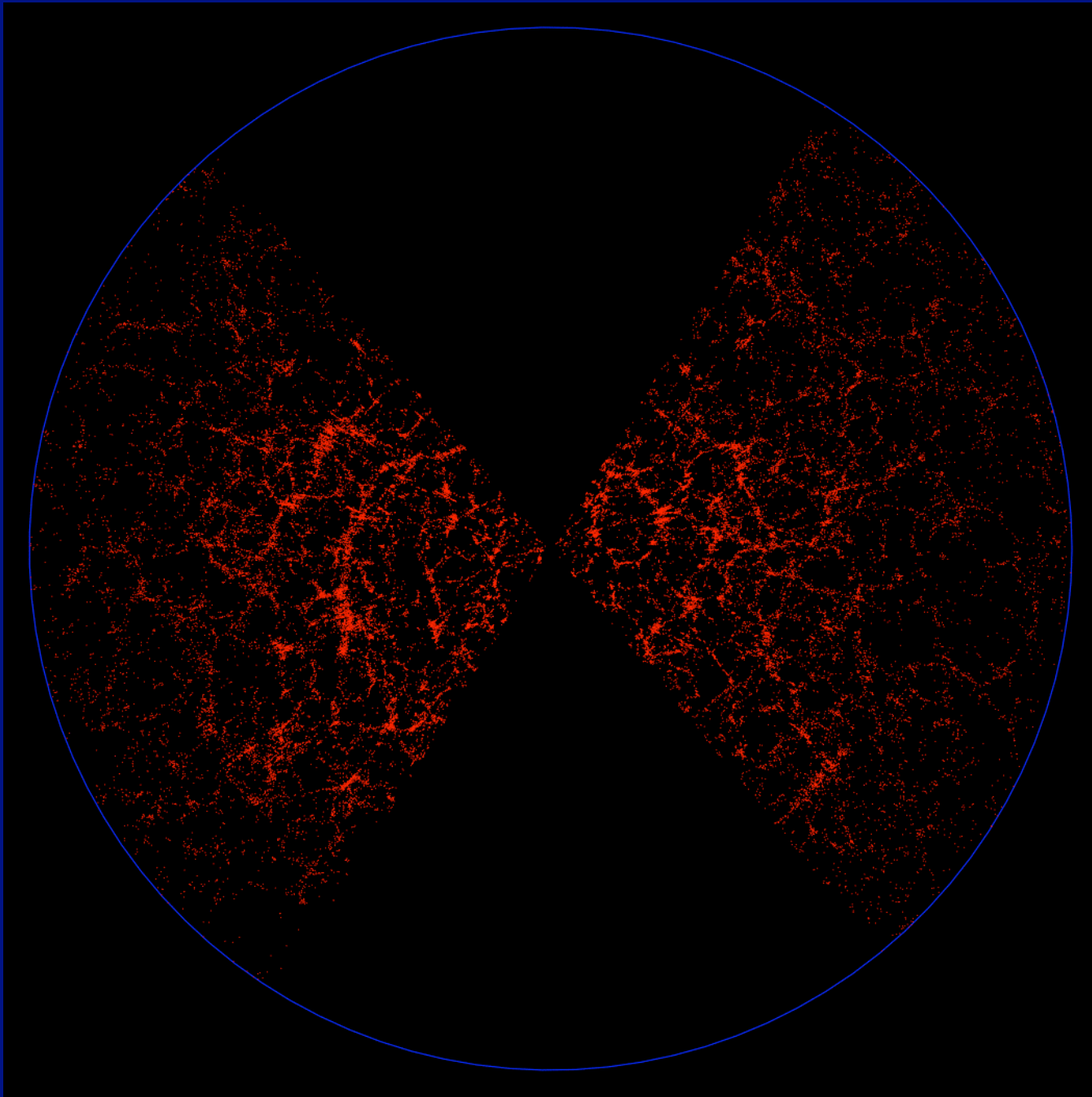# Galaxy And Mass Assembly (GAMA)

The case for a new redshift survey of 250 thousand galaxies

(using AAOmega, the 2dF upgrade on the AAT)

