Herschel-ATLAS and the AGN population

Herschel ATLAS

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and the ATLAS consortium

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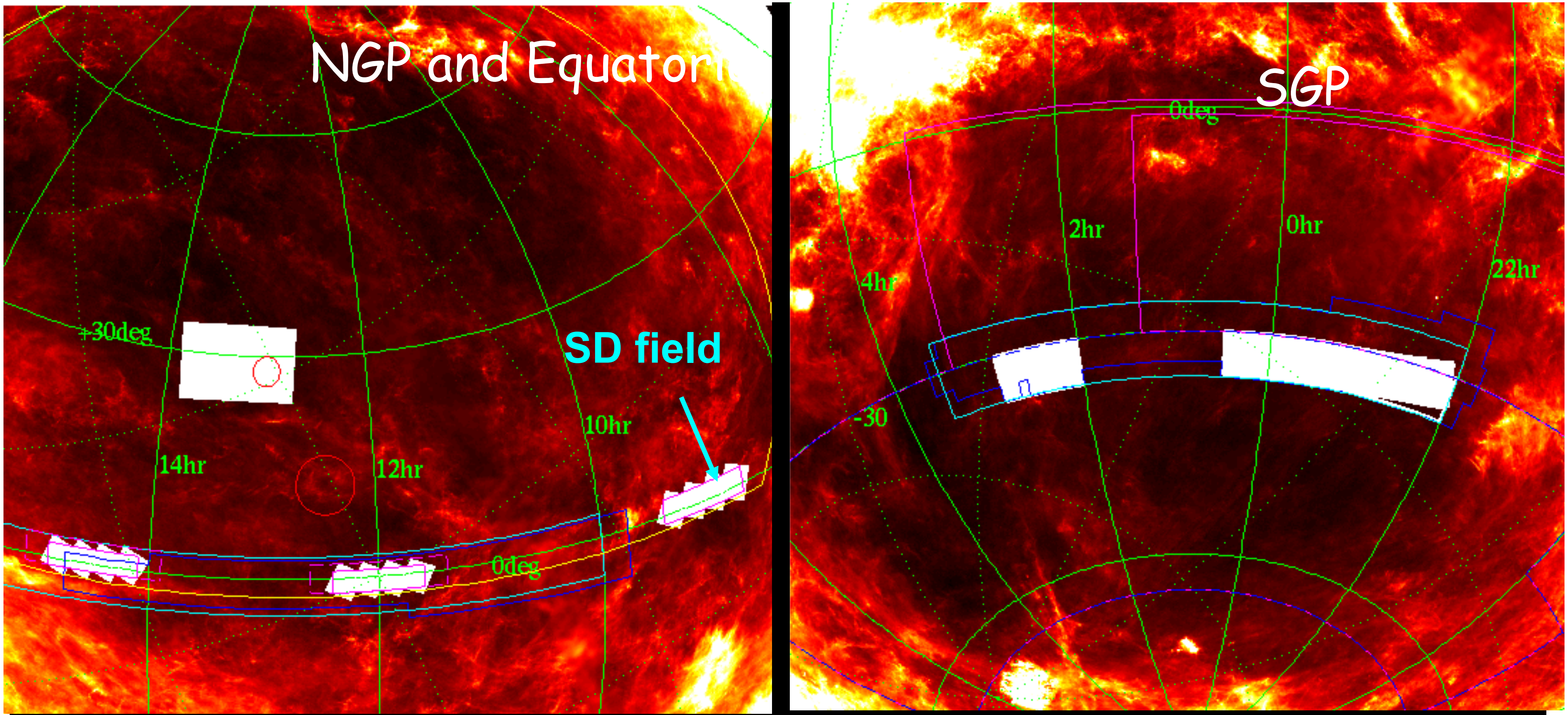

Fields chosen to allow maximum overlap with existing and planned surveys
GALEX, 2dF, SDSS, GAMA, UKIDSS, KIDS, VIKING, PanSTARRS, DES, SPT, SASSy

and to be accessible to new facilities which will be valuable for follow-up
ALMA, ASKAP, MeerKAT, SCUBA2, LOFAR, e-MERLIN

Key Science Themes in ATLAS

1. Local Universe Survey
2. Synergies with Planck
3. The Herschel Lens Survey
4. AGN and rare objects
5. Large scale structure and High-z galaxies
6. Galactic star and planet formation

