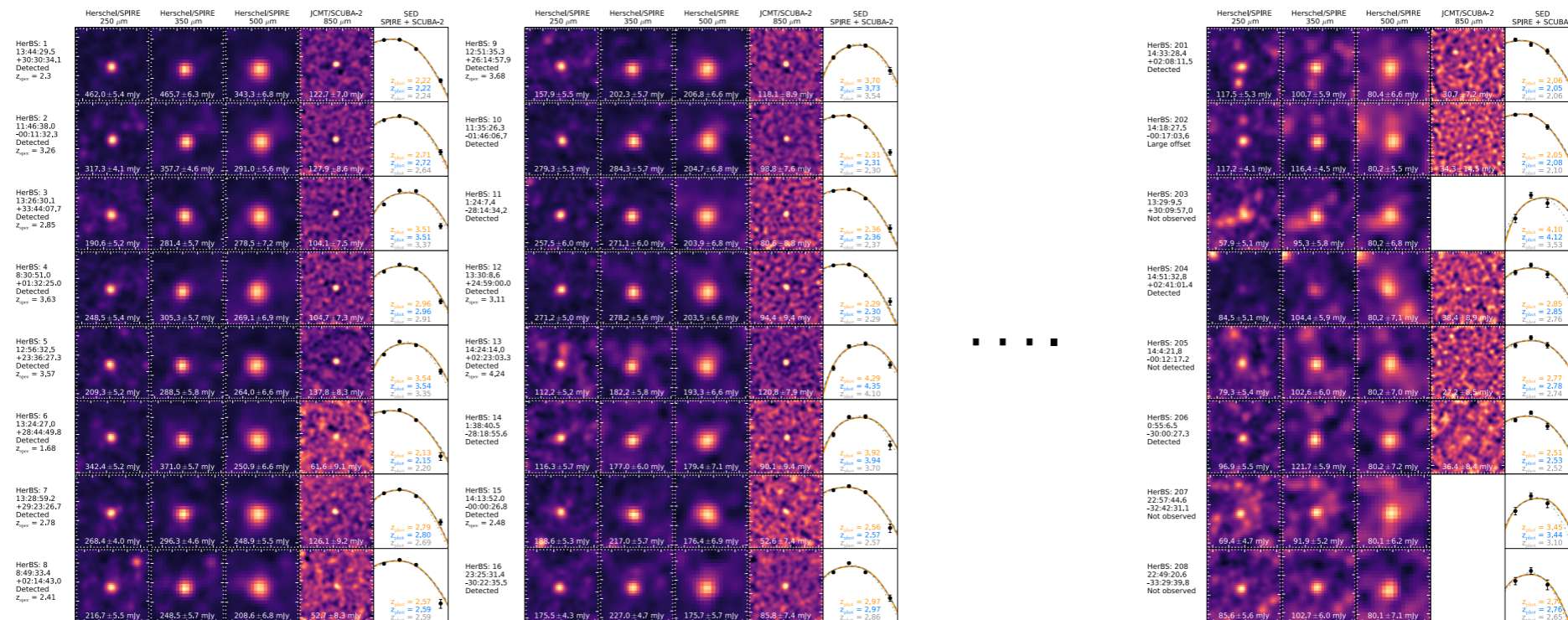# The HerBS sample

Finding lenses in the wide-area, sub-mm
H-ATLAS survey with SCUBA-2 observations
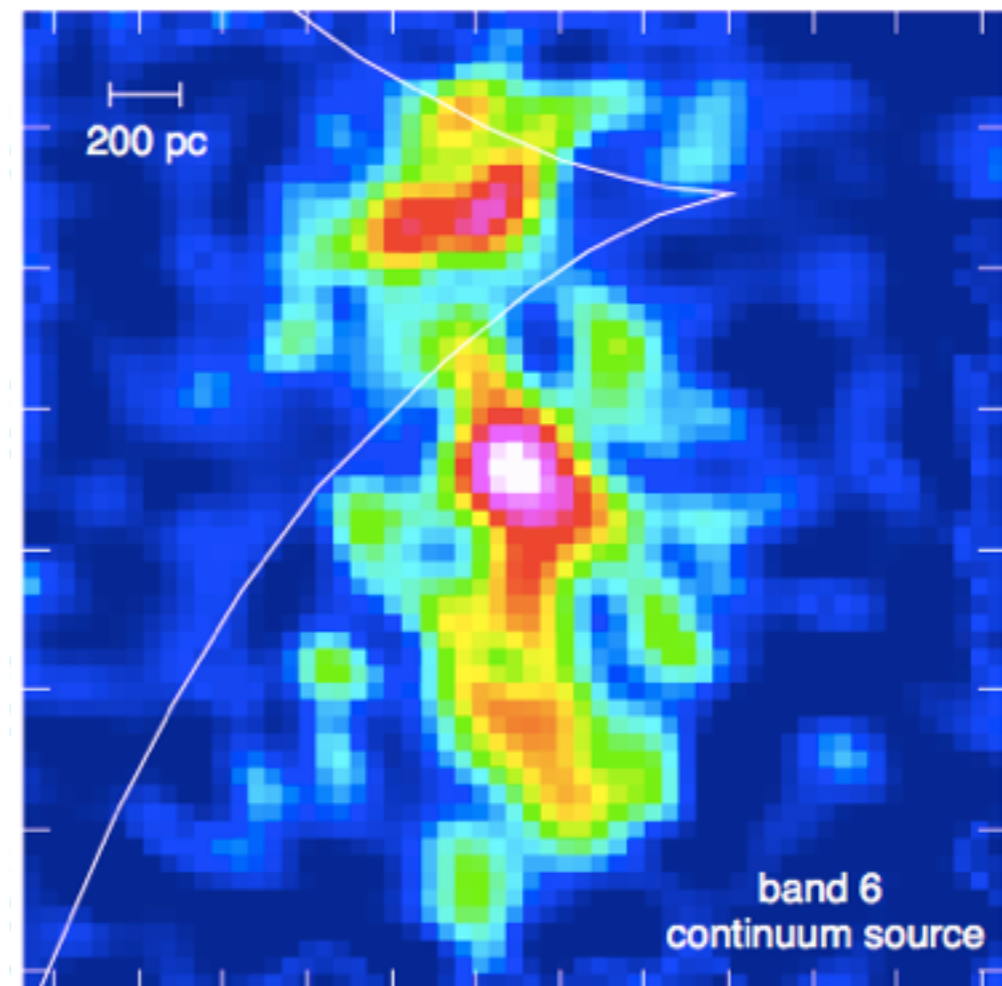

