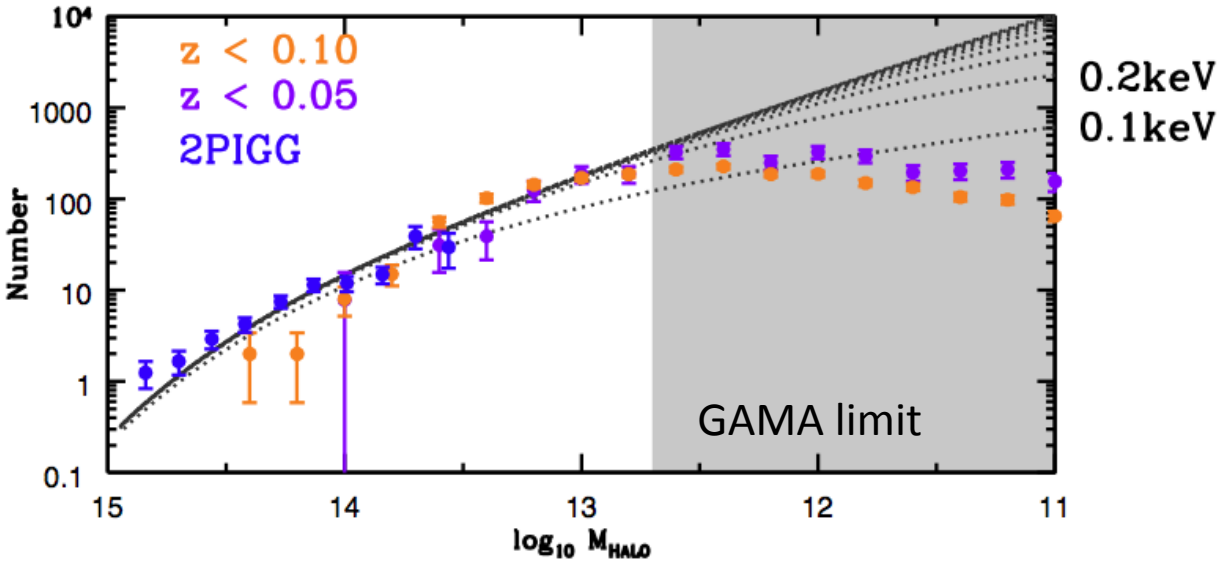
Need to focus on the 10million…

How to find them Robustly…



10 million galaxy (p)-z survey

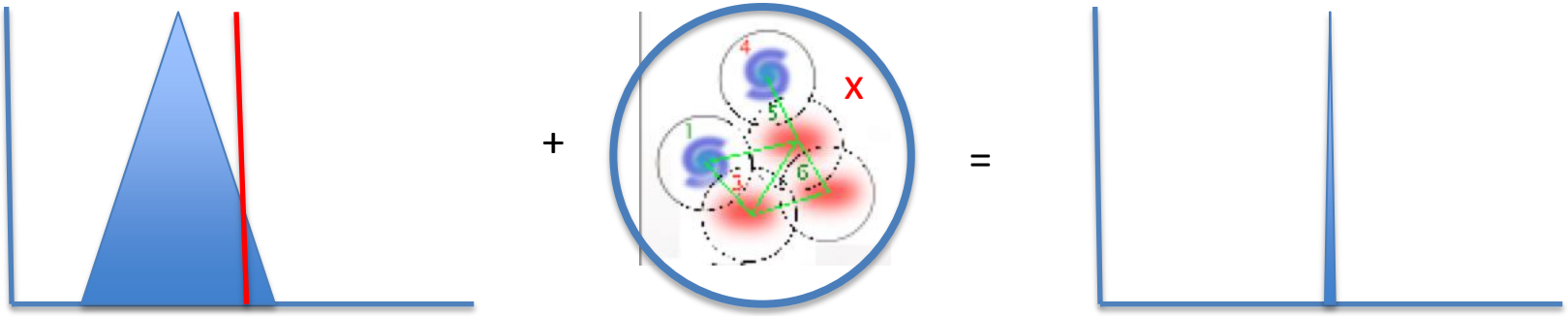
- TAIPAN to survey 500k targets mostly z<0.1 over ~5years
- Robust pair cat of 50k pairs and 5k groups
  - Study tidal features/asymmetry and SF v pair separation and stellar mass
  - Halo mass function to 10^{12}M (DM particle constraint)



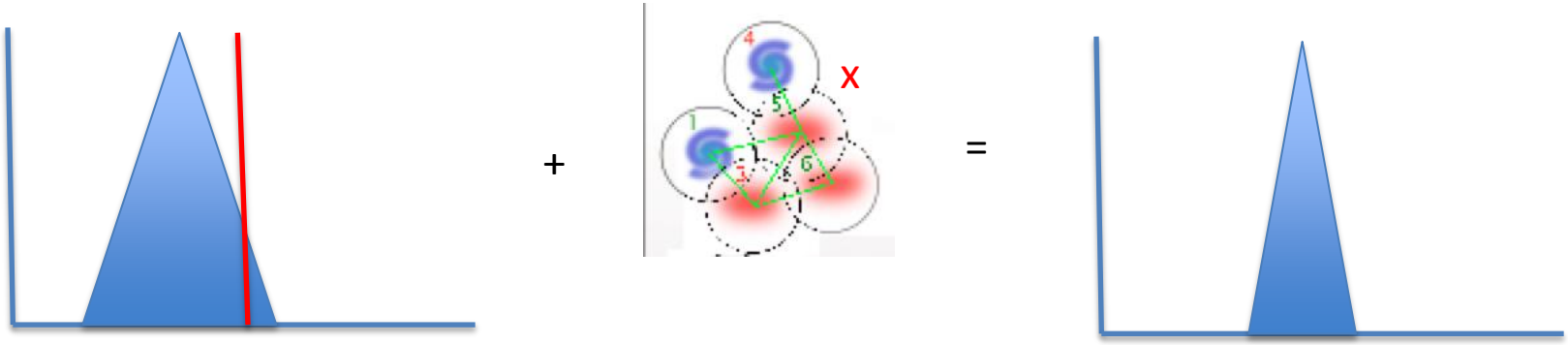
  - Use halos to refine photo-z Δz +/-9000 km/s → +/-300km/s (MAGIC. NO!)

Group refinement

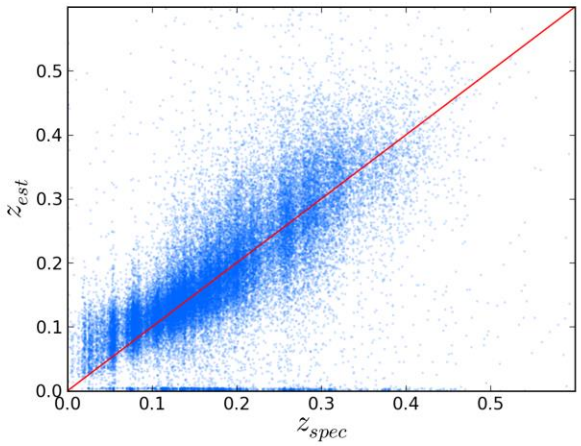
- Two methods:
- Combine photo-z PDF with l-o-s group radius

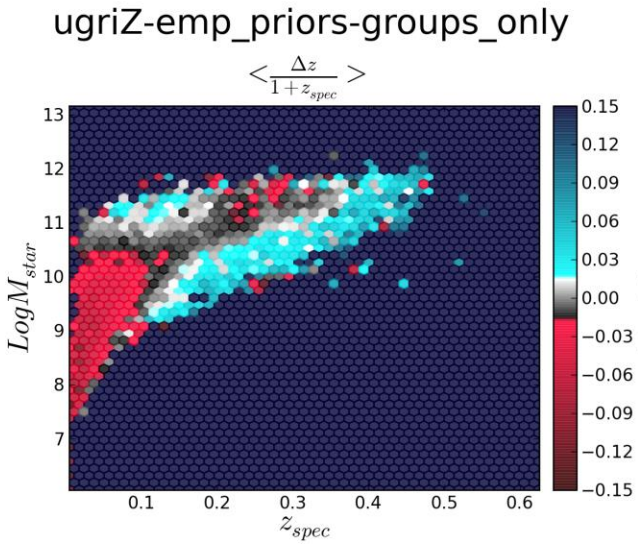


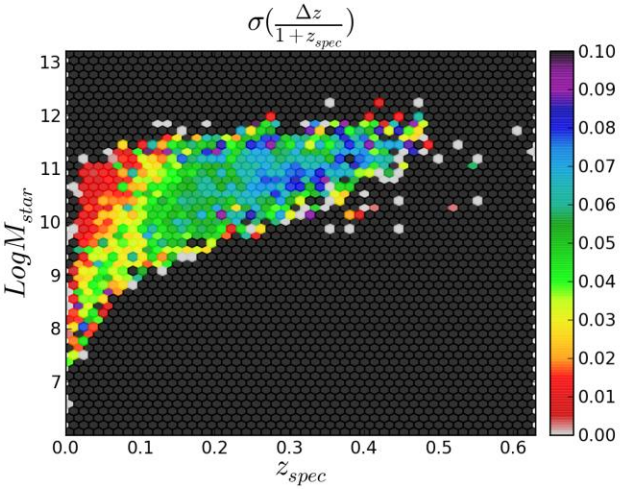
- Combine photo-z PDF with group mean linking length