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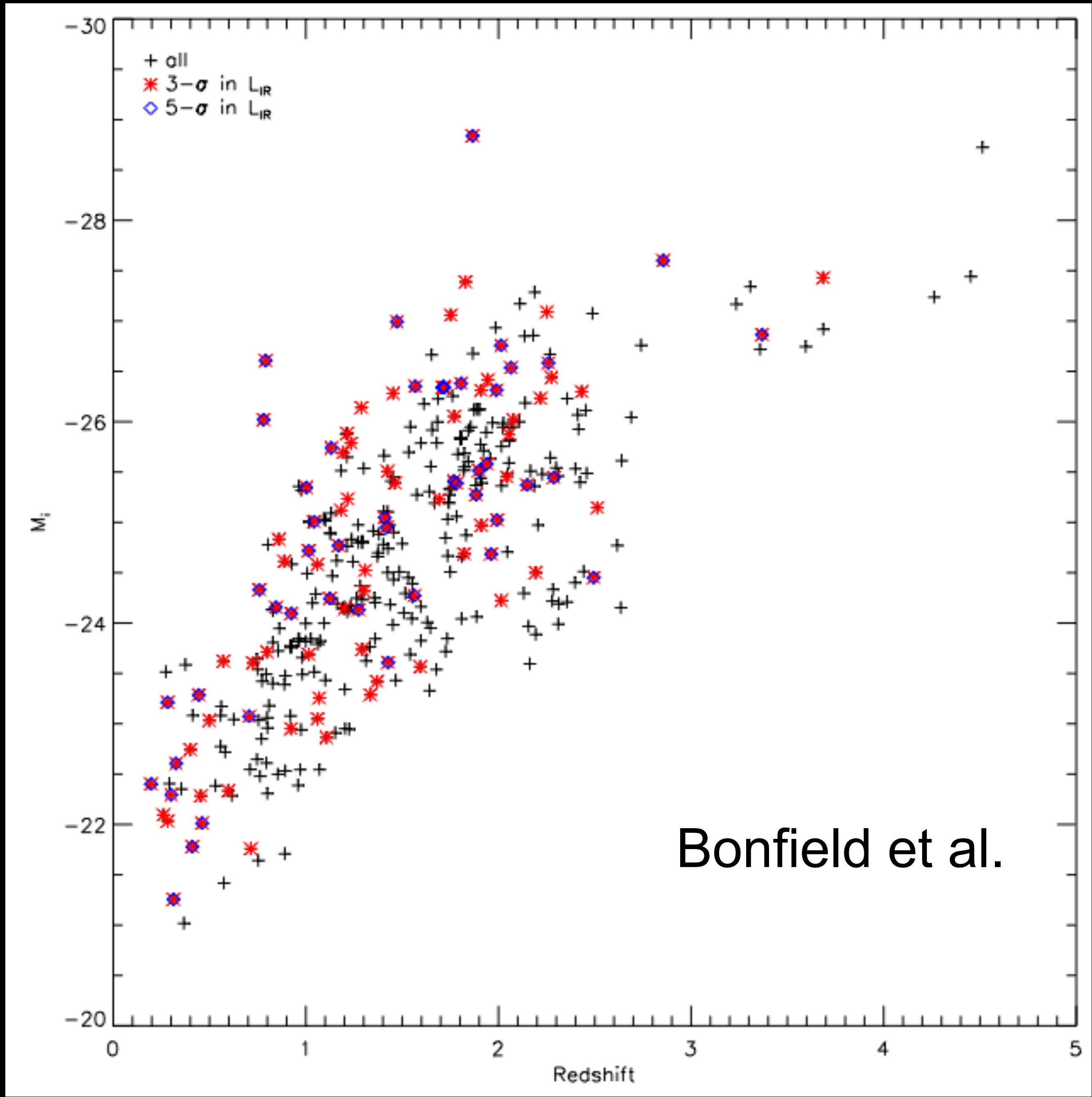
AGN and galaxy formation

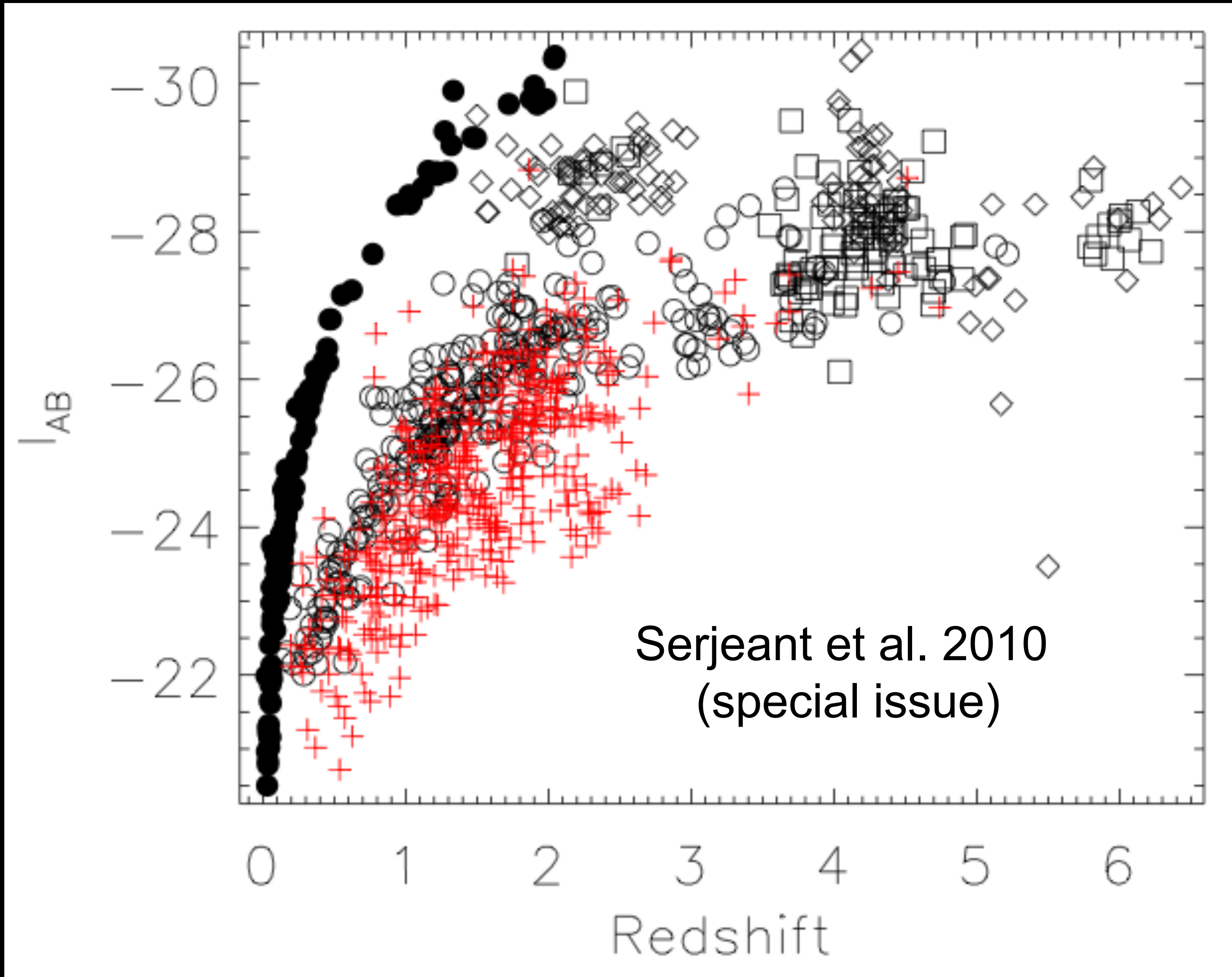
- AGN are now key ingredients in the latest semi-analytic models
- Aid in truncating star formation
- However, observational evidence is relatively weak and hindered by a multitude of selection effects
- Herschel-ATLAS is ideally placed to trace the impact of AGN activity on galaxy formation