Ivan Baldry, Liverpool JMU; NAM 2007

Team

- PPI: Simon Driver (St. Andrews)
- PIs: I. Baldry, A. Hopkins (Sydney), J. Liske (ESO), R./B. Nichol (Ports), P. Norberg & J. Peacock (Edinburgh)
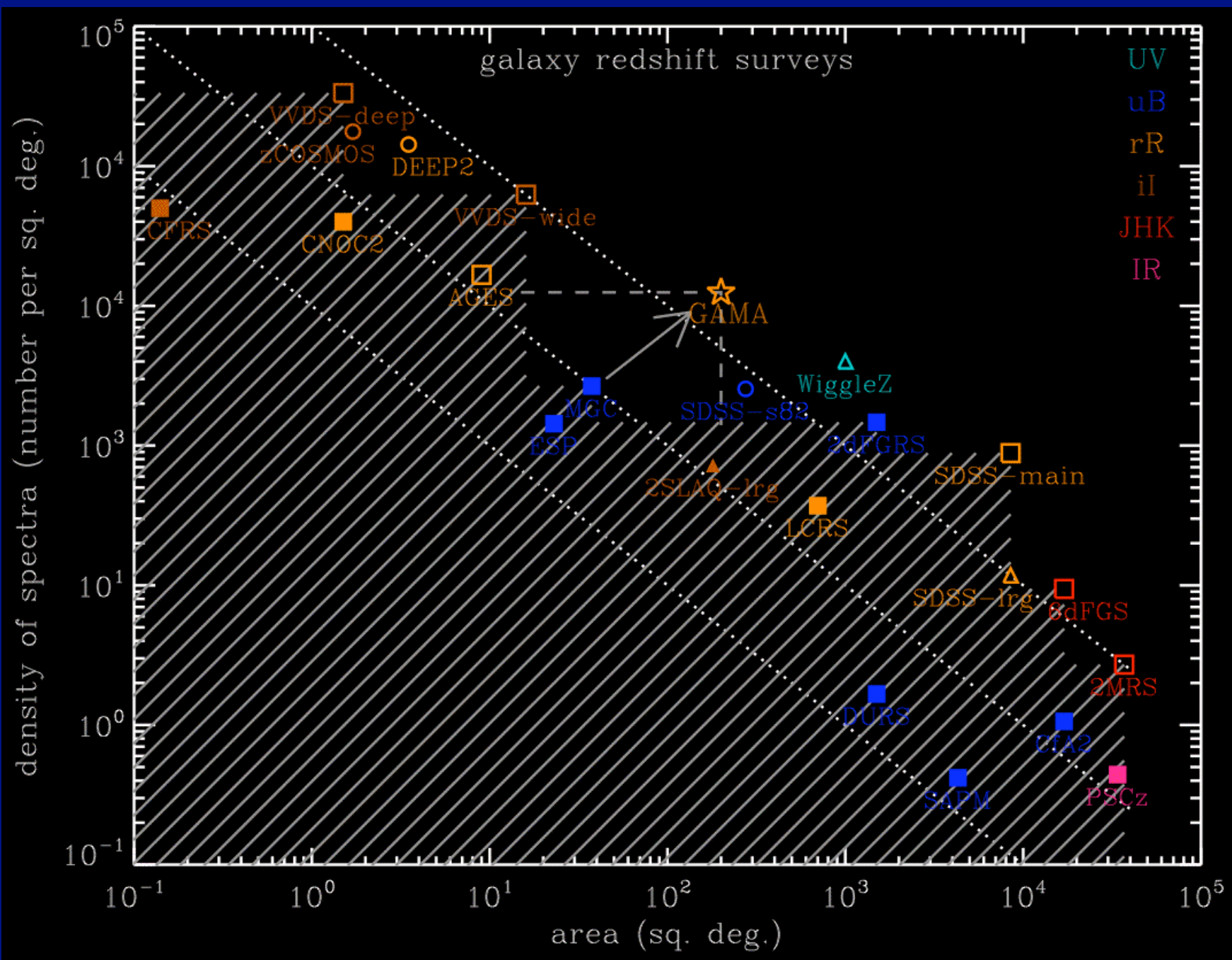- Co-Is: many, e.g. … Steve Bamford, Edd Edmondson, Nick Cross, … UKIDSS, KIDS, VIKING, ICC