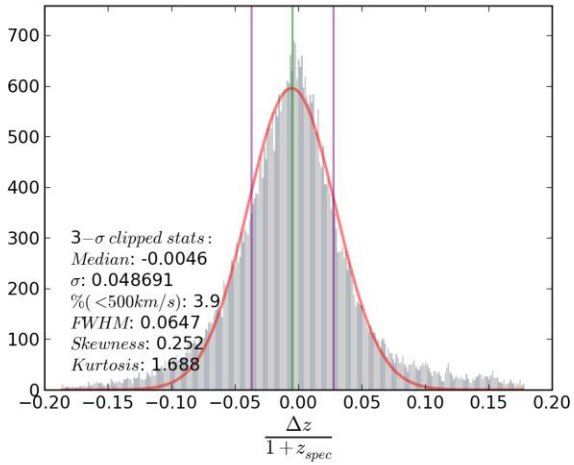


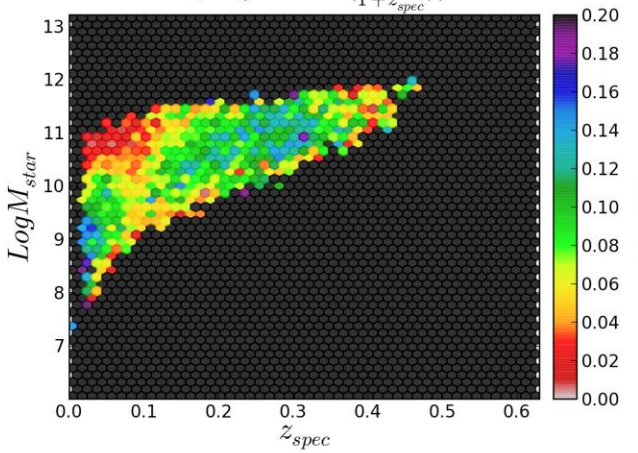
Standard Photo-z

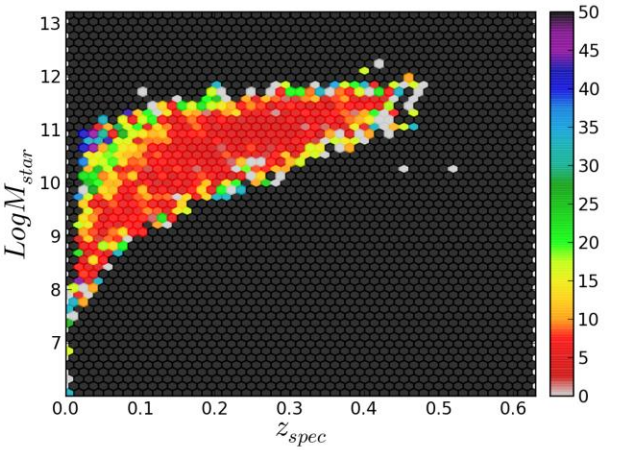






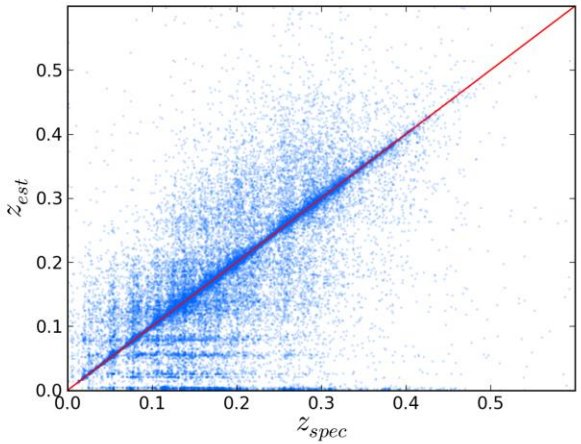


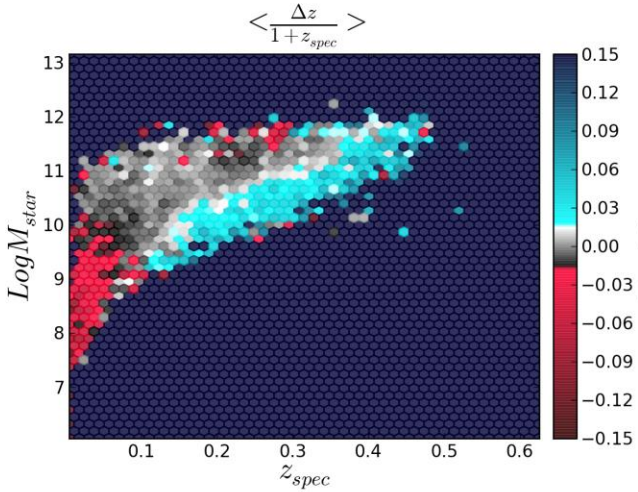


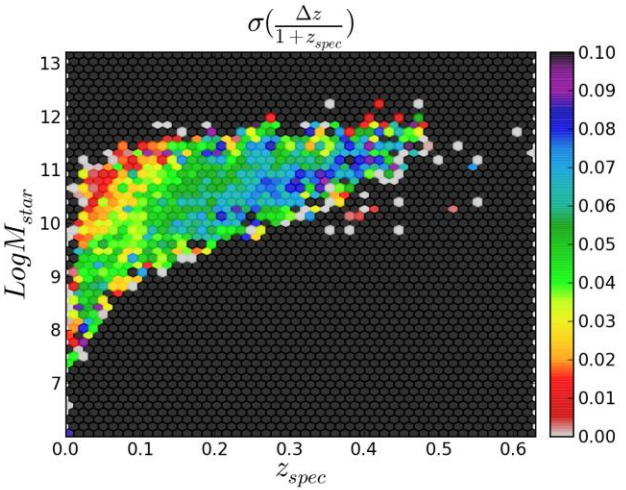


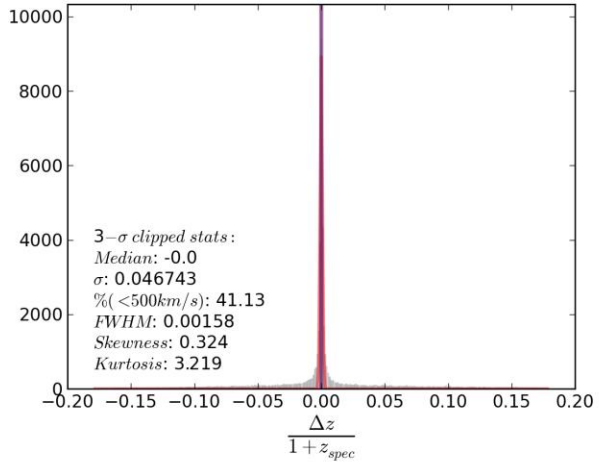
Group refinement

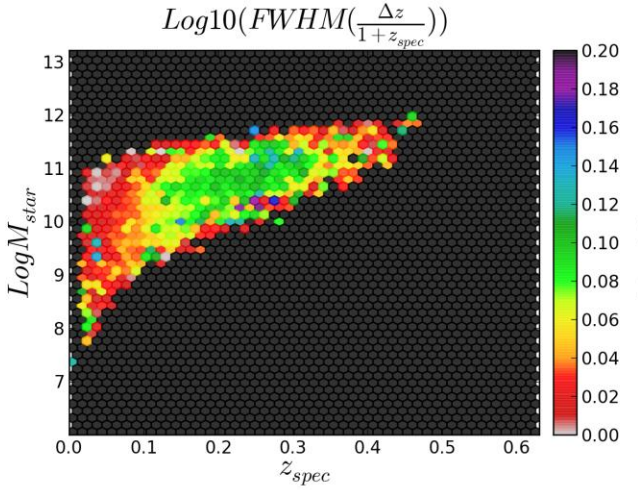
ugriZ-emp_priors+group+improv-0.1

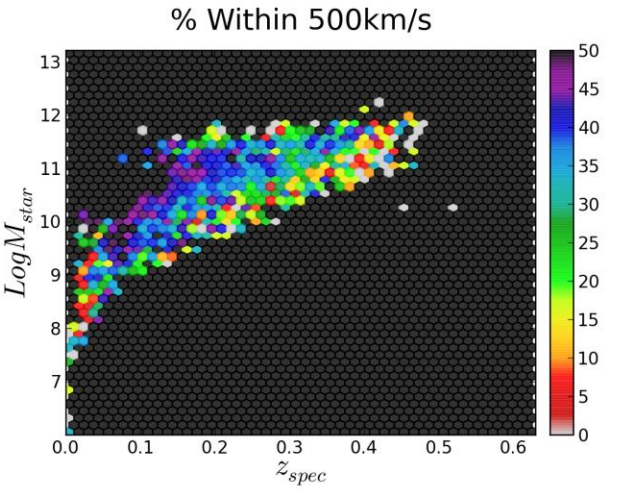




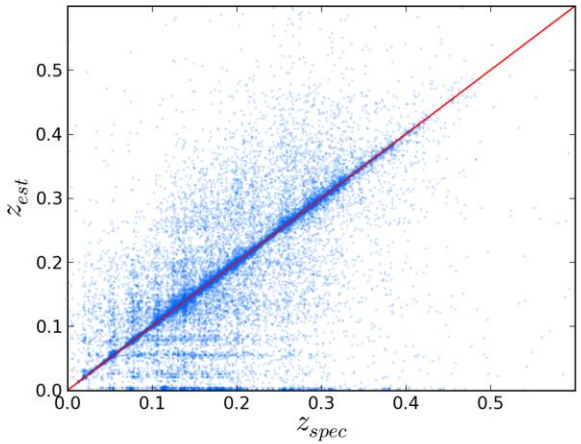


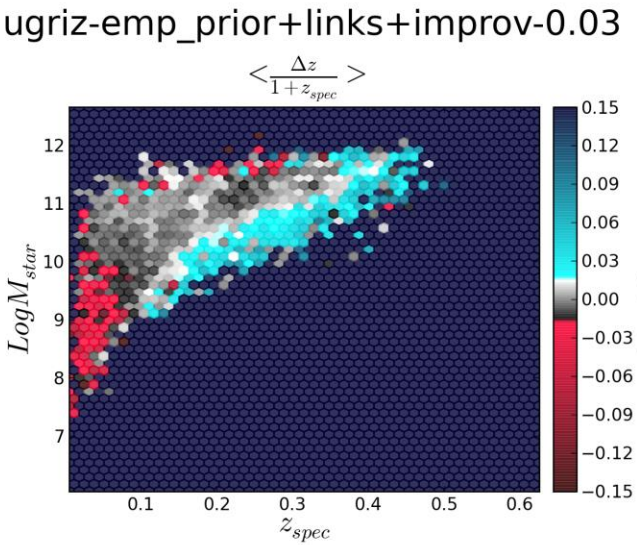


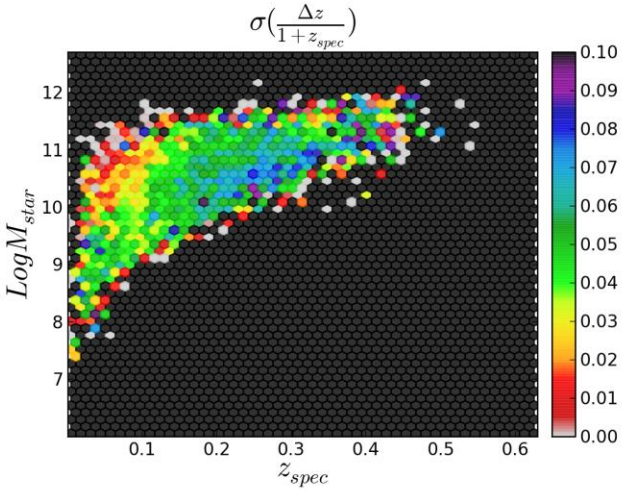


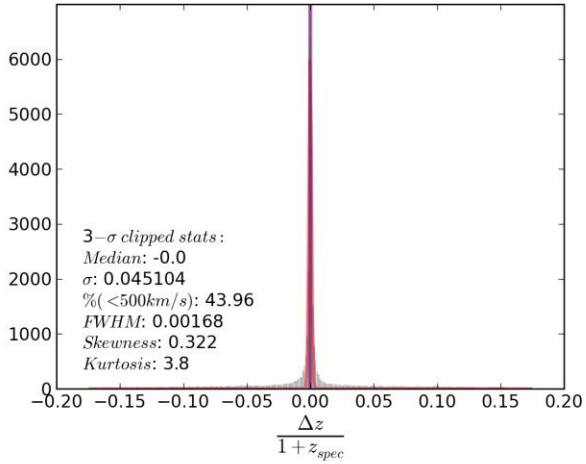


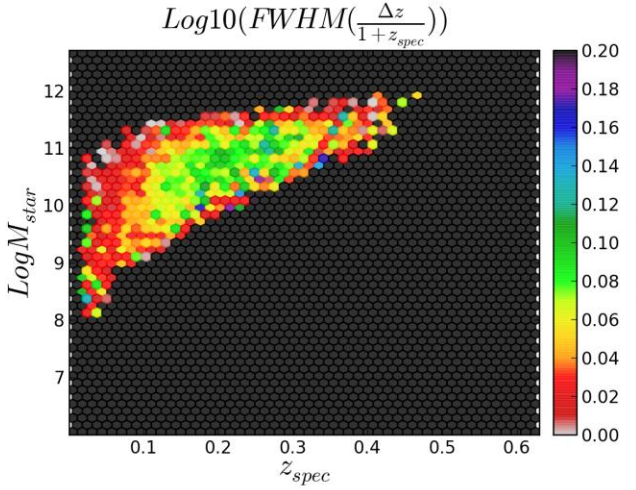
Group refinement

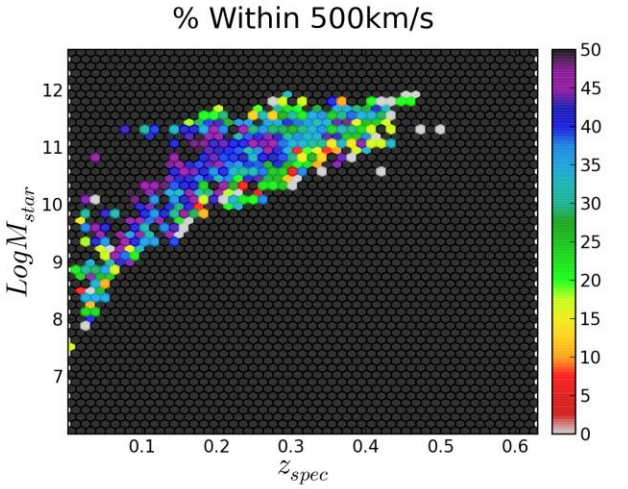












10 million galaxy (p)-z survey

- r<22mag with z<0.05 = 10 million (down to M=-13mag)
- r<22mag with z<0.10 = 50 million (down to M=-14 mag)
- Refinement of halo masses
- Halo occupation statistics v halo mass
- Z's accurate for HI stacking (10million galaxies within WALLABY!)