With H-ATLAS we have sufficient area to explore AGN properties as a function of redshift, luminosity, accretion rate, radio-loudness, etc etc

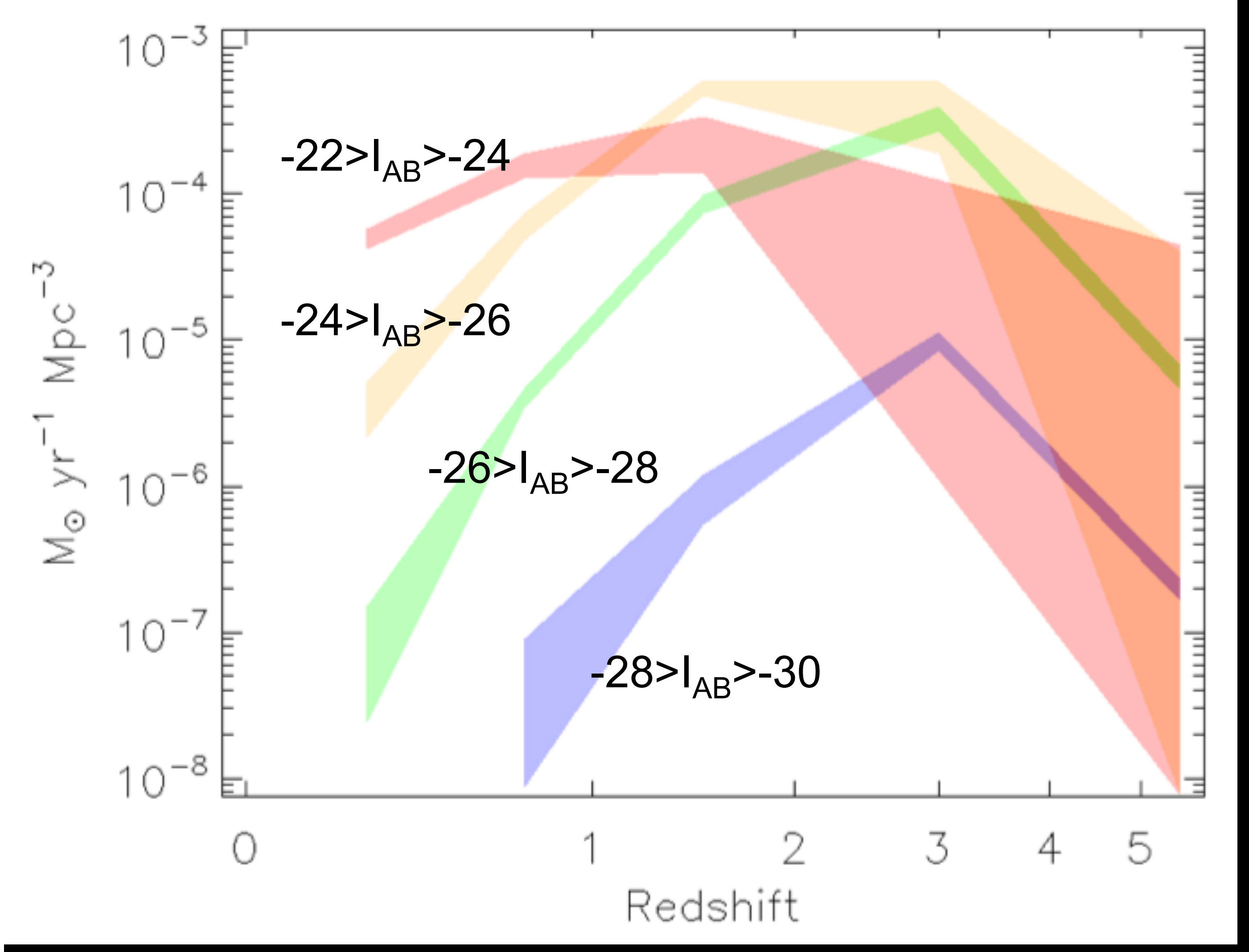


The Lilly-Madau plot for QSO host galaxies

With H-ATLAS we have sufficient area and AGN samples to explore AGN properties as a function of redshift and luminosity/ accretion rate.