Tom Bakx

Cardiff University

Gravitational lenses provide otherwise unreachable levels of detail

band 6 model continuum

ALMA Partnership 2015, Dye et al. 2015

Gravitational lenses provide otherwise unreachable levels of detail

band 6 model continuum
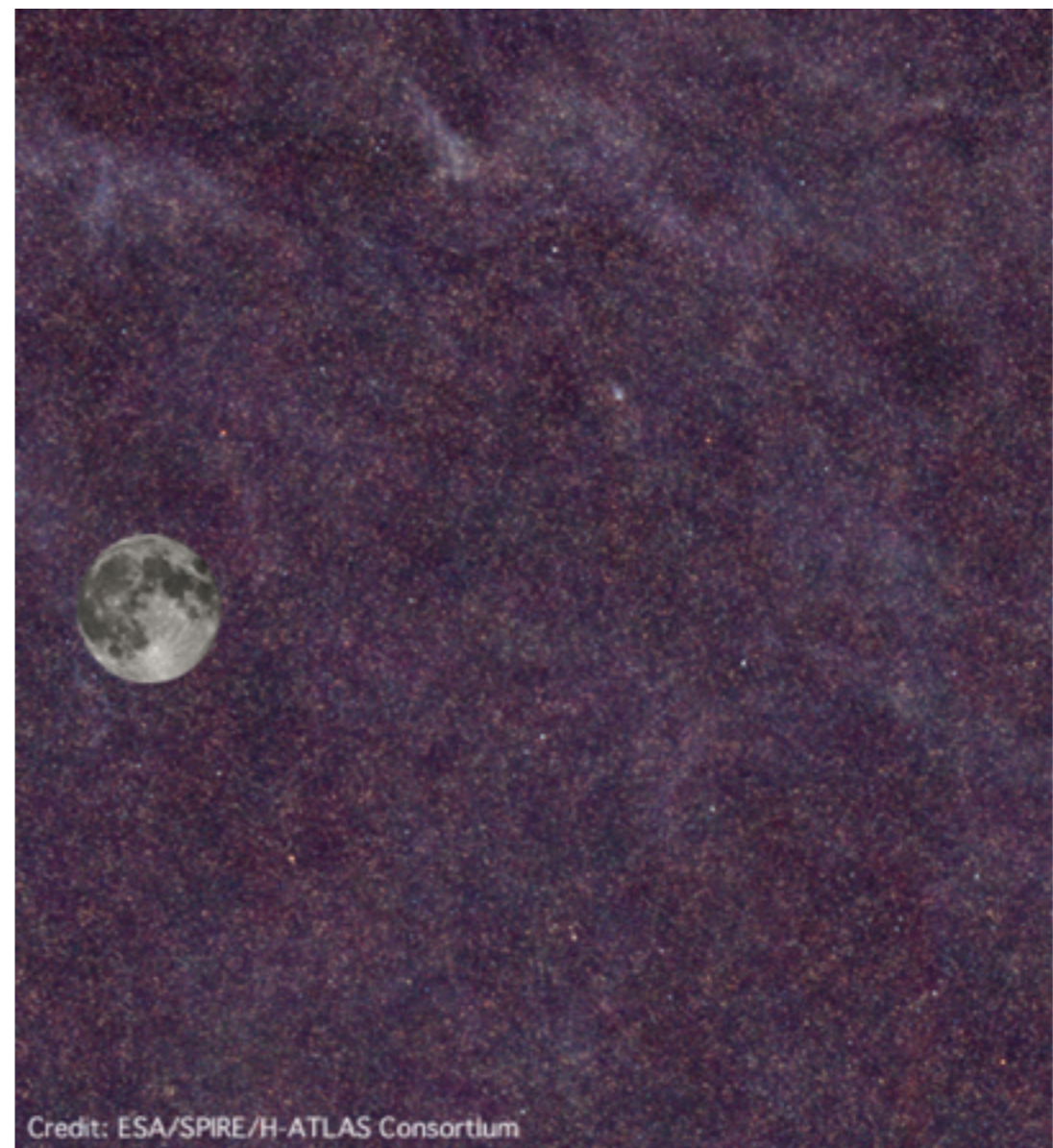
band 6 continuum source

200 pc
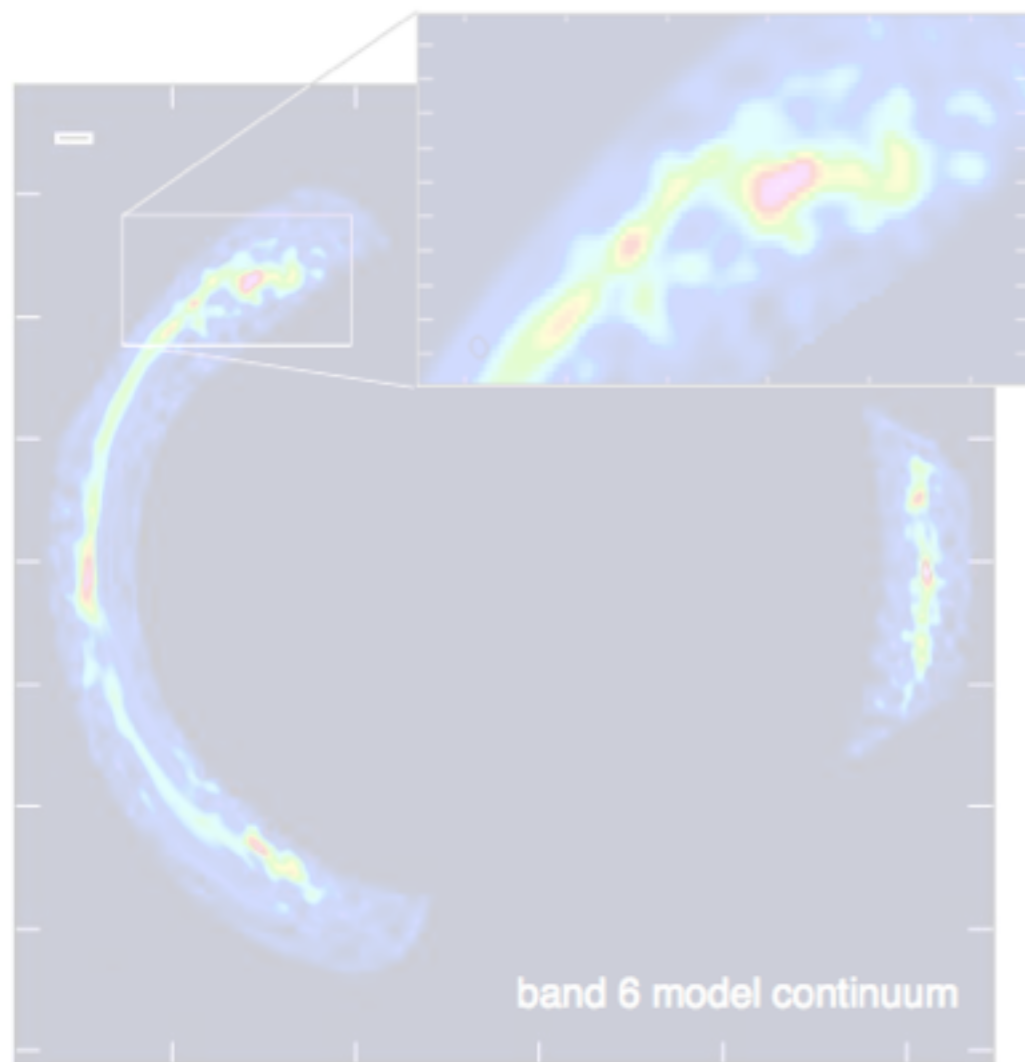
Dye et al. 2015

We use the 590 sqr. deg. H-ATLAS survey to look for lenses

H-ATLAS:

590 sqr. deg.
NGP, SGP & GAMA
Confusion limits
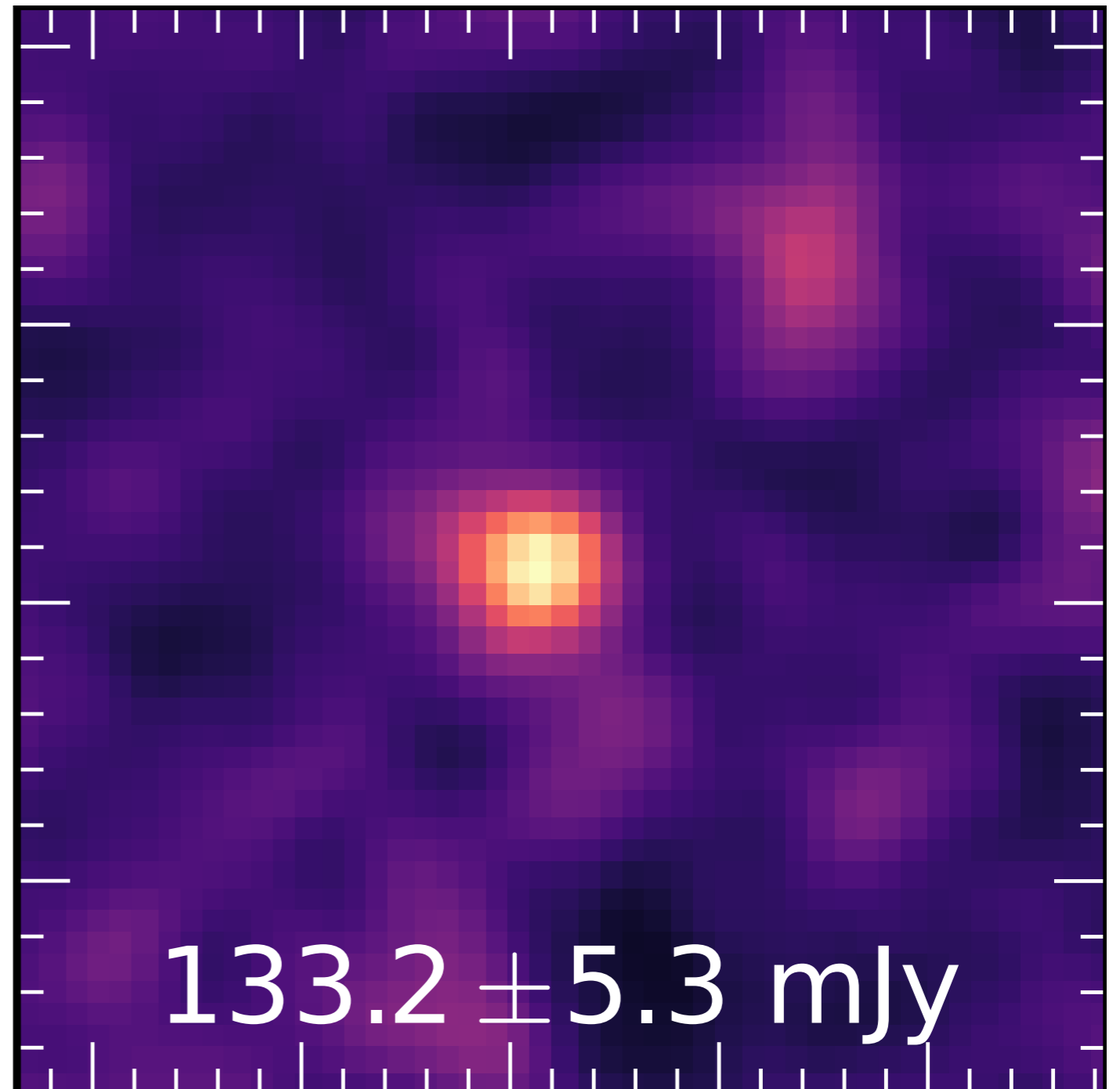
**Data Release
TODAY
www.h-atlas.org**