- Surface brightness limits may prevent detection or require creative steps (e.g., remove stars, bin data etc)

- New algorithm in progress to combine photo-z, group finding and group refinement all in one monster black box possibly fold in size and type priors too…..

Structural analysis (Why)

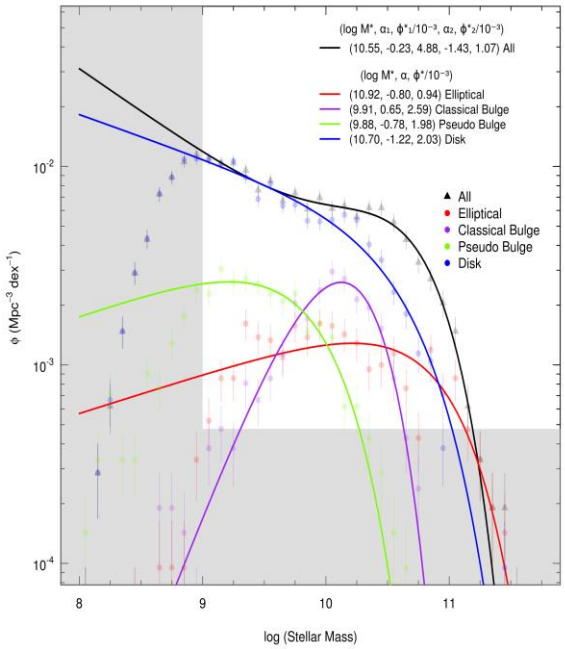
- SIGMA code in place to process all resolved galaxies

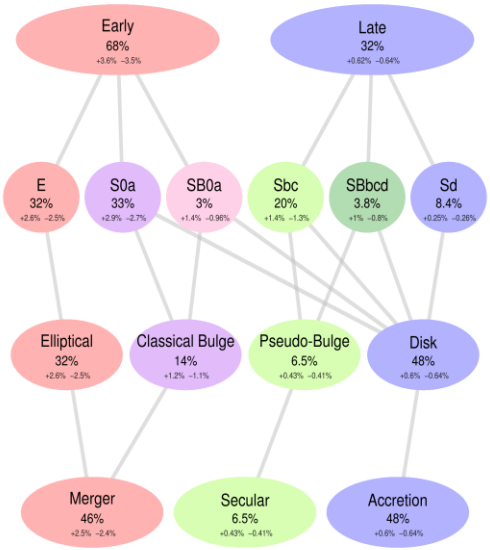
- Nucleus associated with AGN or central CMO star-cluster
- Spheroids/bulges formed via collapse/mergers (Hot mode)
- Discs grow via gas accretion (Cold mode)
- Halo implies lumpy accretion history
- Pseudo-bulges/bars formed via secular processes (Secular mode)

- Mass in each component => evolutionary history of each galaxy
- Studies so far restricted to mainly L* systems
- Need to study sub-L* as well

- Bulge luminosity → SMBH mass

The (baryonic) mass budget





TAIPAN/SkyMapper/VHS can extend this to much lower masses.
Study influence of halo mass on the mass budget