The Lilly-Madau plot for QSO host galaxies



Serjeant et al. A&A, special isssue

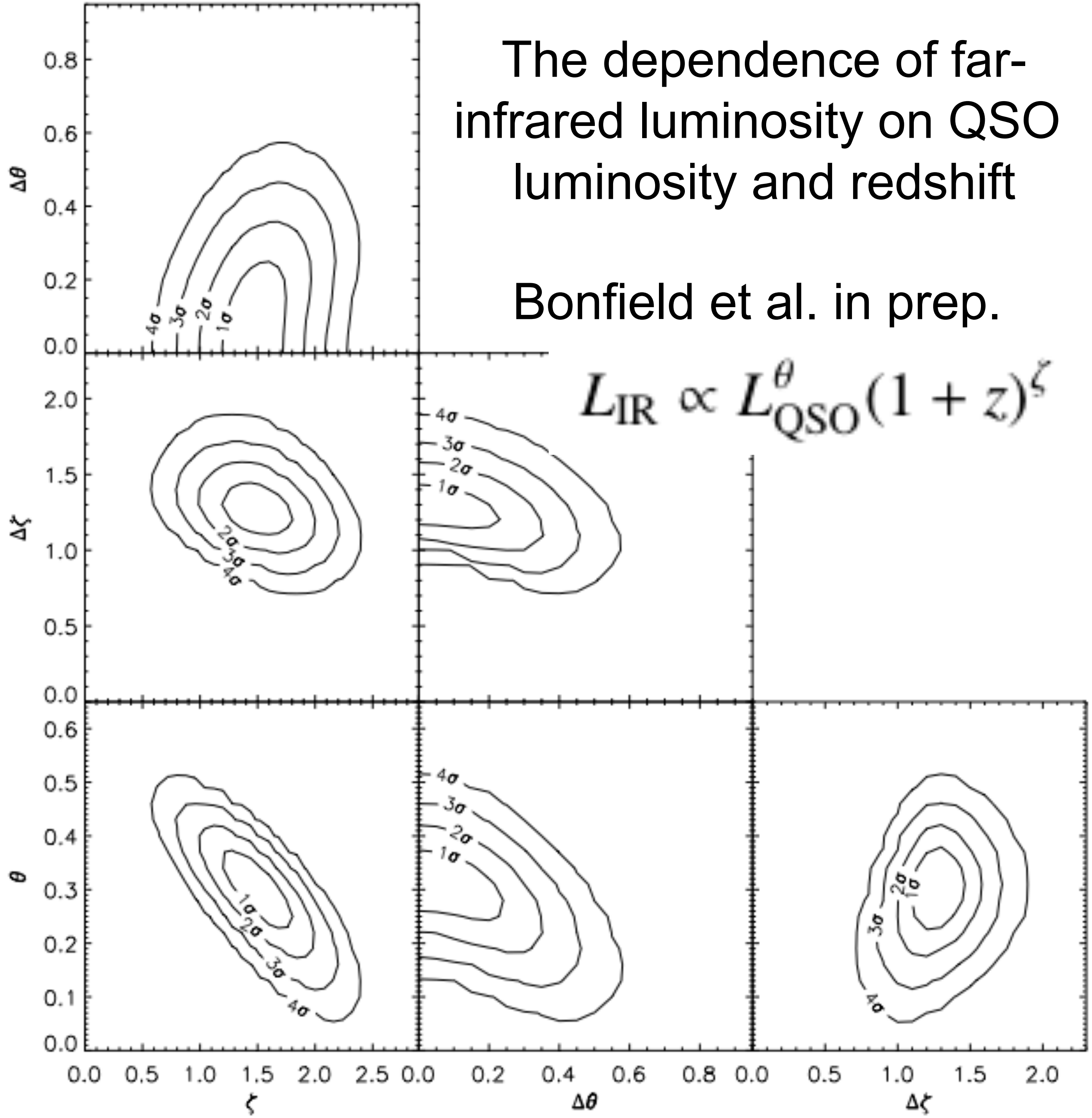
Evidence for downsizing in the QSO host galaxies

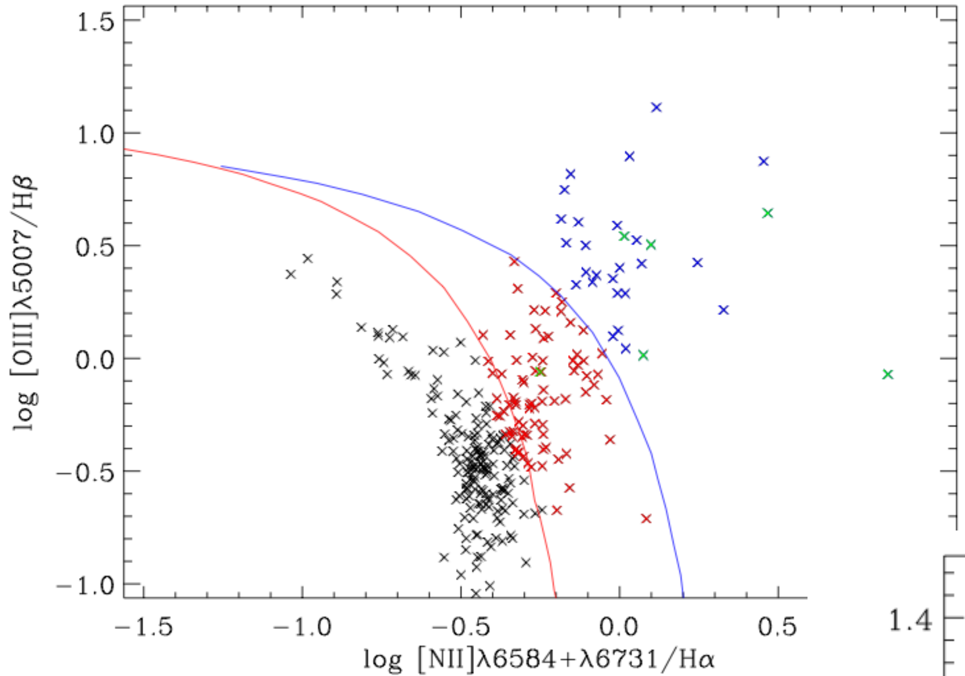
Luminous QSOs have higher SFR at higher z

The dependence of far-infrared luminosity on QSO luminosity and redshift

Bonfield et al. in prep.