SDSS:
redshifts to 0.2
from the main
galaxy sample
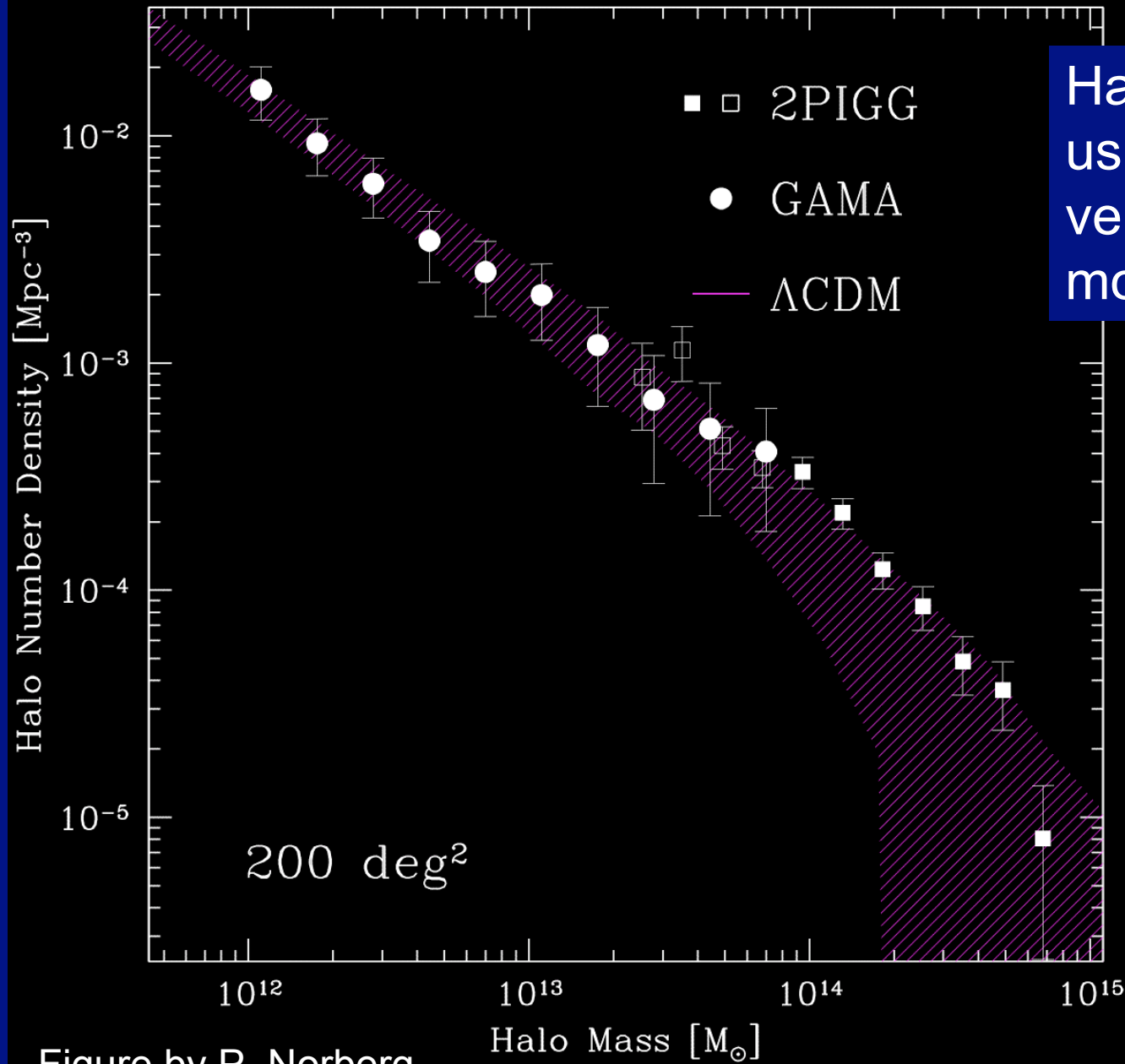
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SDSS(MAIN) + 2dFGRS

- Cosmological parameters, LSS clustering
- Luminosity functions
- Effect of environment
- Star formation histories
- Bimodality in colour / emission lines
- Galaxy properties: AGN, metallicity, post-starburst, etc.

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GAMA primary science goals

- Group halo mass function
- Galaxy stellar mass function
- Merger rates
- Selection
  - $r < 19.8$ (~1000 / deg^2)
  - $K < 17.0 (18.9_{AB})$ & $19.8 < r < 20.5$ (~300 / deg^2)
- Area: 200 square degrees