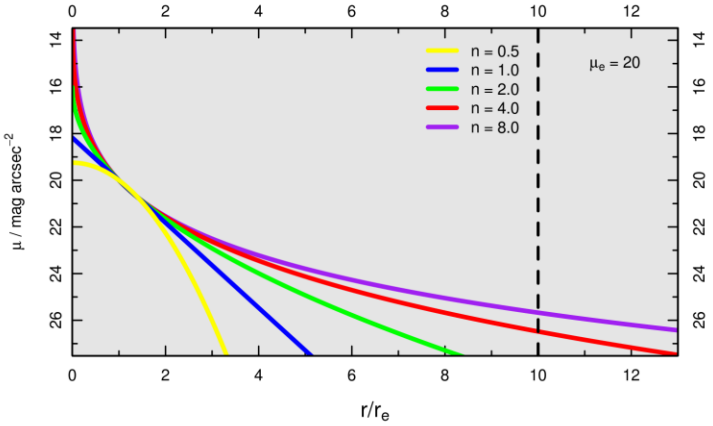
Multi-Component Models

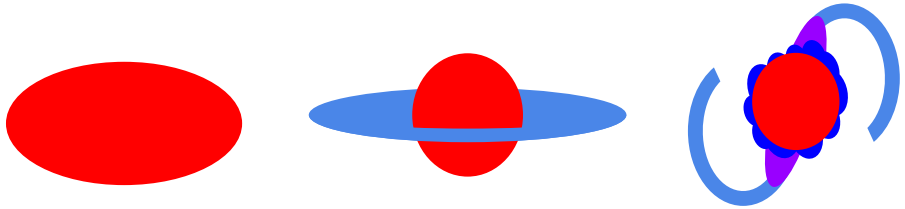
M01: Single-Sérsic

M02: De Vaucouleurs bulge + exponential disk

M03: Sérsic bulge + exponential disk

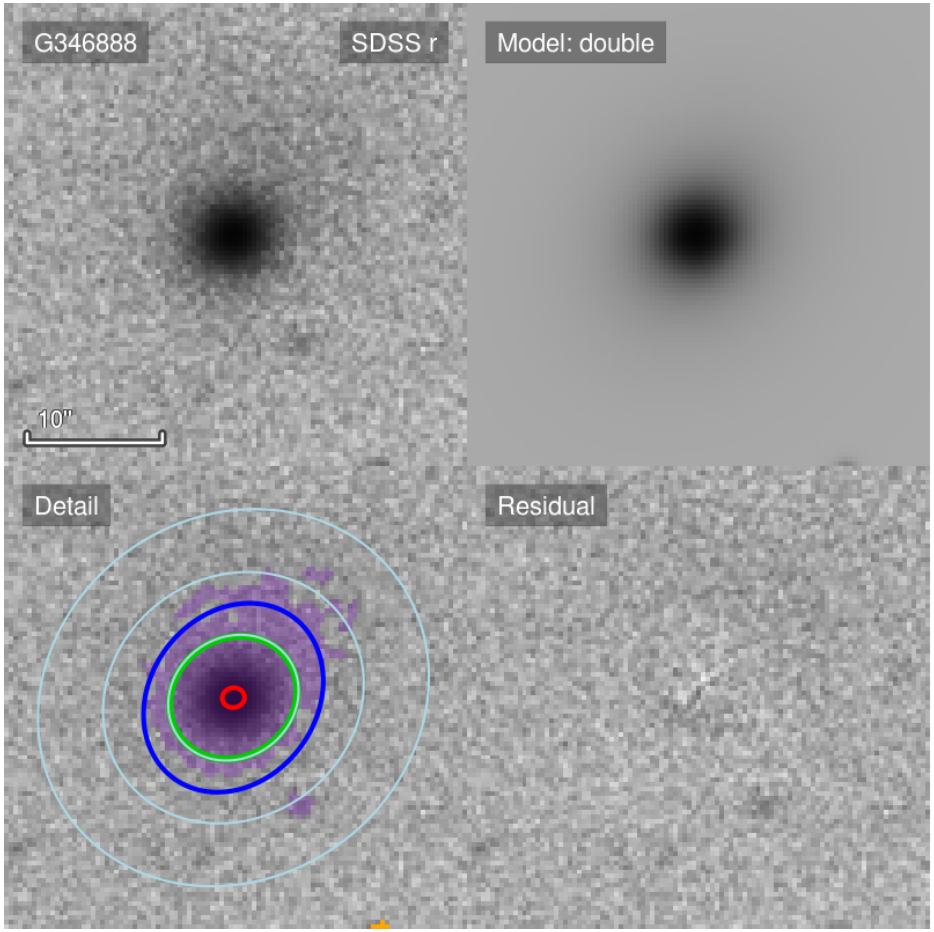
M04: Sérsic bulge + Sérsic disk