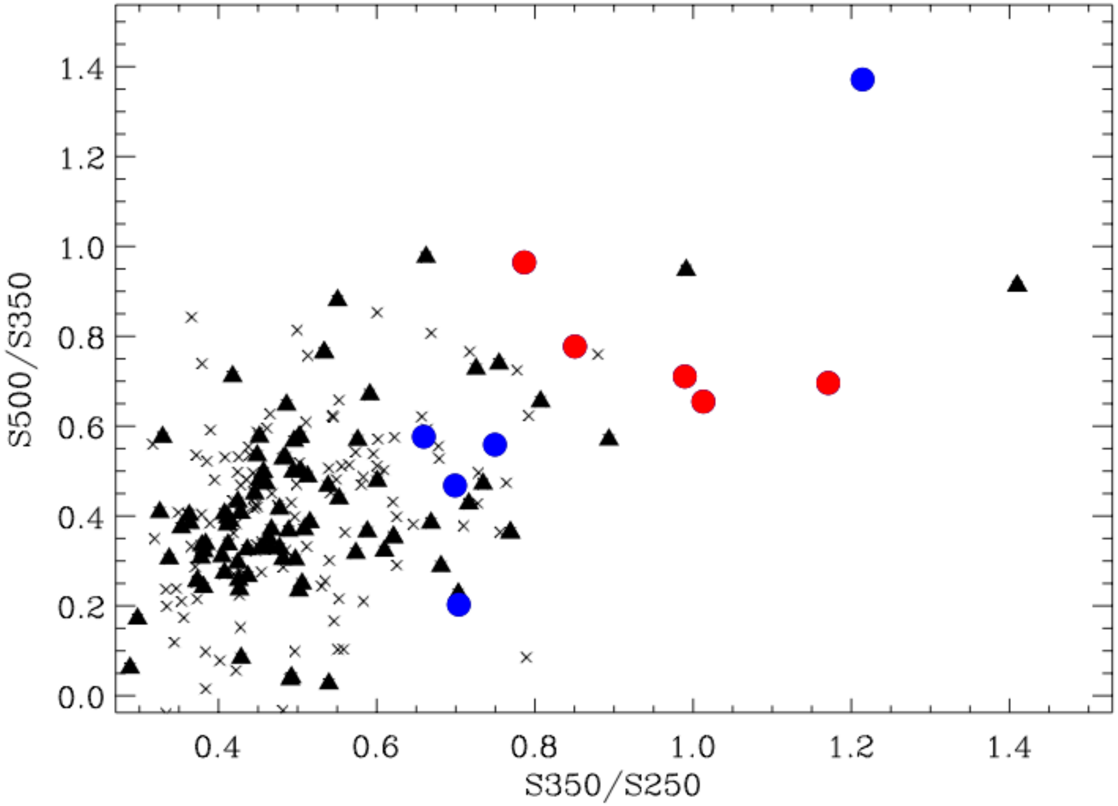
$$L_{\rm IR} \propto L_{\rm QSO}^{\theta}(1+z)^{\zeta}$$





BPT diagram for AGN in the SD field using SDSS spectra

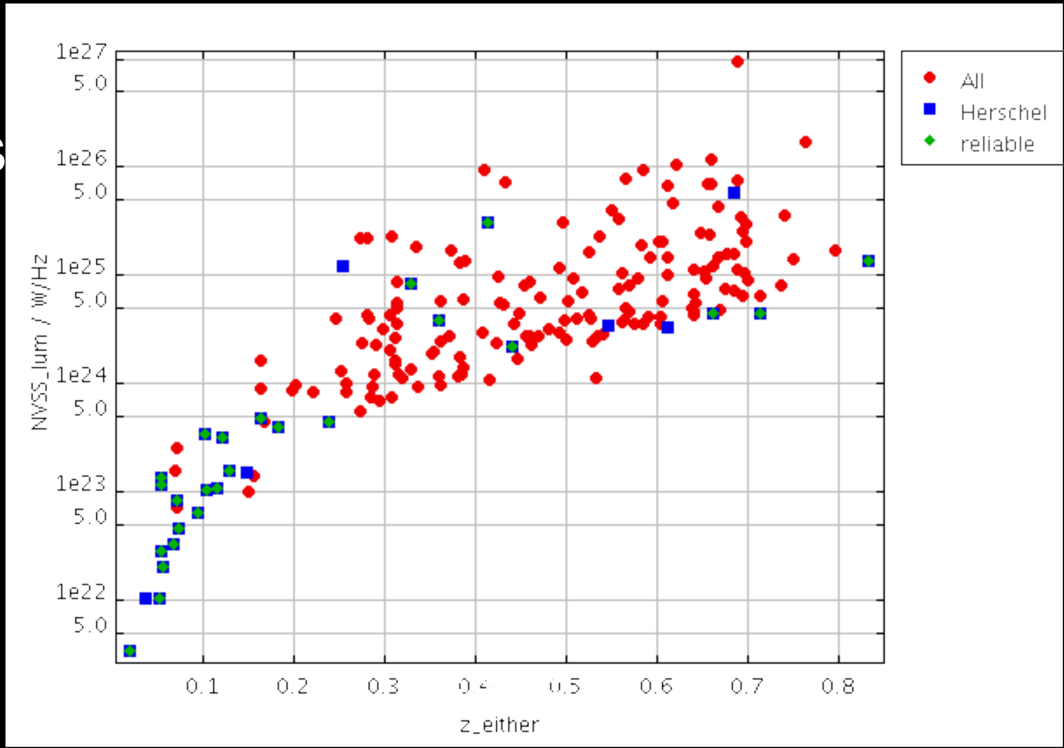
Trichas et al. in prep.