Credit: ESA/SPIRE/H-ATLAS Consortium

Eales et al. 2009, Valiante et al. 2016

Gravitational lenses provide otherwise unreachable levels of detail

band 6 model continuum

200 pc

band 6 continuum source
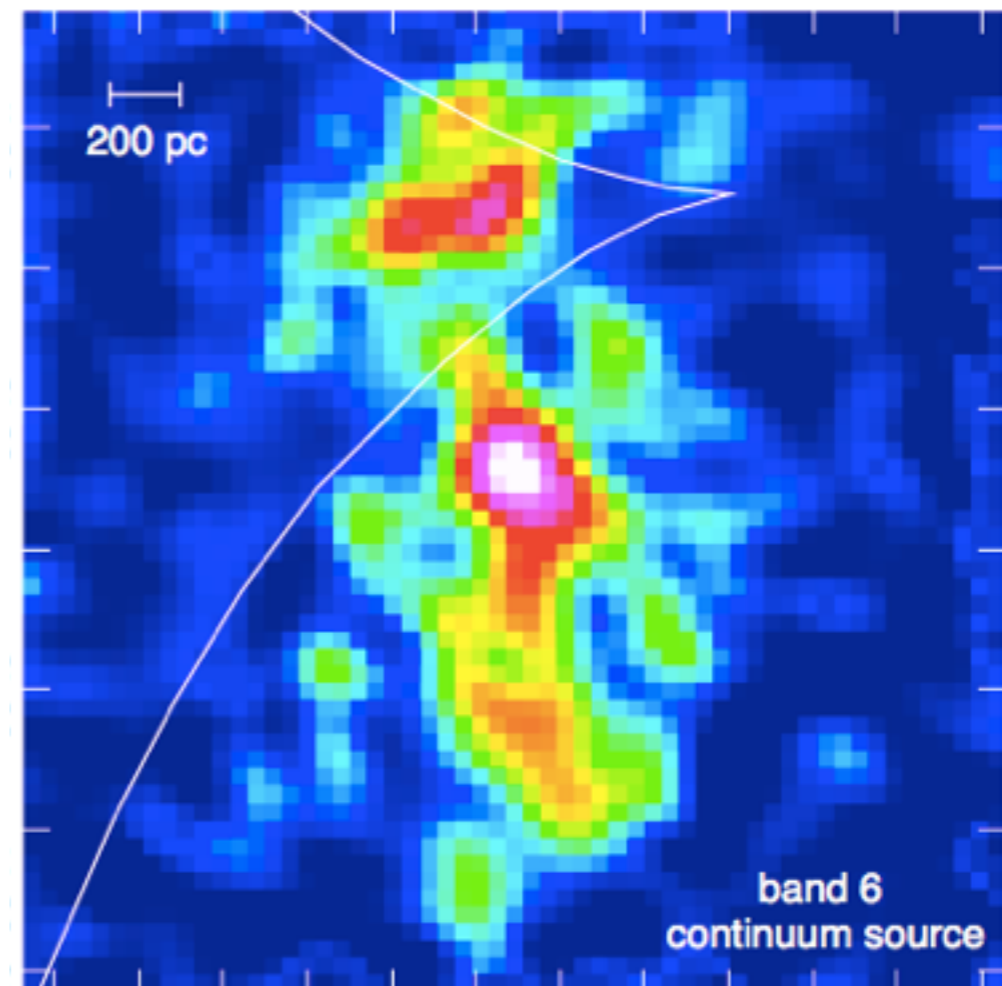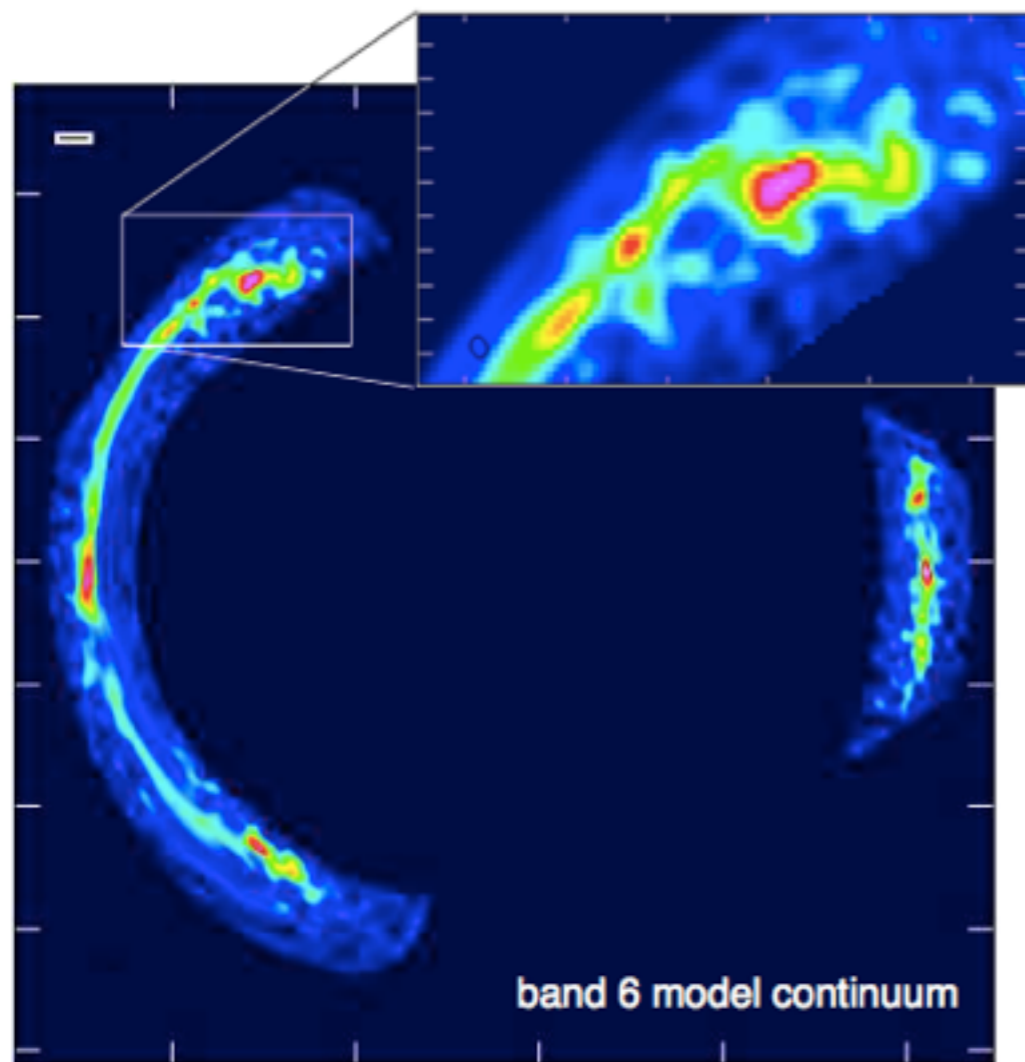
Dye et al. 2015