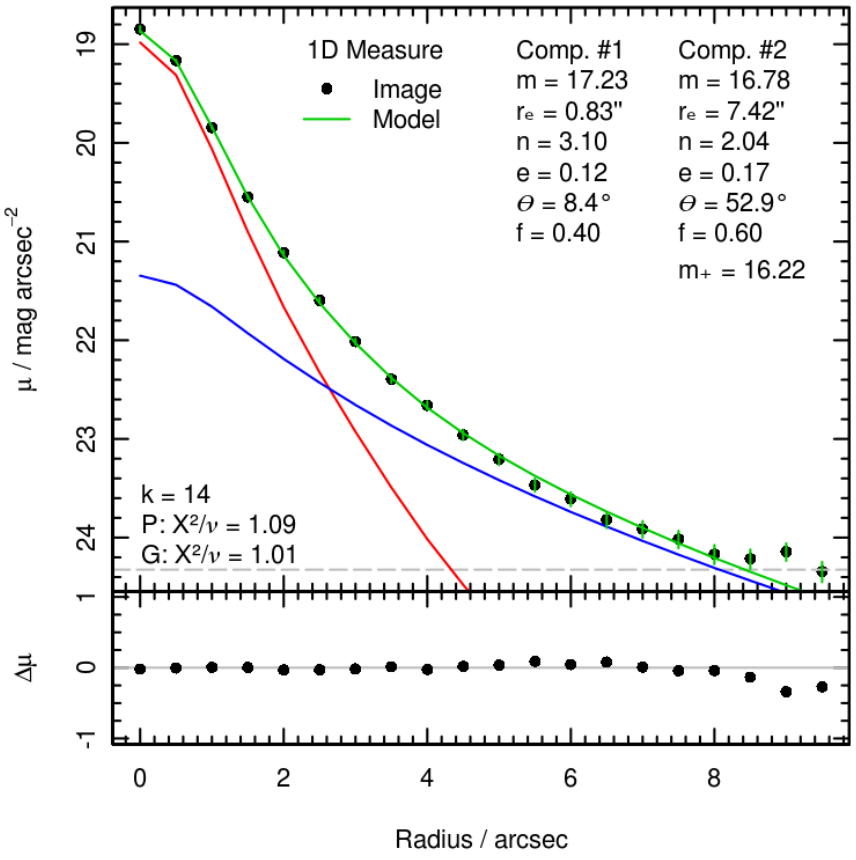




Elliptical: G346888

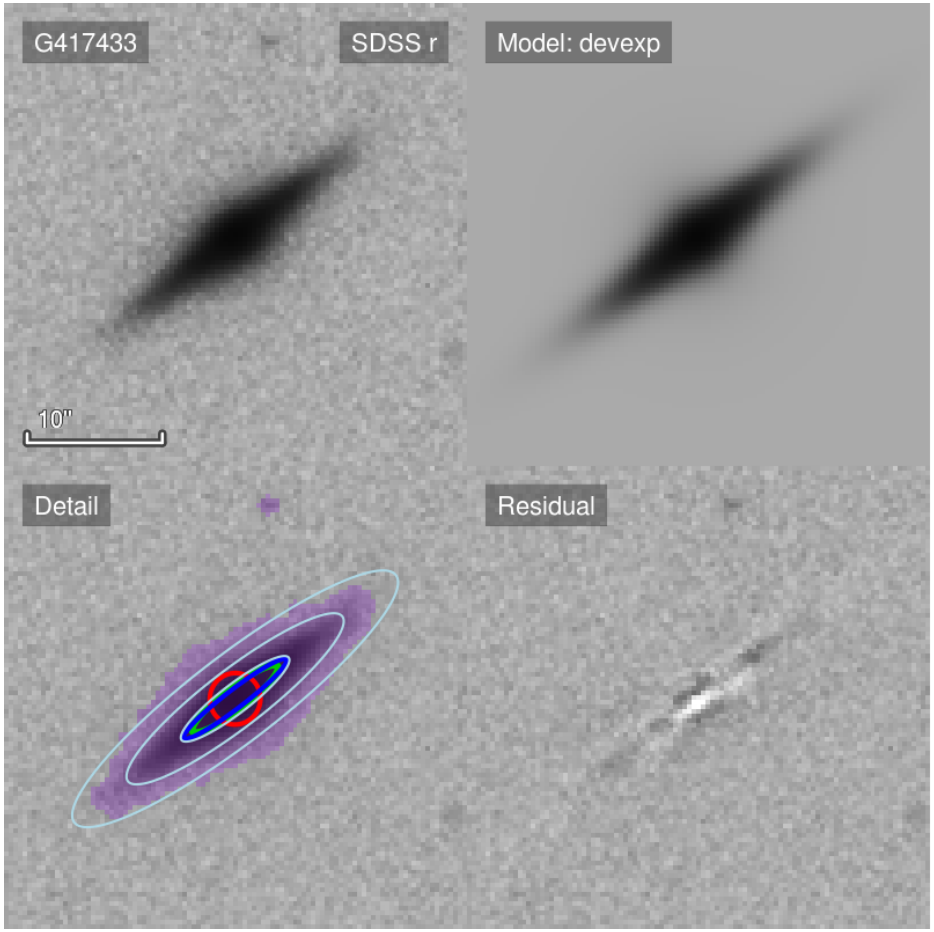
M04: Sérsic bulge + Sérsic disk

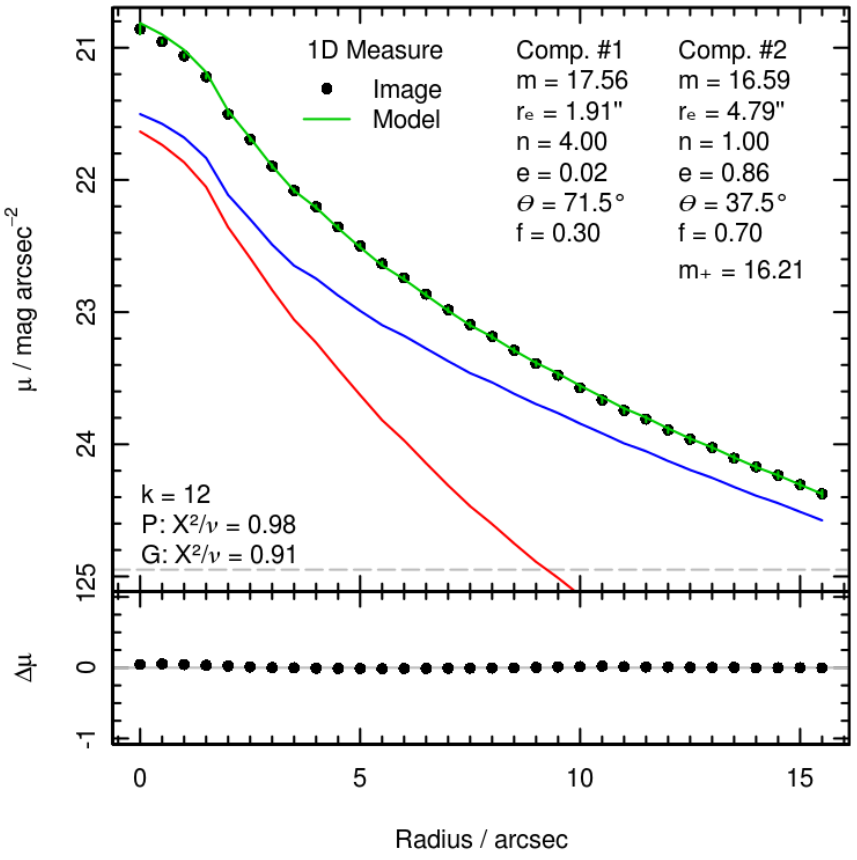




S0a: G417433

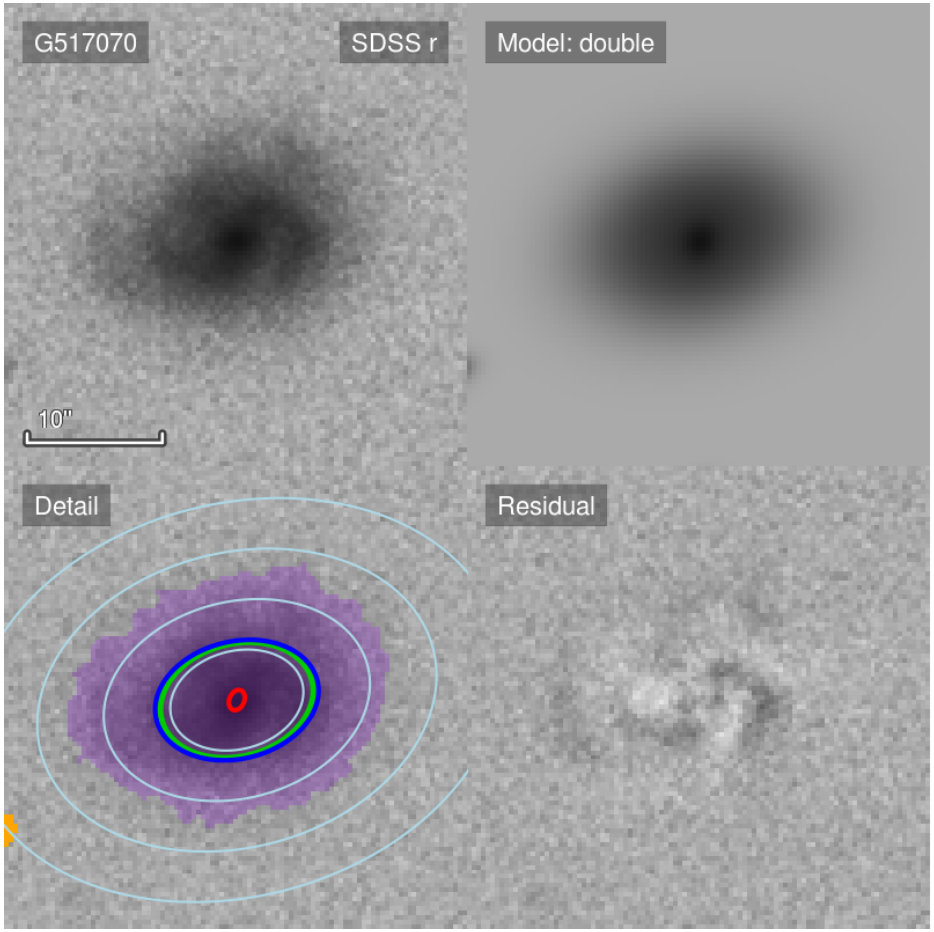
M02: De Vaucouleurs bulge + exponential disk