Radio-loud AGN in the H-ATLAS SD field

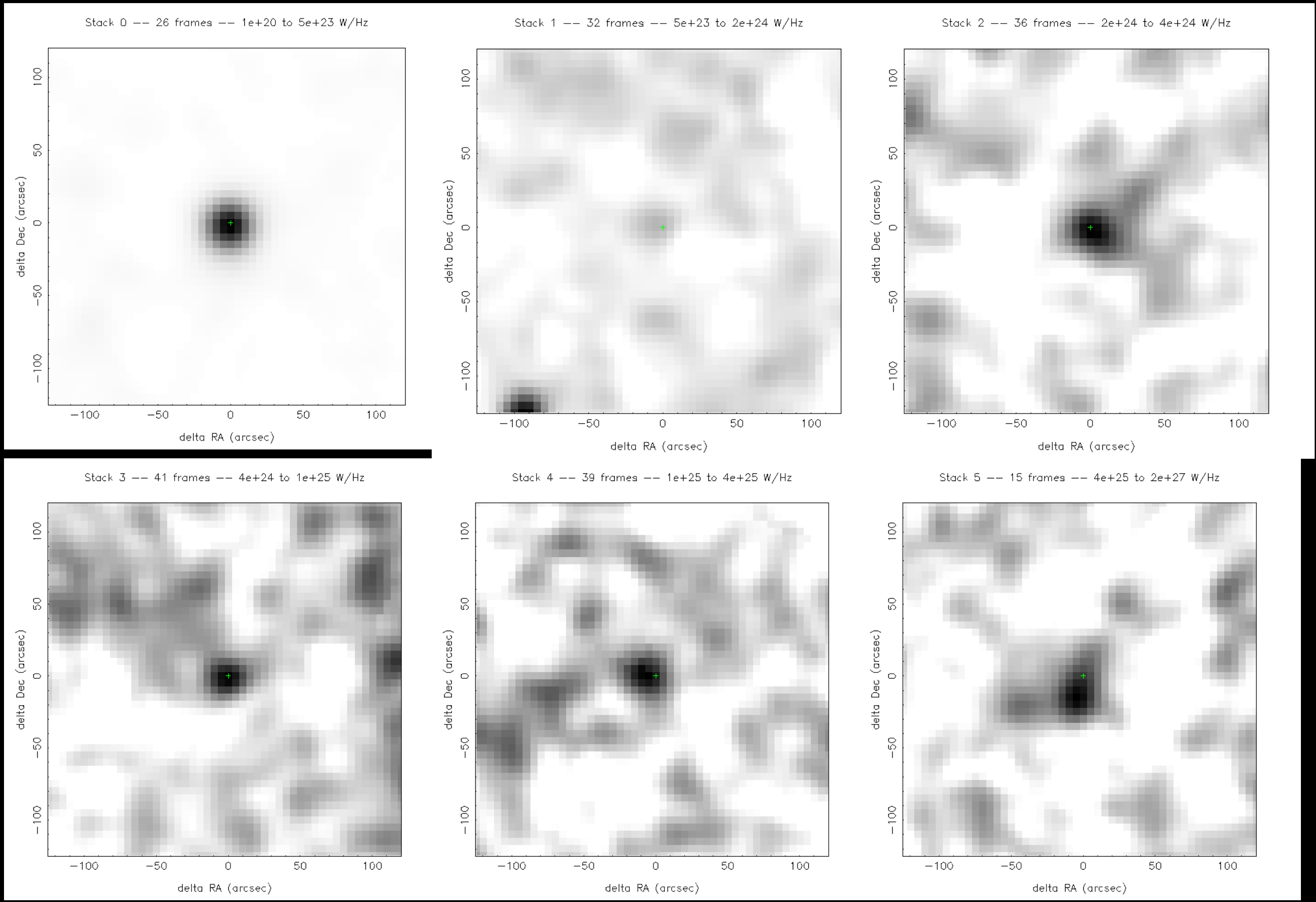
Virdee, Hardcastle, Rigopoulou, Jarvis, Rawlings, Verma, Mauch +++

- Sample is NVSS detections matched with UKIDSS LAS hosts
- Select all objects with reliable photo-zs or SDSS spec-zs
- Vast majority undetected with Herschel, though almost all low-z, low-L objects are detected (local star-forming systems)



NVSS luminosity as a function of redshift. Blue objects are detected in the 'official' SV catalogue. Starburst LF cuts off ~ few x 10^{23} W/Hz