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galaxy redshift surveys

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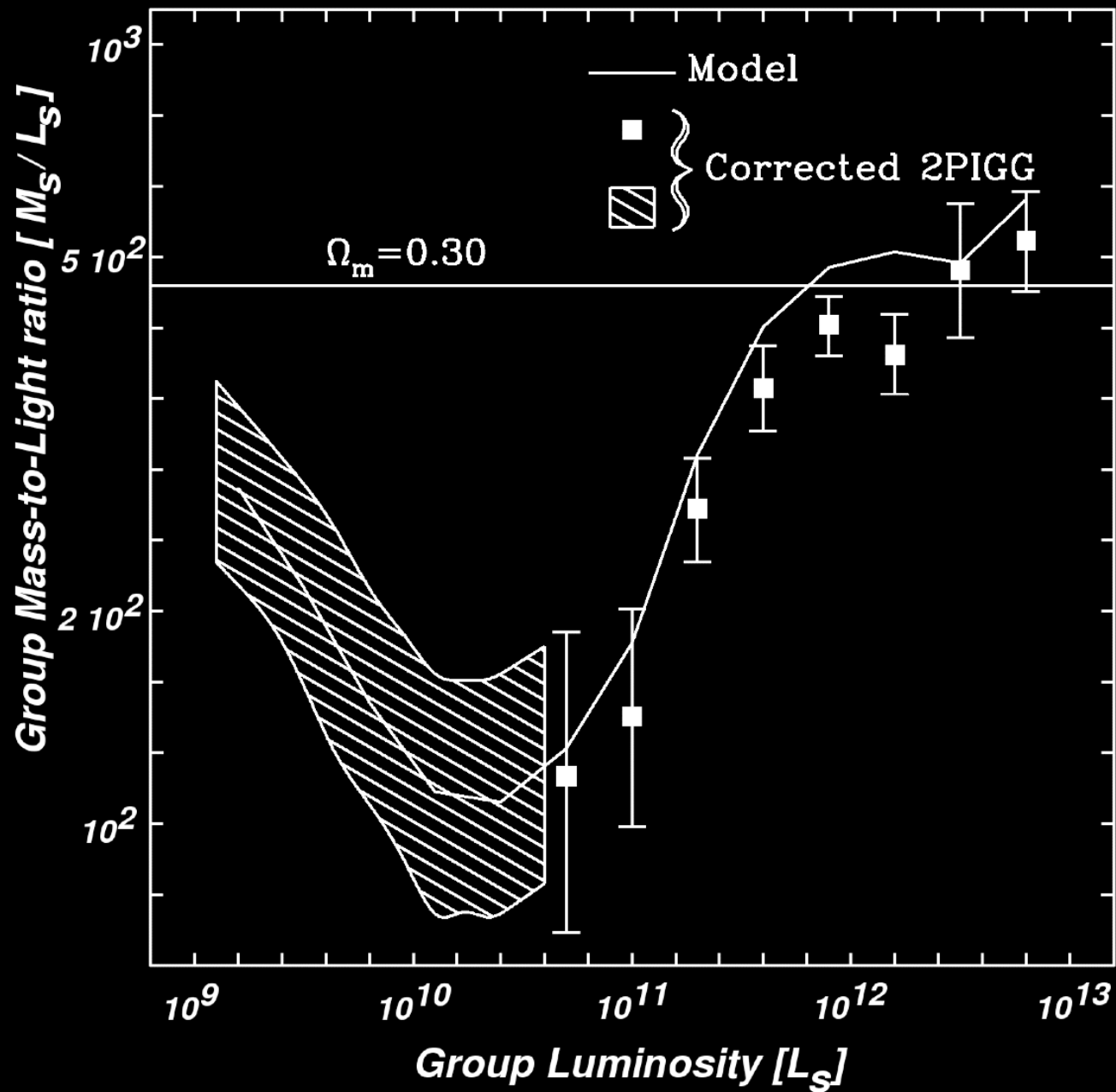Halo mass function: using group finder, velocity dispersions, mock catalogues.

Figure by P. Norberg

Figure adapted from Eke et al. 2006

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galaxy stellar mass functions

GAMA (simulated) $0.008 < z < 0.1$

Bell et al. 2003 table 5
Baldry et al. 2006 fig. 8
New analysis using NYU−VAGC
Cole et al. 2001 fig. 18
Jones et al. 2006 table 4

~ HMF slope

SF efficiency decreasing

number density (dex^{-1} Mpc^{-3})

stellar mass: log ($\mathcal{M}/\mathcal{M}_\odot$)

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PEGASE.2 magnitudes for SSPs:
up to 12 Gyr
log (stellar mass) = 7.5
redshift = 0.008