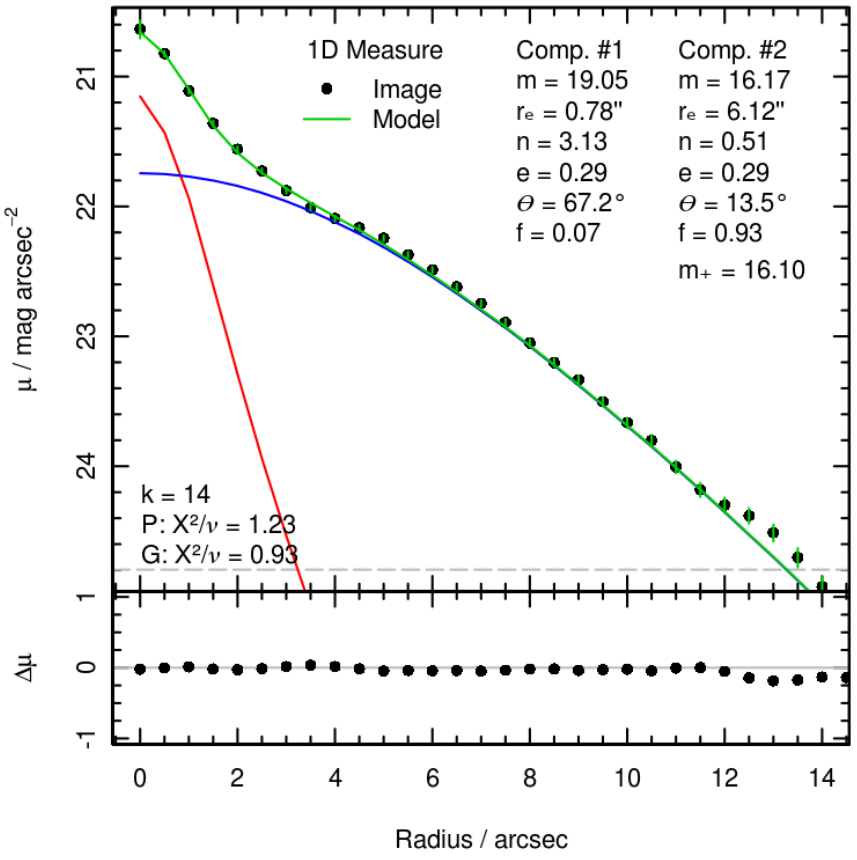




SBbc: G517070

M04: Sérsic bulge + Sérsic disk

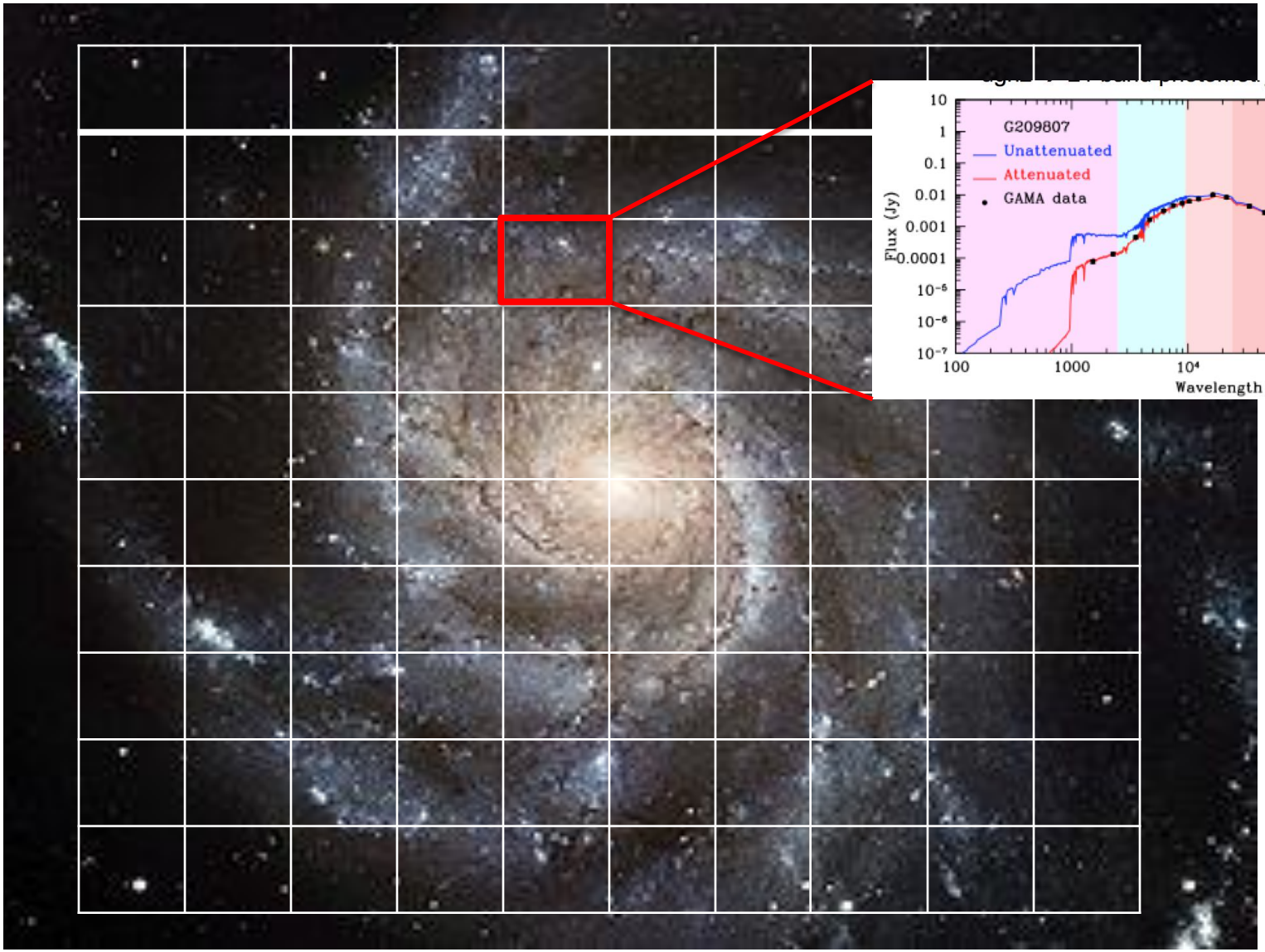




GAMA

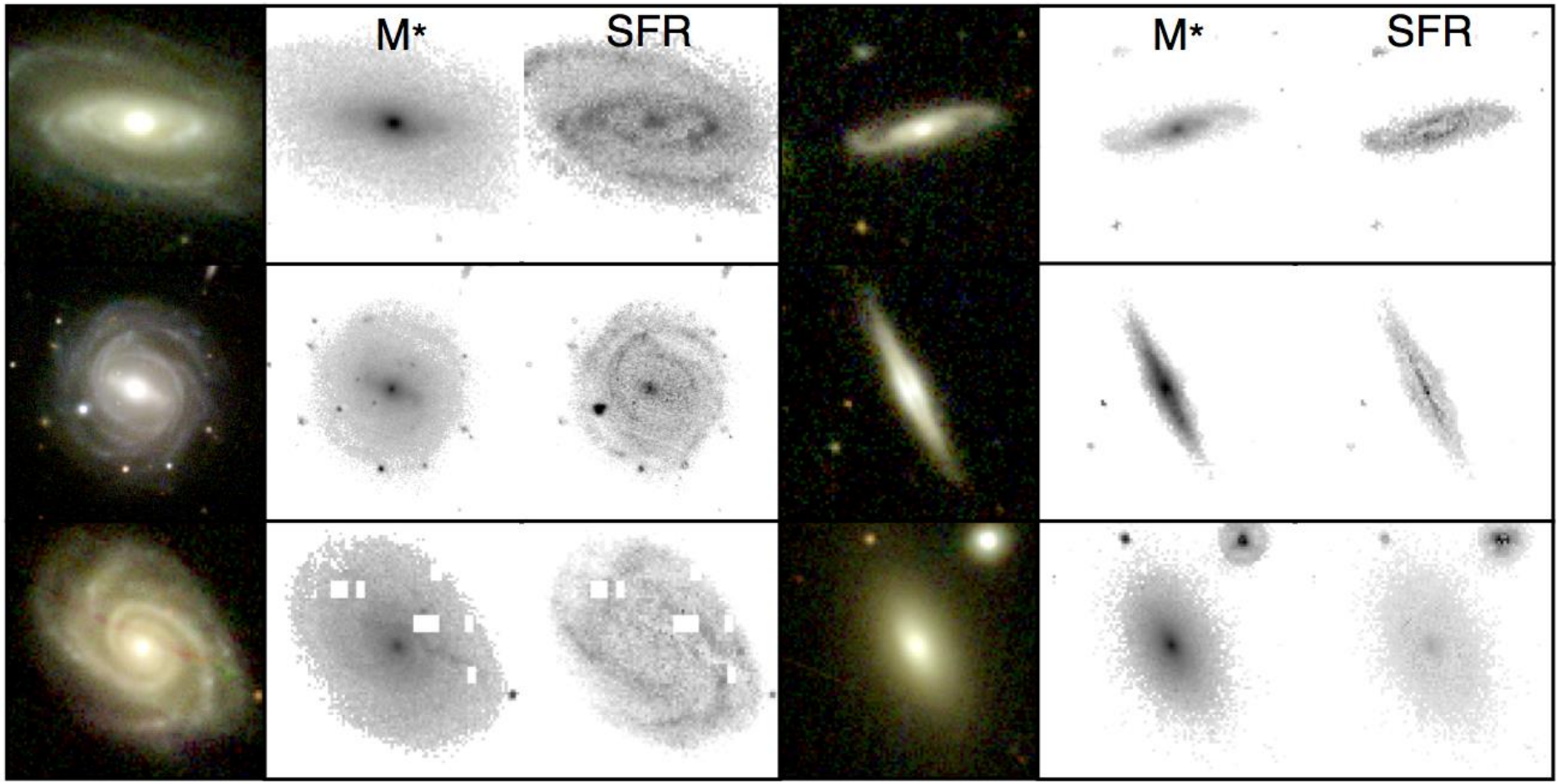
Galaxy on 100pc ssscales

Photometric IFUs



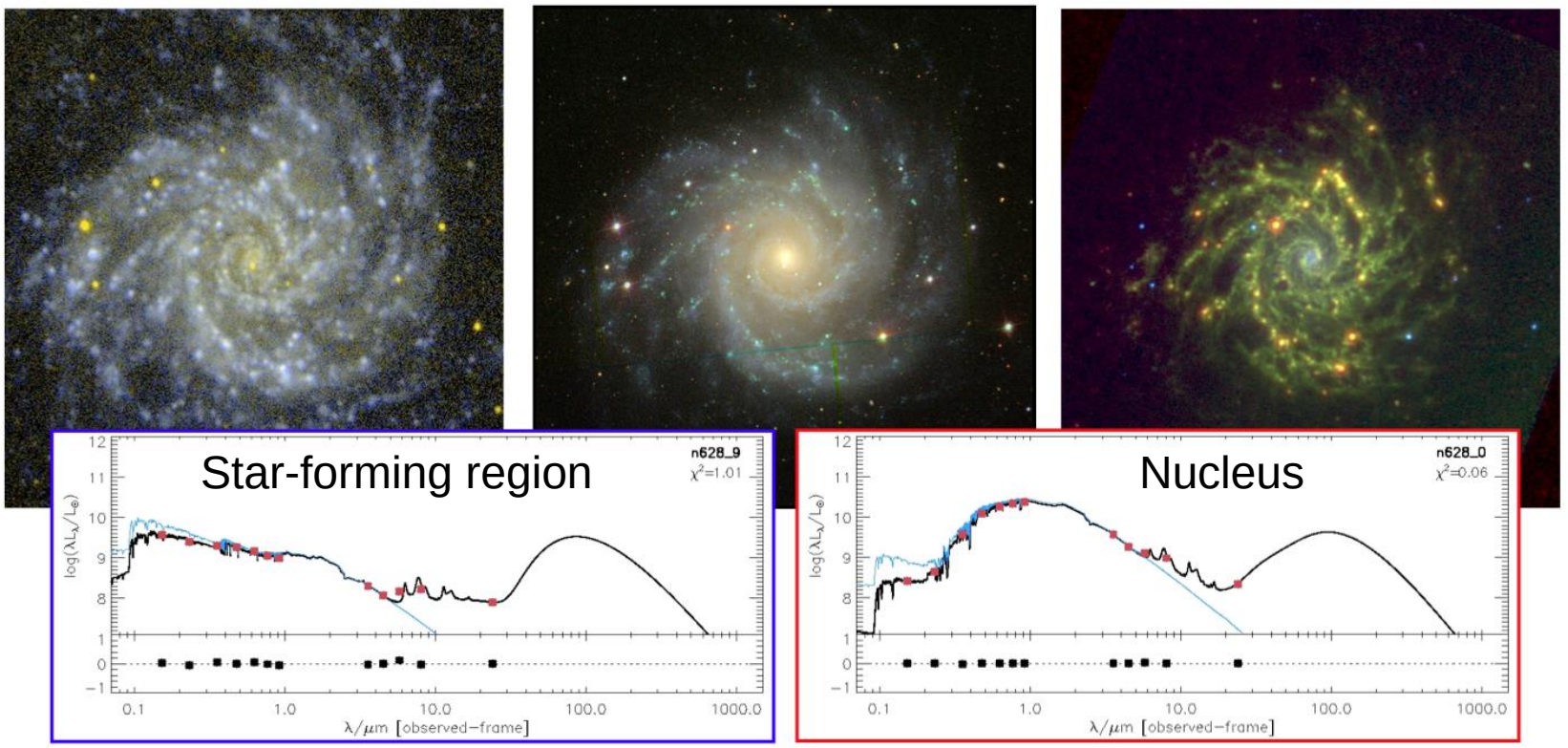
Pixel mapping

- **POGS (MEURER, THILKER, VINSEN)**



Pixel Mapping

- **POGS (MEURER, THILKER, VINSEN)**

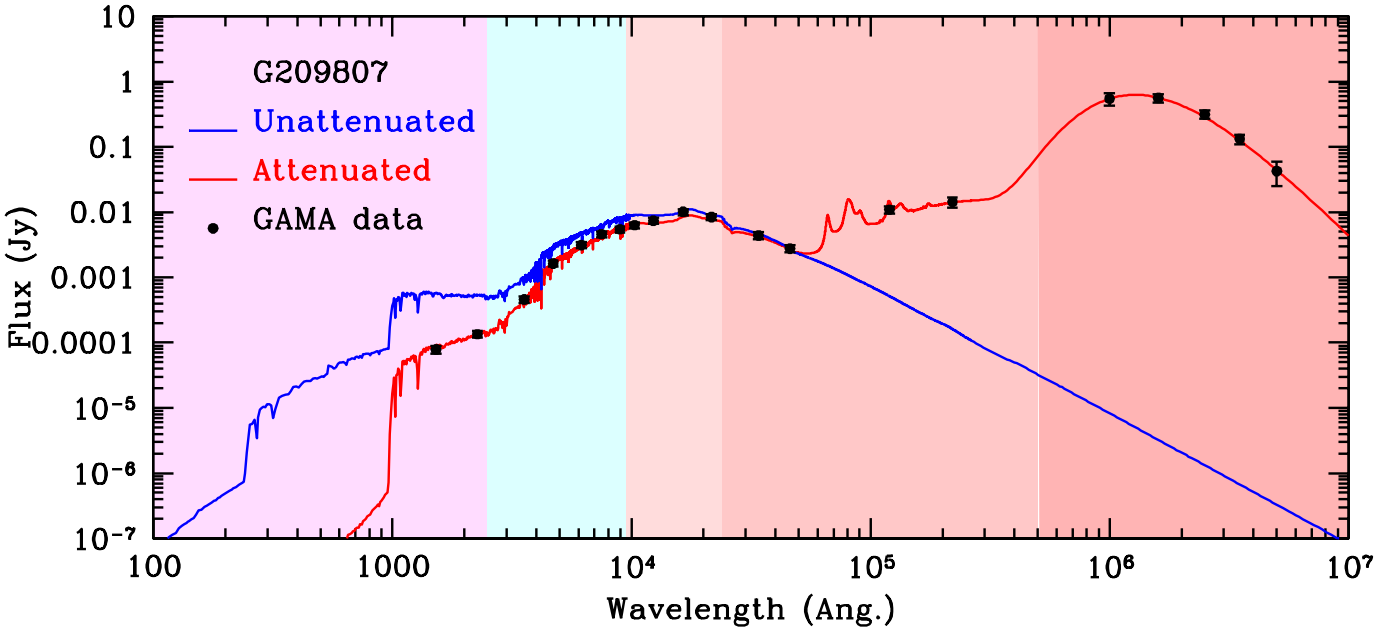


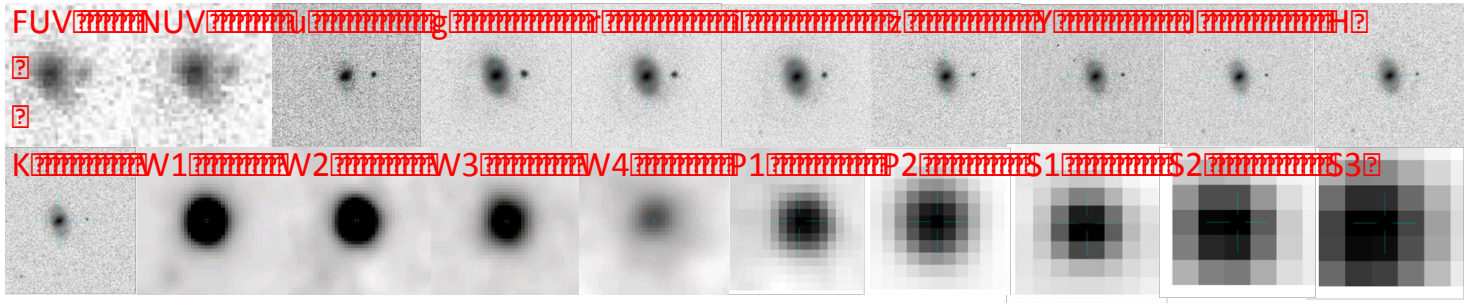
For poorer resolved systems focus on just integrated bulge and disc properties