Stacking of H-ATLAS at radio positions

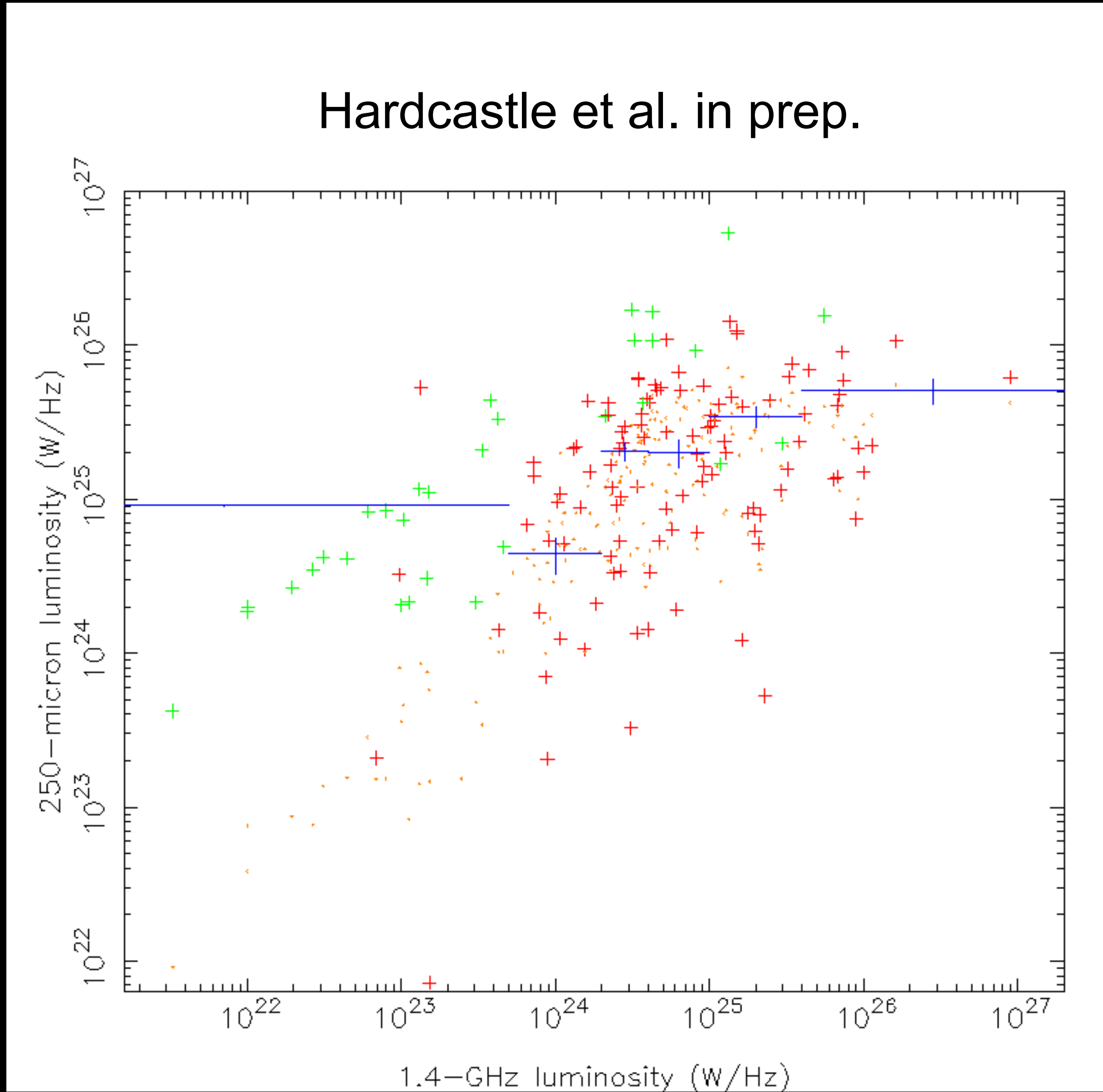


Stack in bins corresponding to radio luminosity. Significant detection (on K-S test compared to random positions) in all but the lowest-luminosity 'radio-loud' frame (which contains the lowest-luminosity FRIs).

Hardcastle et al. in prep.

Determining mean IR luminosities in radio luminosity bins (method similar to Serjeant+ 10) allows a comparison in luminosity (SF rate) to local systems.

At high radio luminosities the typical IR luminosities become comparable to the most luminous SF systems.



Blue shows bins and weighted mean luminosities: raw data in green (detections) or red (non-detections); 1-sigma noise level for comparison as orange dots; negative values are not plotted but are included in the averages.

Young, Dusty Type II Quasars at High Redshift

Virdee, Rigopoulou, Rawlings et al.

Selection Criteria & Physical Properties

- S(1.4Ghz)>3mJy (NVSS), K>18.2 (UKIDSS/ LAS) and S(250μm)>30mJy (H-ATLAS).
- 6 objects in SD area.
- The K-band limit implies z > 1.5.
- SPIRE detections suggest large dust reservoir- SED's show most of the flux coming from SPIRE bands (Figure 2).
- All are FIRST point sources, with size <5" implying a radio source age <1 Myr (Willott et al., 2000). I.e. young FRII's.
- H-ATLAS detected radio galaxies at z>1.5 appear to be young radio sources
- **Poster Session 2 (P2.52):** J. S. Virdee, D. Rigopoulou, S. Rawlings and the Herschel ATLAS Consortium