low metallicity

□ 2 Gyr

△ 6 Gyr

high metallicity

GAMA selection

GAMA selection

K−band AB mag

r−band AB mag

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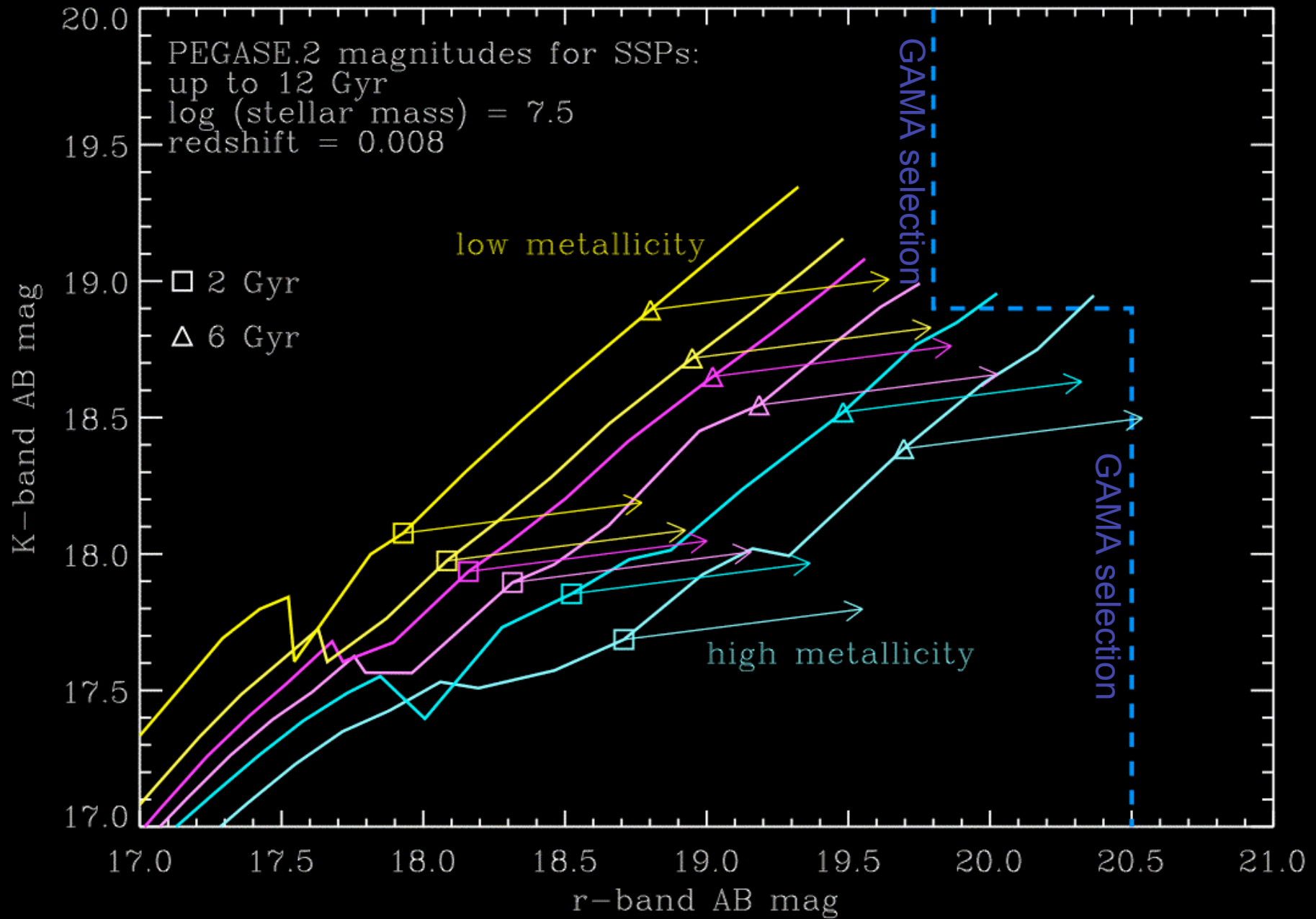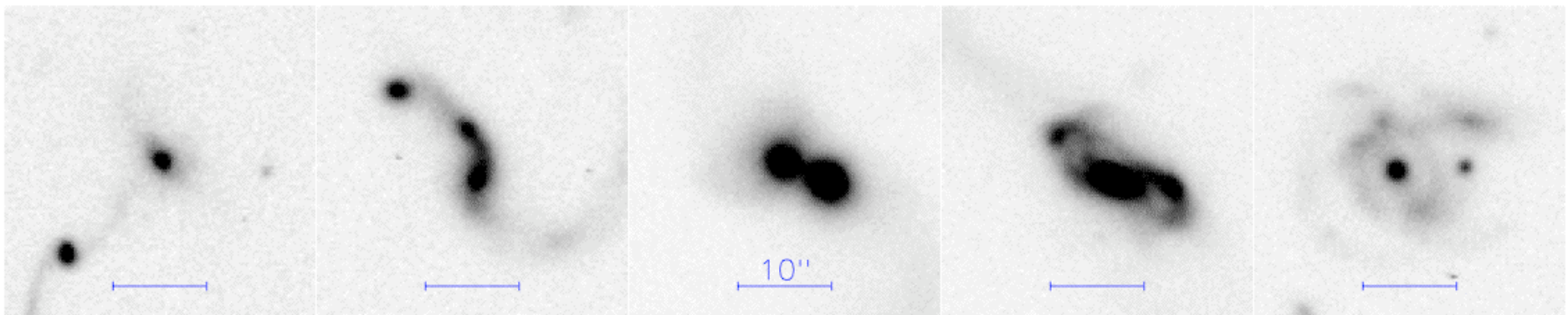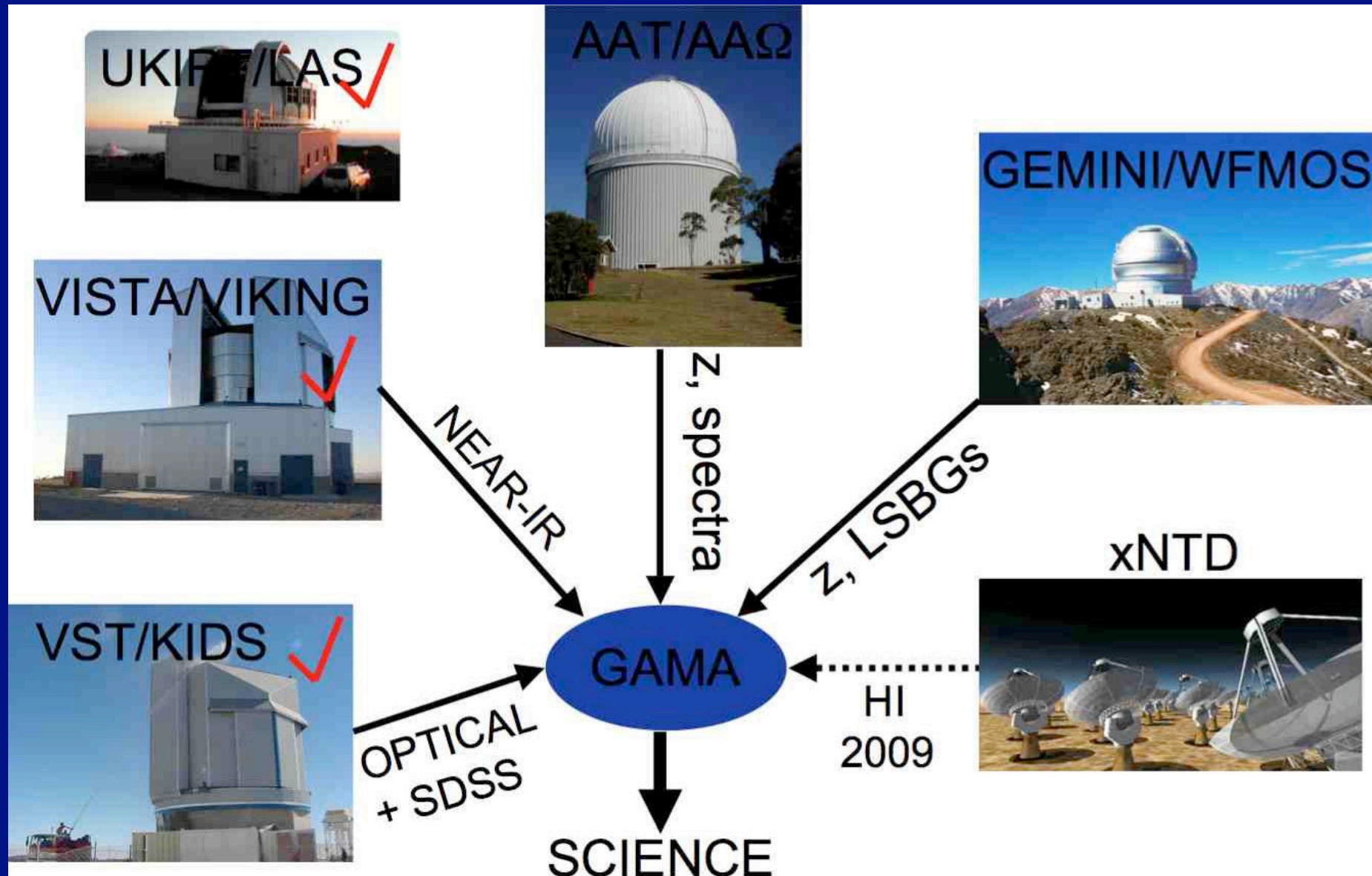
Merger rates