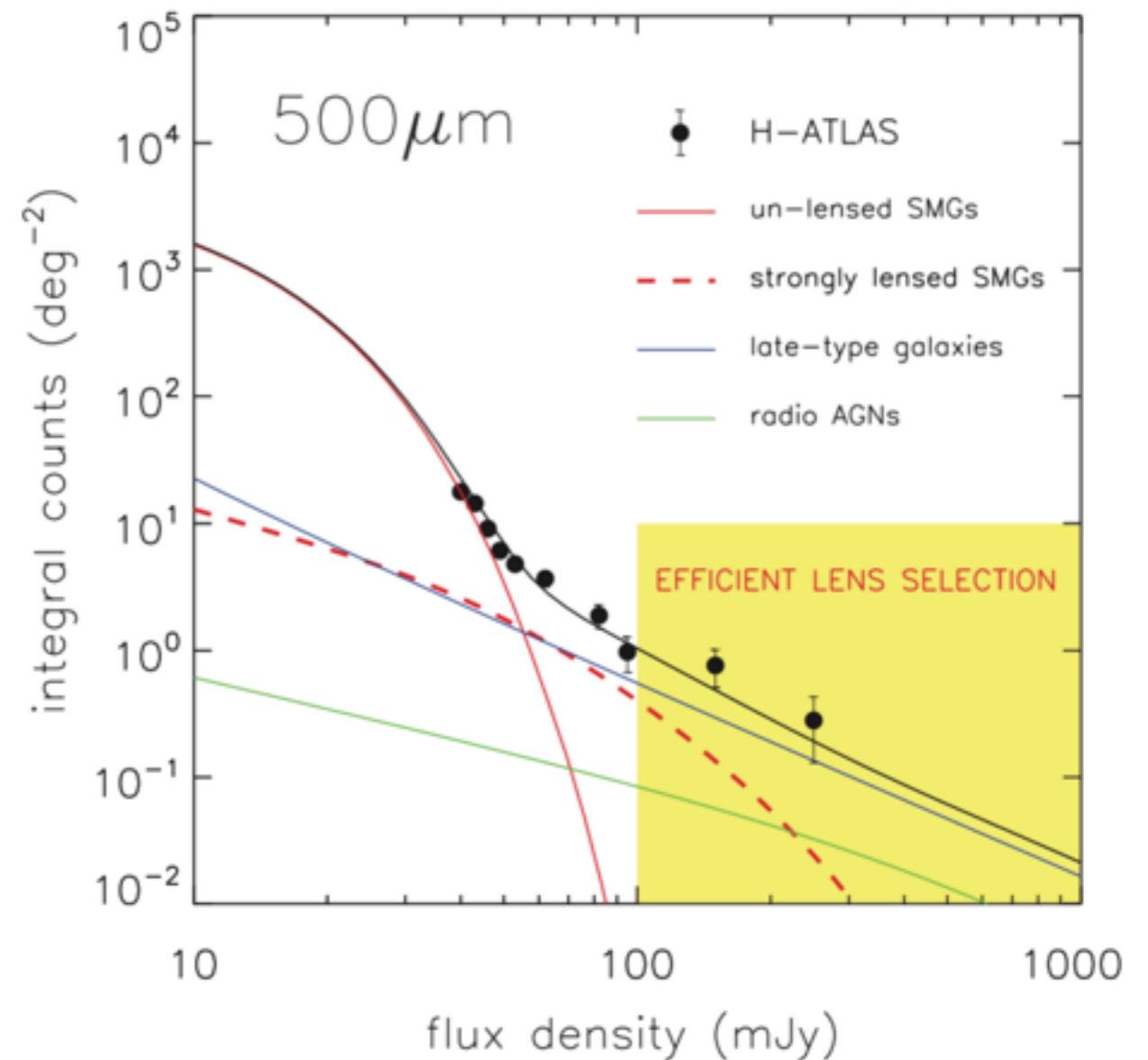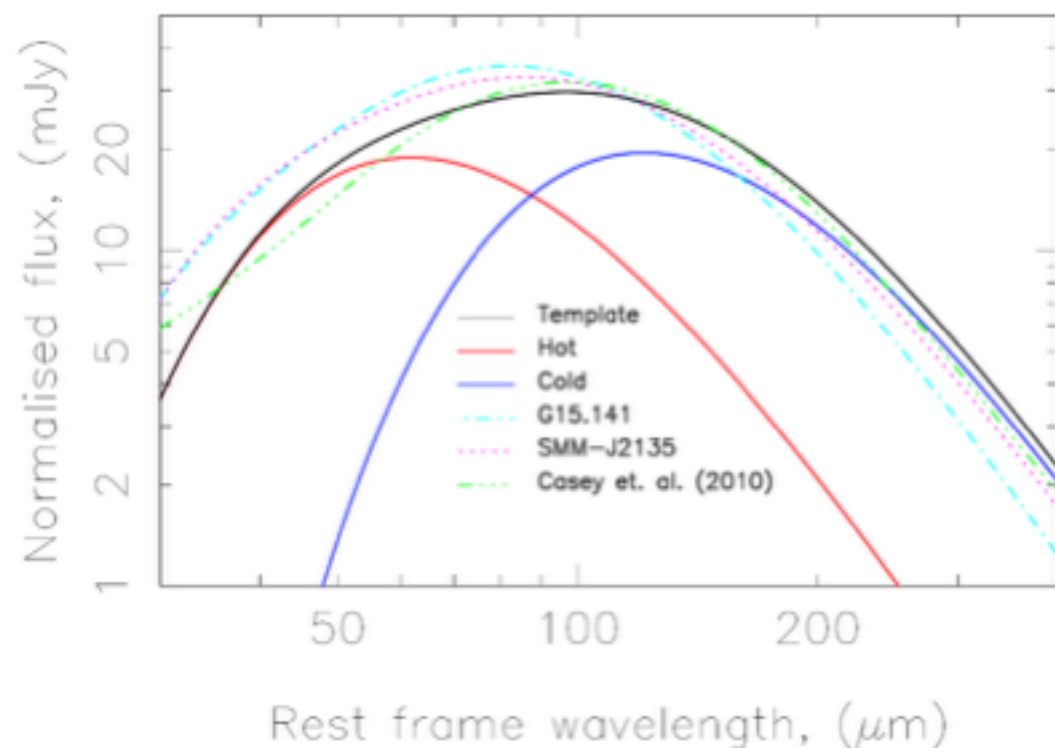# Large surveys can't directly distinguish lenses

133.2 ±5.3 mJy

The HerBS sample contains lensed ULIRGs and unlensed HyLIRGs

HerBS selection:

236 sources with

$z_{phot} > 2$
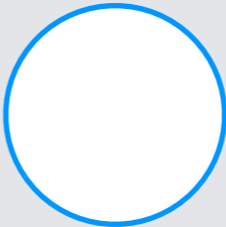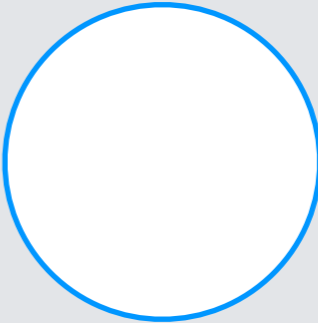
$S_{500um} > 80$ mJy

Negrello et al. 2009
Pearson et al. 2013

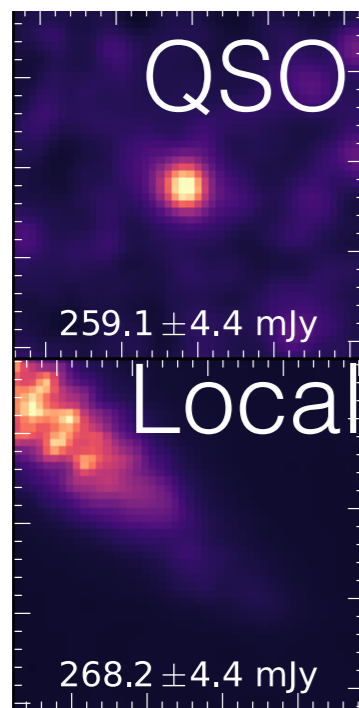# Source confusion effects need to be measured