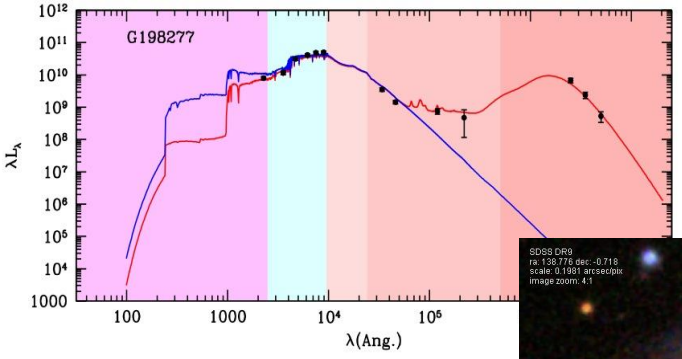
GAMA: Building on SDSS

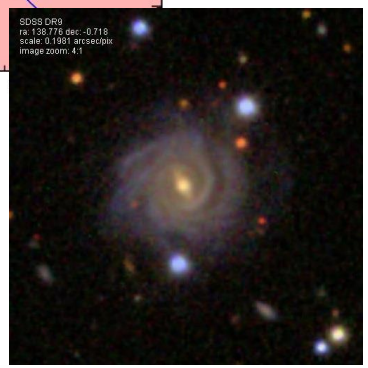
MAGPHYS (da Cunha et al 2008)=> M_*, M_D,Z,SFR,T_D,T_W,L_D/L_W,+

ugriz → 21 band photometry + Radio (HI+20cm-1m)



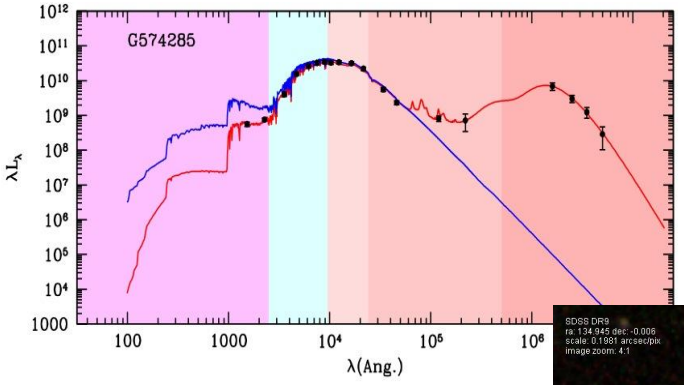


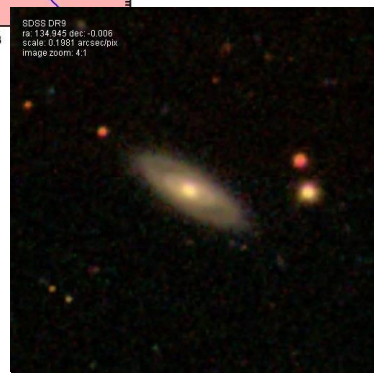




G198277 (Sb)

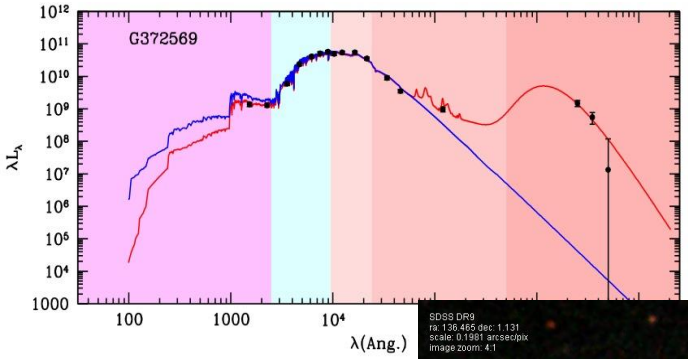
M_r = -14.7

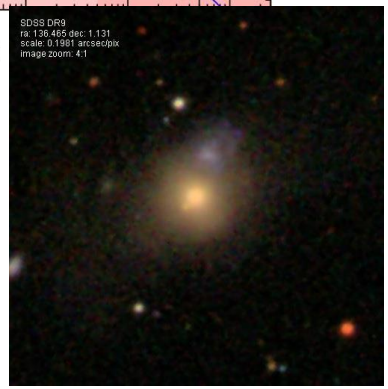




G574285 (Sb)

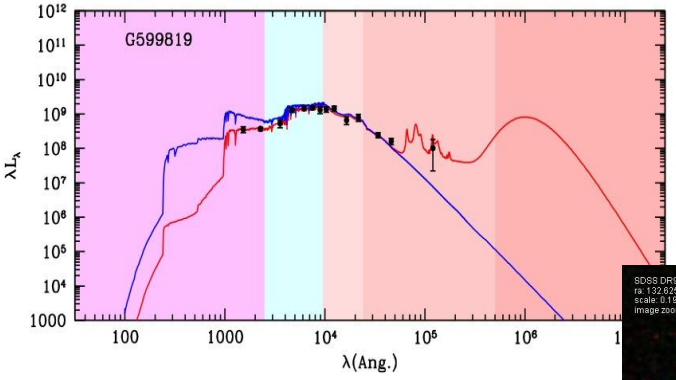
M_r = -15.2

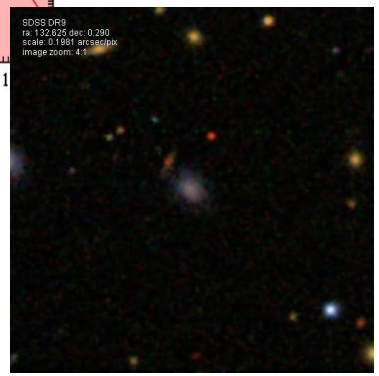




G372569 (E)