- Close pairs (sky and redshift space)
- Asymmetric light distribution (imaging from VST-KIDS and VISTA-VIKING)

10"

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Contributing Facilities

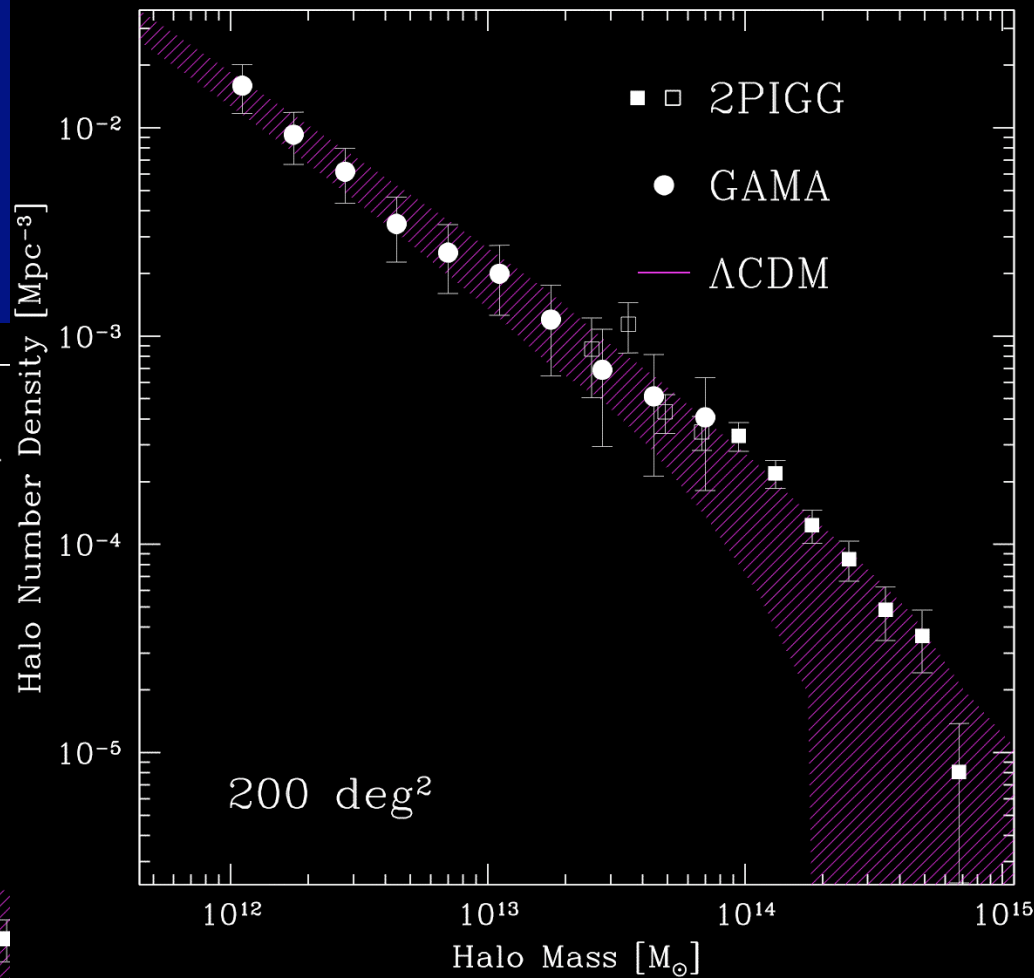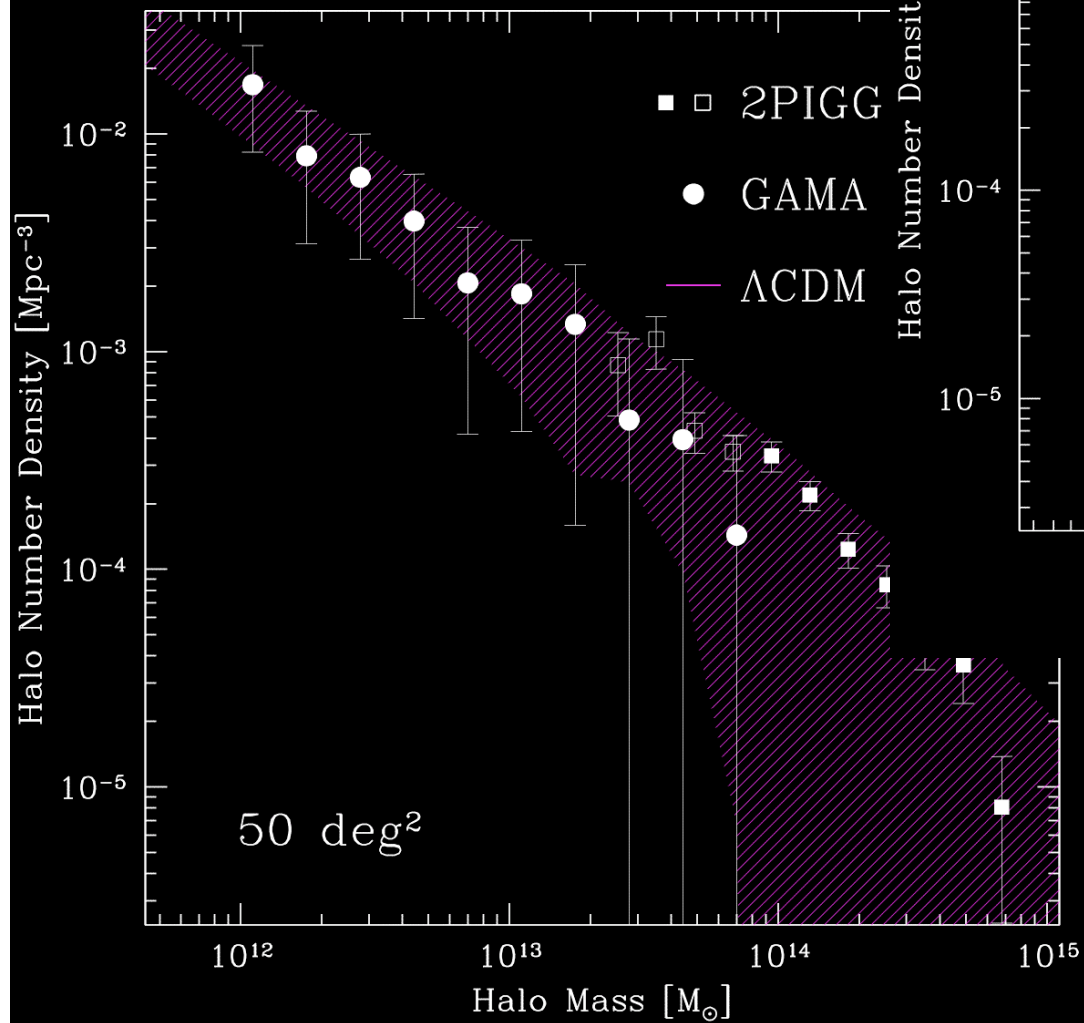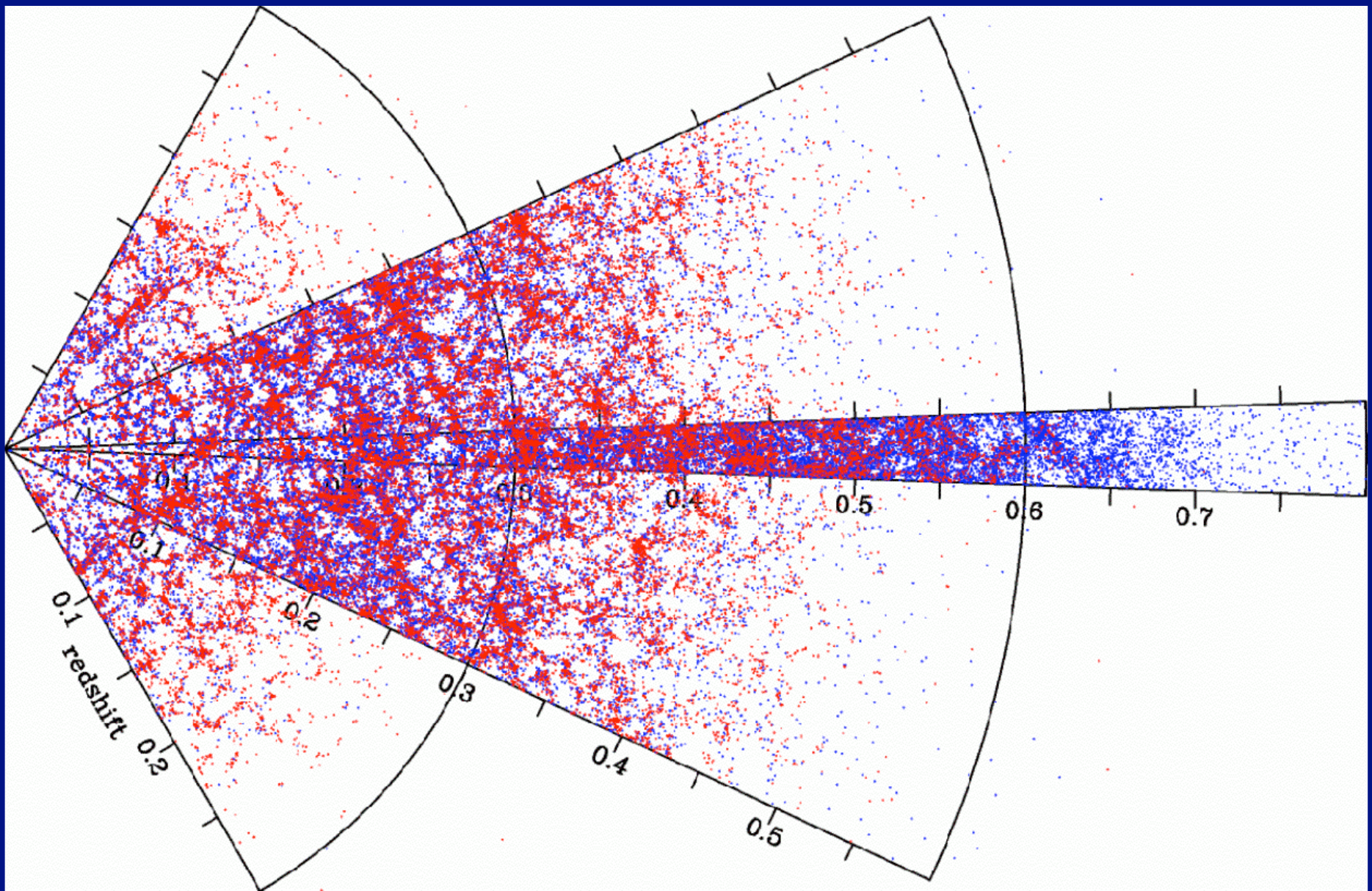
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Spectroscopy