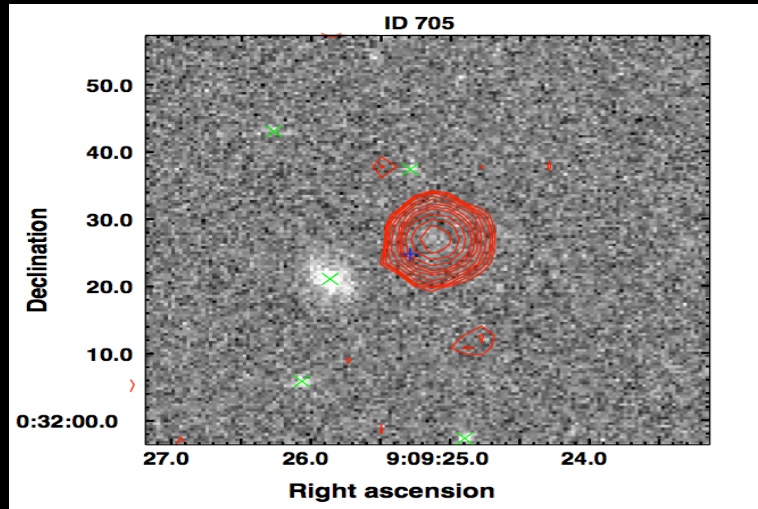


Figure 1: FIRST contours on VIKING near-IR image

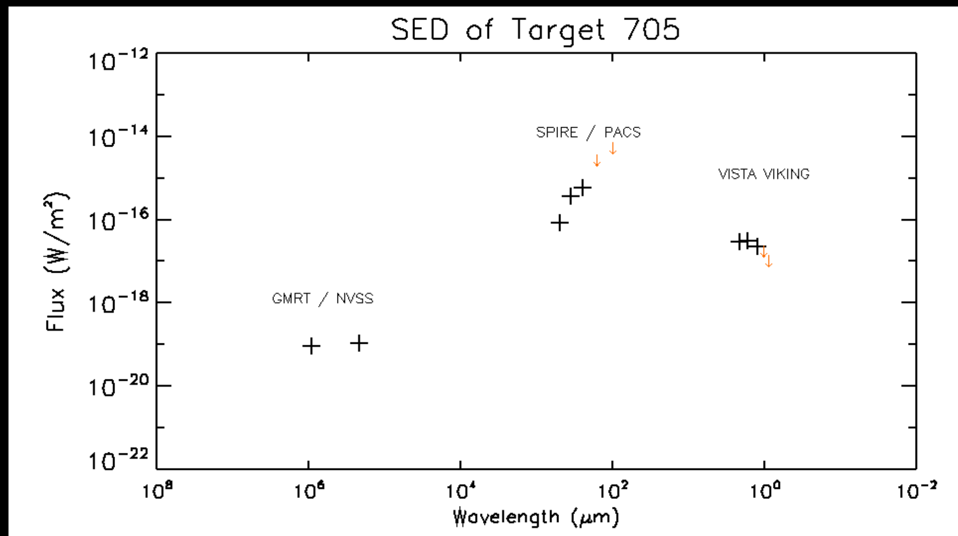
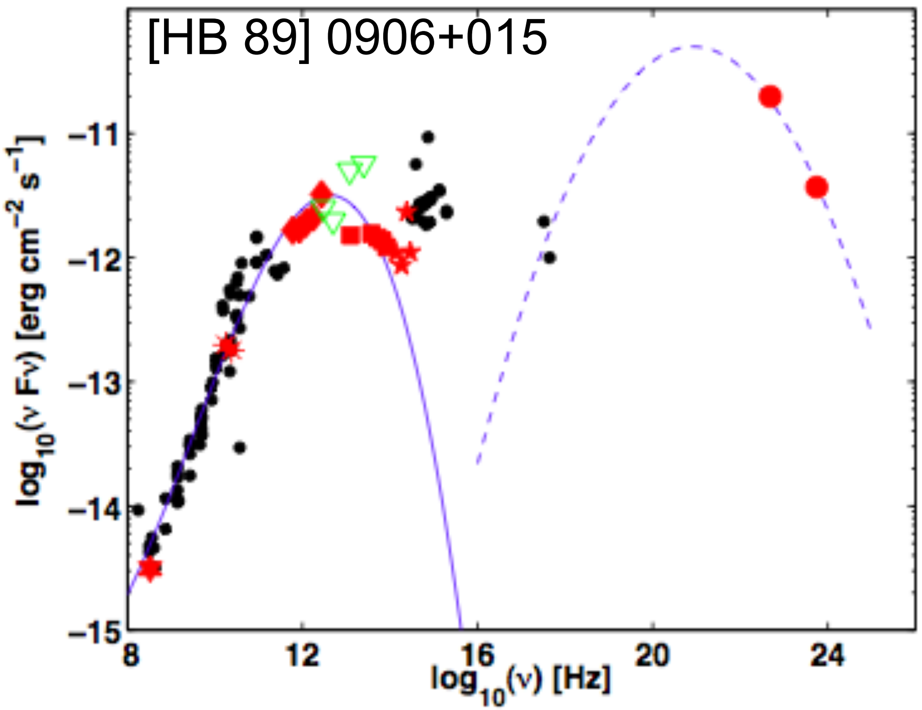


Figure 2: SED for source 705 using H-ATLAS, VIKING and radio data.

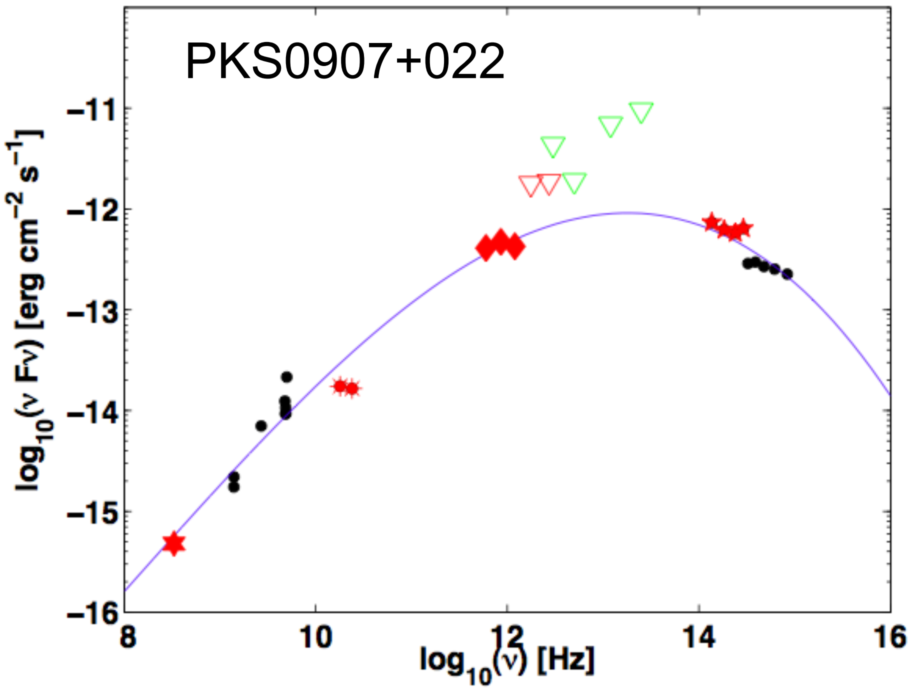
Blazars in H-ATLAS SD field



Gonzalez-Nuevo et al. 2010 (special issue)

H-ATLAS will allow the first unbiased far-infrared selection of Blazars.

Provide important constraints on the jet physics



Next steps … 45 sq deg in GAMA 15

Summary

- The Herschel ATLAS is a key legacy survey of 550 sq degrees.

- Particularly useful for studying the AGN population over all redshifts.

- The large area ensures that we sample the rare AGN, including the most luminous QSOs, radio-loud quasars and the FRI/FRIIs divide for radio galaxies.

- The large area also ensures that we will be able to undertake the first unbiased survey of Blazars at far-infrared wavelengths.

- In our full area we will have ~7000 SDSS QSOs (+ a lot more fainter ones), ~3500 z>1 FRII radio galaxies, ~10000 FRIs and ~80 Blazars.

So lots of great science to come!