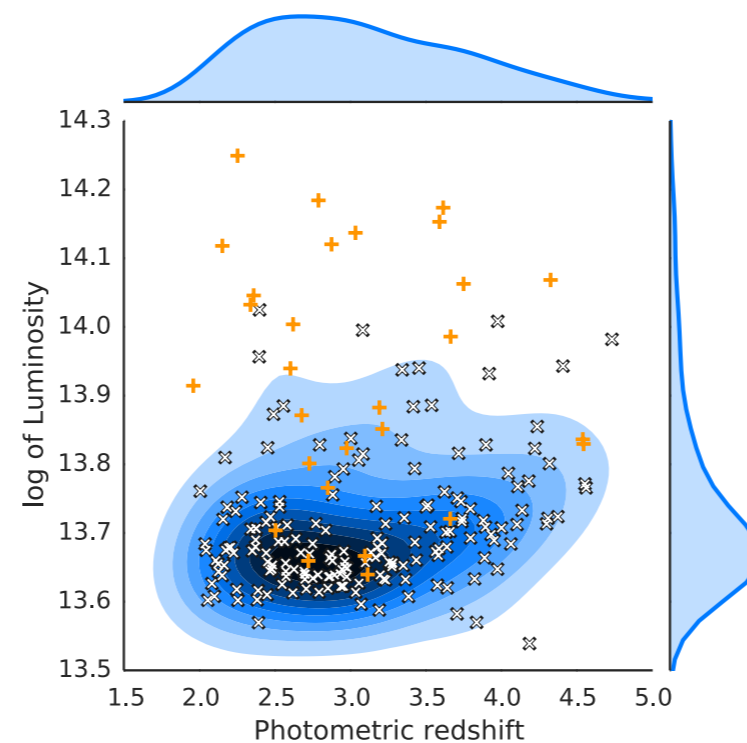| λ [μm]	*Herschel* 250	350	500
Angular size	18"	25"	36"
Surface	158%	306%	634%
Beam size			

A lensed sample that probes the Cosmic Star Formation History

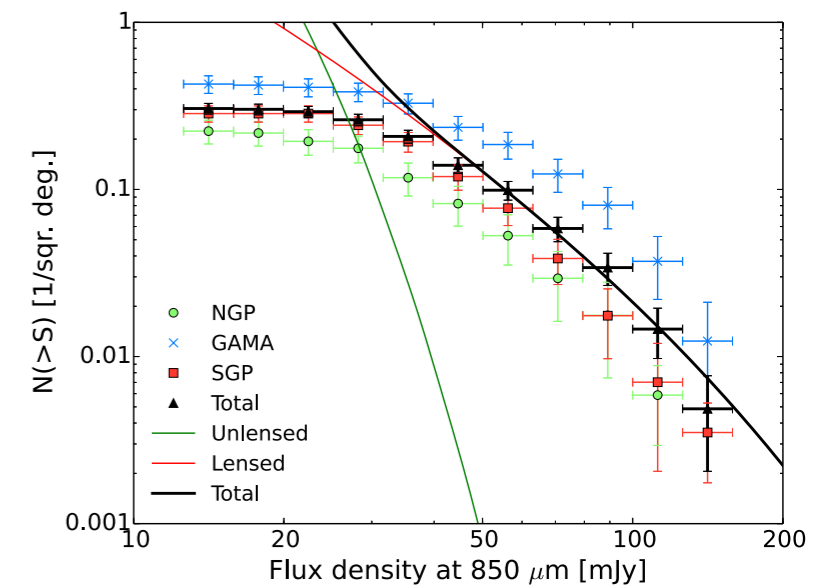Of our 189 SCUBA-2 observed galaxies, we expect 150 galaxies to be lensed

Sample purification

HerBS sample

Lensing estimates

Our sample contained several local galaxies and QSO's

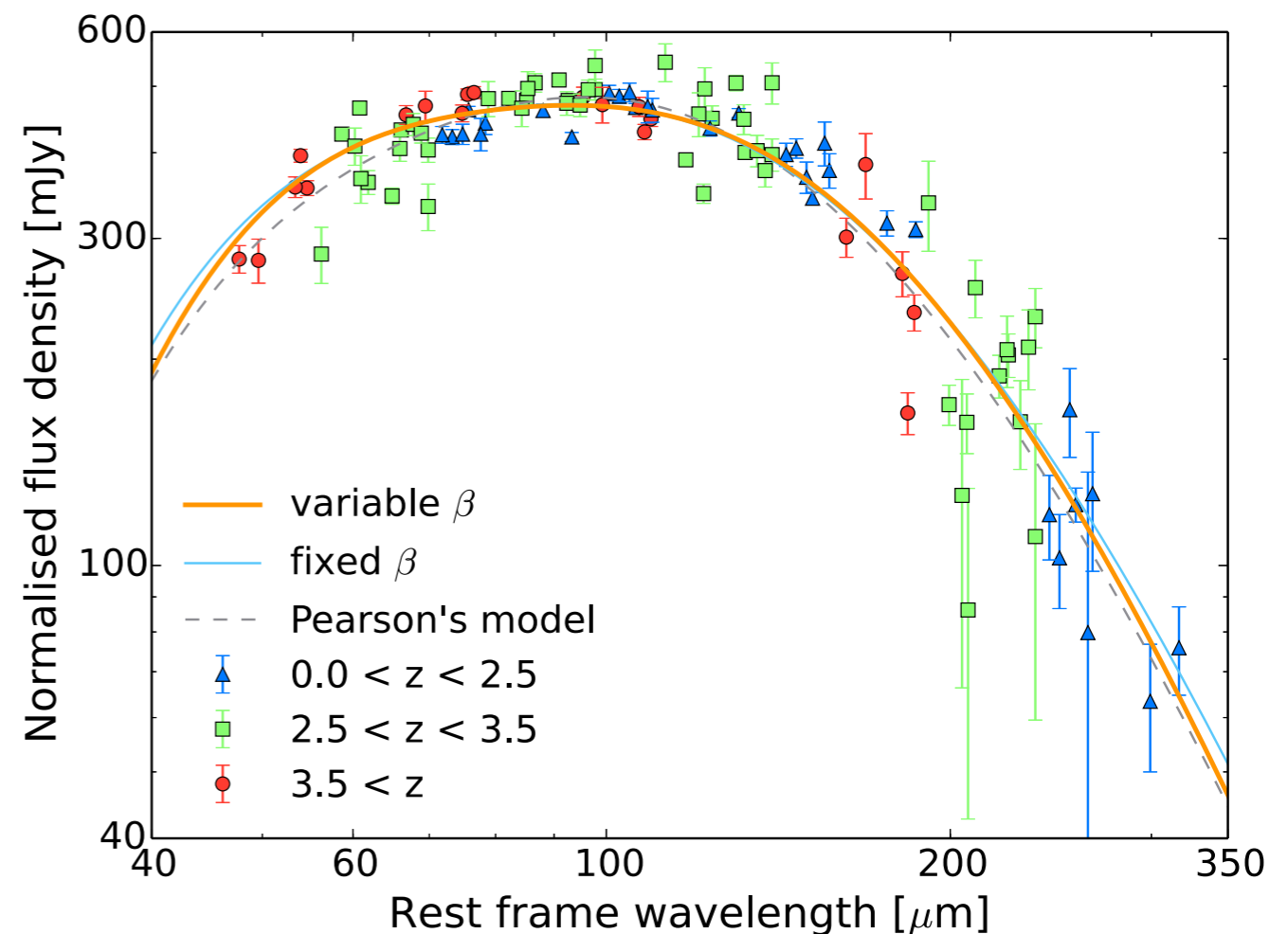| Herschel/SPIRE 250 μm	Herschel/SPIRE 350 μm	Herschel/SPIRE 500 μm	JCMT/SCUBA-2 850 μm	SED SPIRE + SCUBA-2