M_r = -14.7

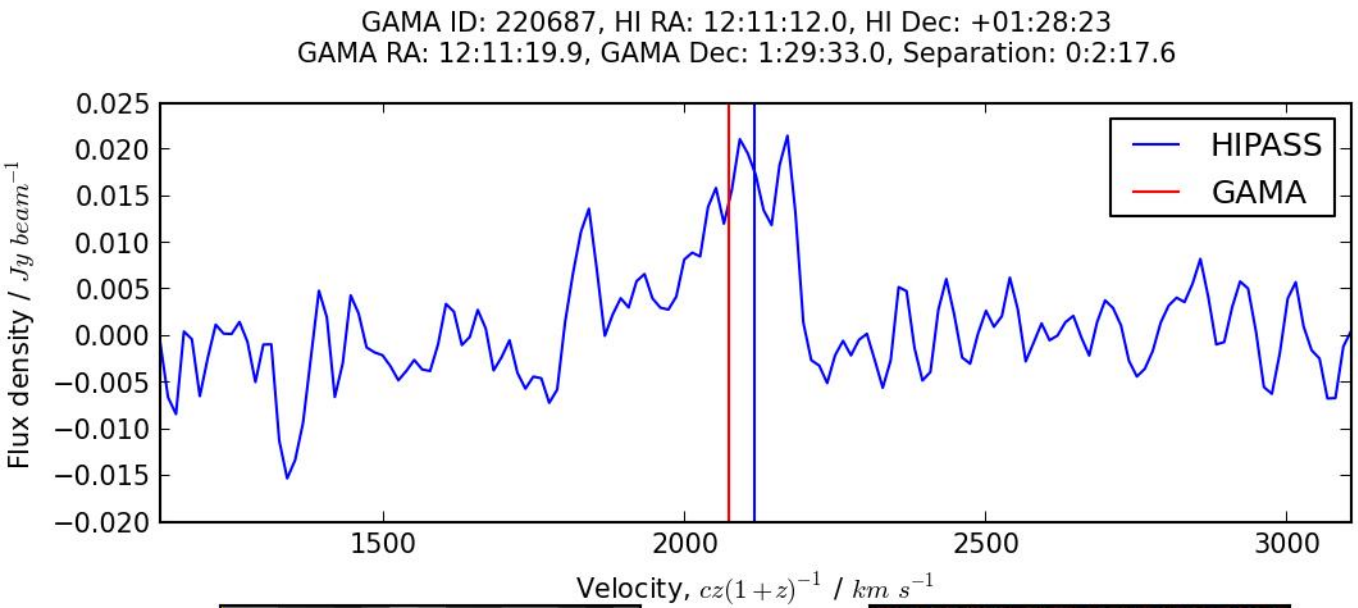


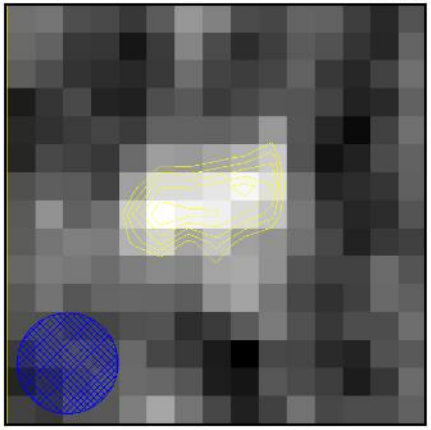


G599819 (Sd)

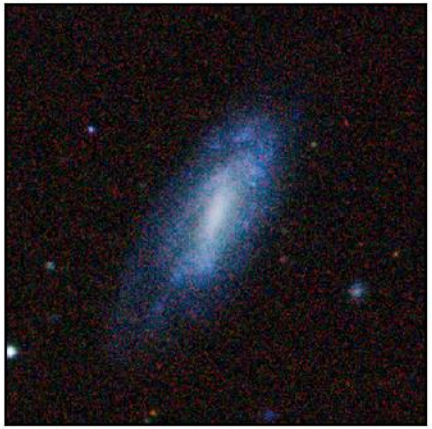
M_r = -18.3

GAMA and HIPASS



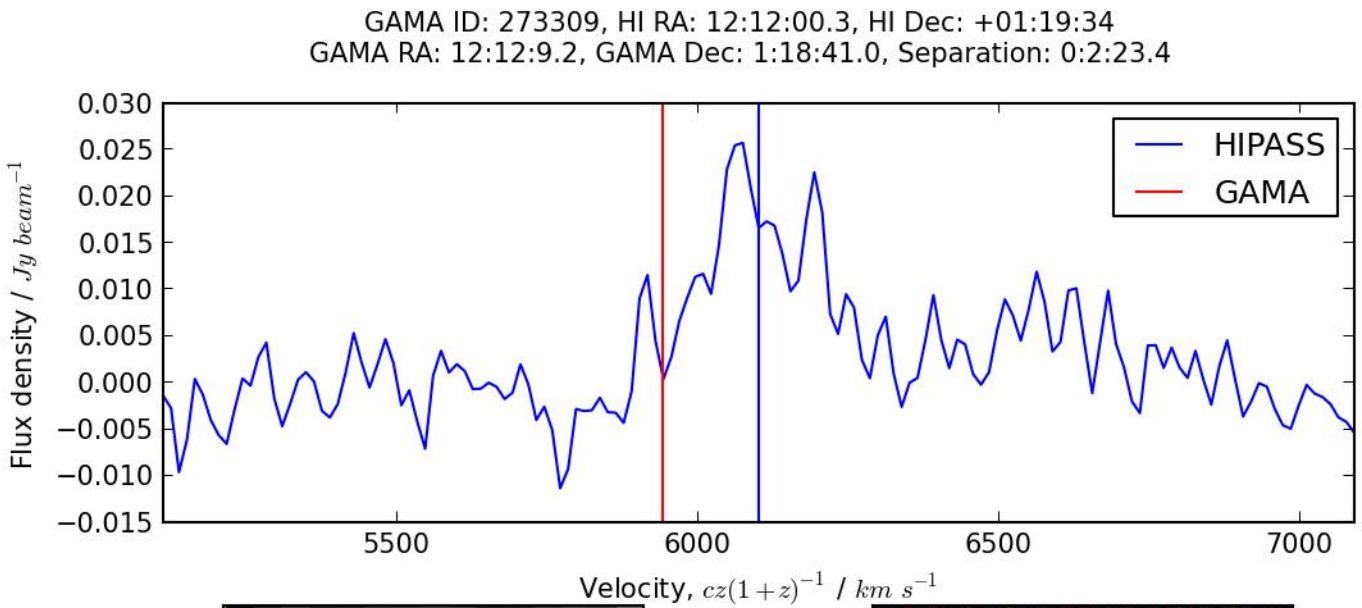


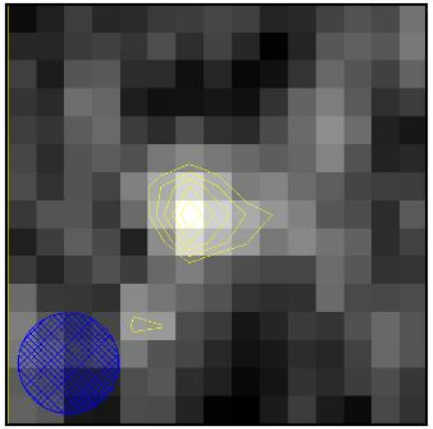
HIPASS zero-moment map



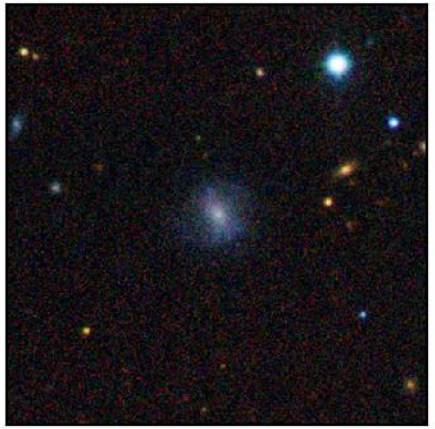
GAMA image

GAMA and HIPASS





HIPASS zero-moment map

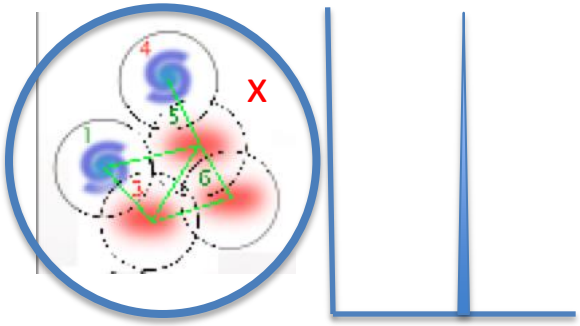


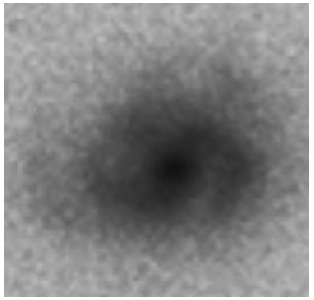
GAMA image

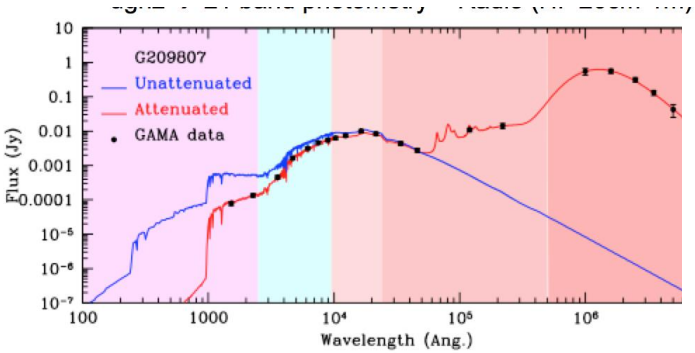
SkyMapper+VISTA VHS+WISE+ASKAP

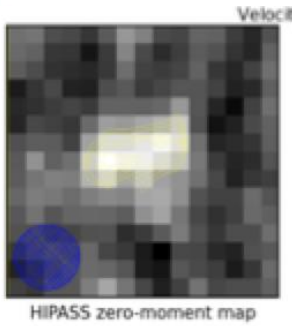
- TAIPAN critical to define z<0.1 groups
- SkyMapper critical for photo-z, need to catch that 4000A break
- VISTA VHS critical for star-gal separation and 1kpc structure to z<0.2
- WISE critical for indication of dust content to get dust corrected fluxes
- ASKAP(WALLABY/EMU) to provide HI and continuum

TAIPAN + SkyMapper + VIKING + WISE/Akari + HI









- Each by itself is interesting, together immensely powerful
- 1-2million to combine dataset of 200million galaxies
- Dataset needed by EMU, WALLABY, MWA, 4MOST etc
- Only Australia can do this (access to all data)
- Science = z<0.1 Legacy