- Requires ~ 150 nights of time on AAT using AAOmega.

- Problem: UK-led science but the UK's share of AAT is going down!

- ? 75 nights from standard TAC and 75 nights purchased directly ?

  – Other options?

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GAMA

- PIs: Driver (St Andrews), Baldry (LJMU), Hopkins (Usyd), Liske (ESO), Nichol (Ports.), Norberg (Edin.), Peacock (Edin.) + 16 Co-Is
- Associated groups: UKIDSS LAS, VST KIDS, VISTA VIKING, ICC
- Building on success of the 2dFGRS, SDSS and MGC
- 200 sq degrees (2x100 sq deg. chunks each 4x25deg), 250k galaxies
- General science:
  – A study of structure on 1kpc-1Mpc scales, where baryon physics is critical
  – Tracing how mass (stars and cold gas) follows light
  – Provide a definitive zero redshift benchmark for the JWST and the SKA
- Specific goals:
  – the CDM Halo mass function from group velocity dispersions
  – the stellar mass function into the dwarf regime
  – the HI mass function and associate gas/stellar mass ratios
  – the baryonic mass function and baryon to dark matter ratios
  – determine the galaxy merger rates as a function of mass ratio
- Provision of a SDSS/2MASS like public database incorporating:
  – Optical: ugri (VST), spectra (AAT)
  – Near-IR: ZYJHK (VISTA)
  – Radio: 21cm (xNTD, SKADS)

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50 deg²

200 deg²

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SDSS, GAMA and VVDS(wide)

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Galaxy Evolution versus Environment and Mass

GAMA

Hopkins & Beacom 2006

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