Of which only ~5 show extended profiles

Template fitted shows little changes to previous version

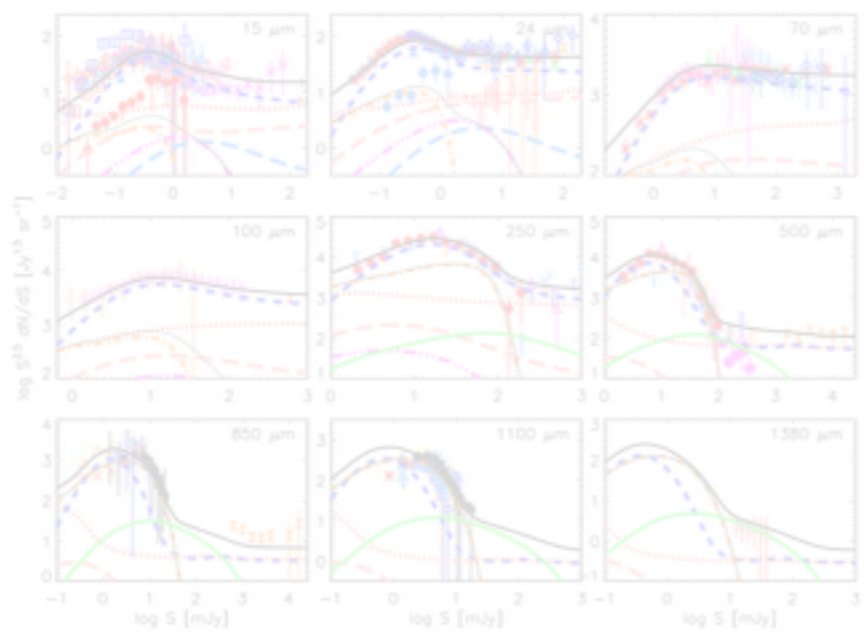|	Best-fit	Pearson
T_{cold}	19.0±3.3	23.9
T_{hot}	39.7±7.1	46.9
α	46.1±23.1	30.1
β	2.62±0.82	2 (fixed)
χ^2	929	1143

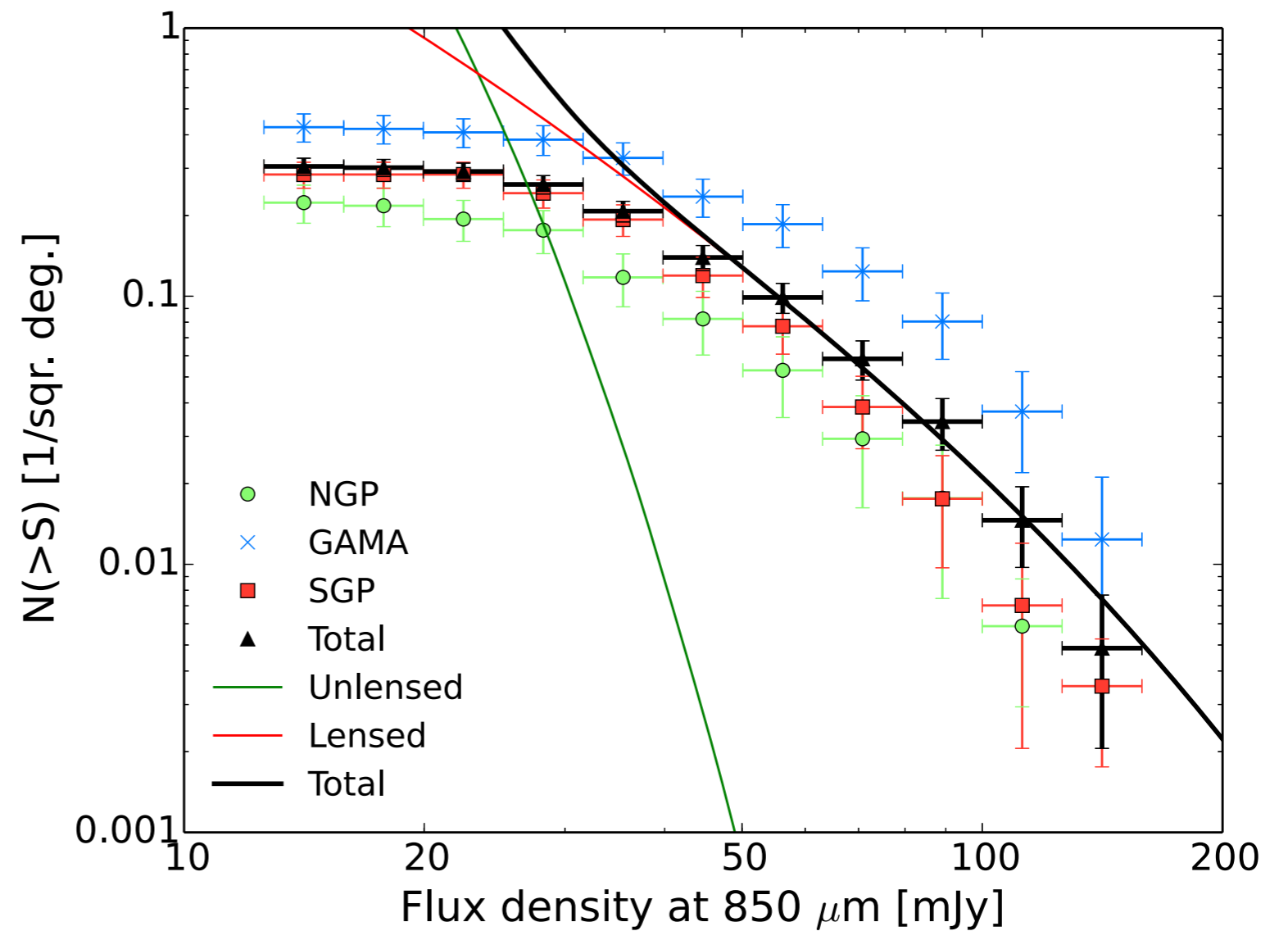# We find no HerBS selection problems
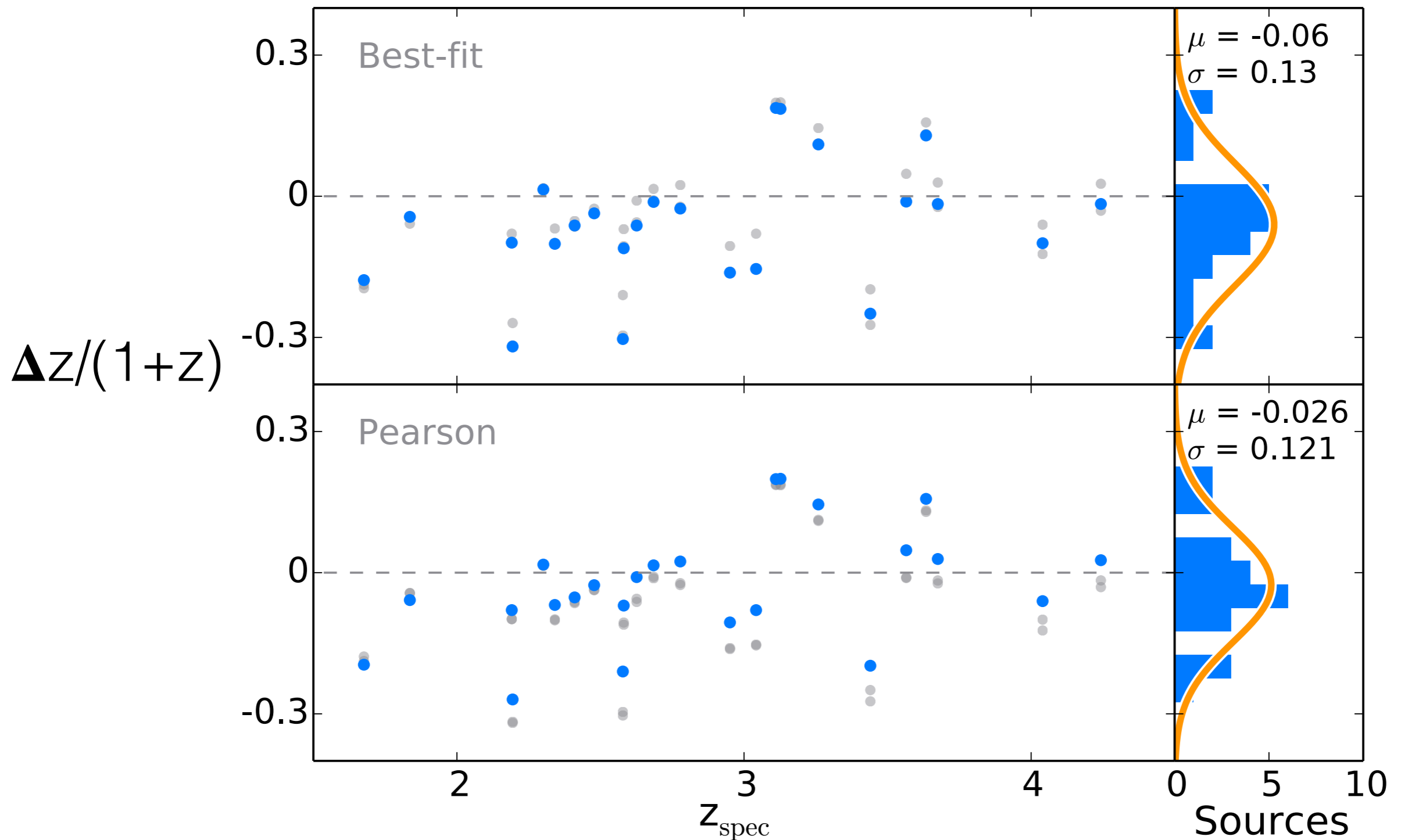
Our sources probe high redshifts and luminosities
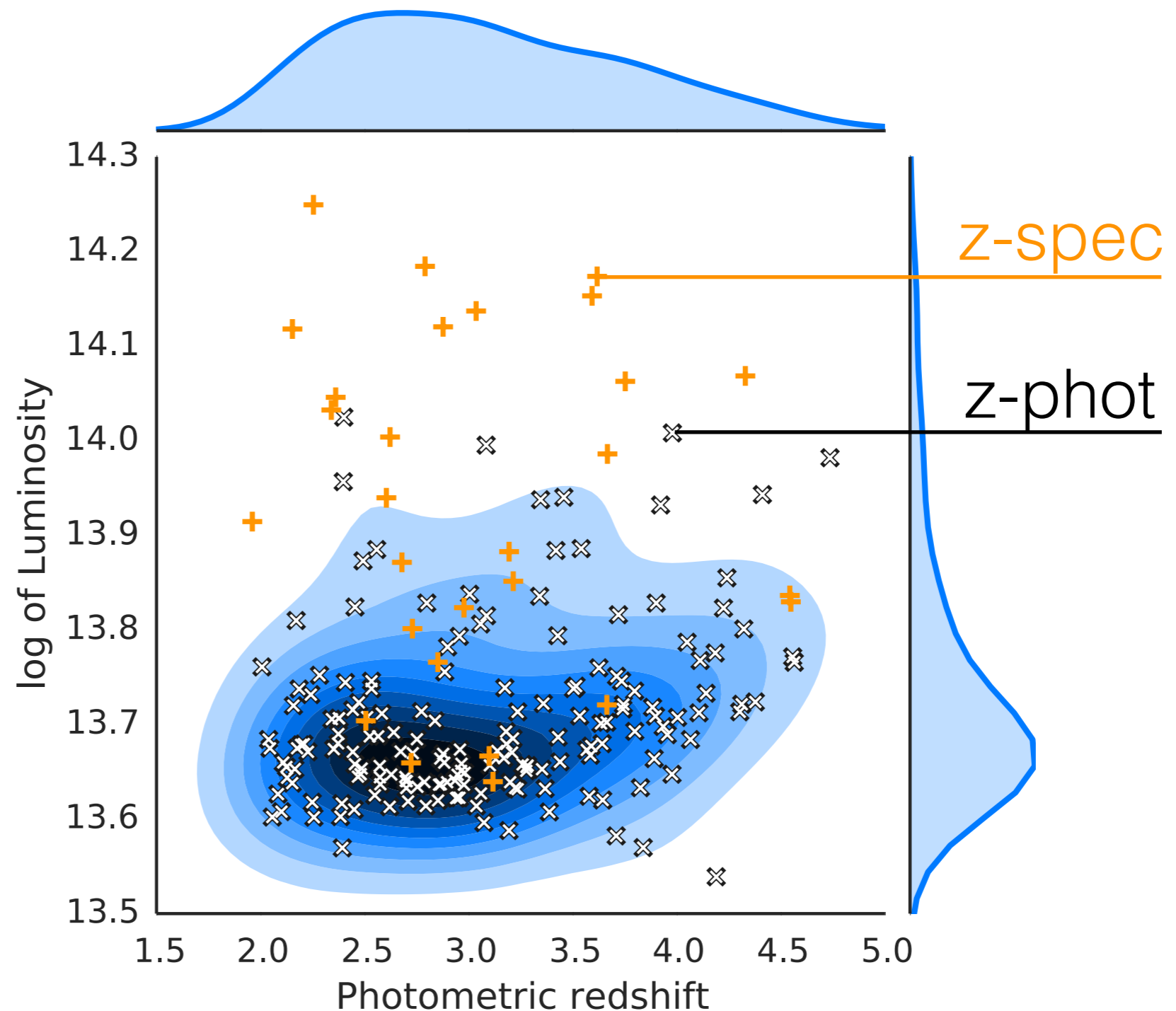
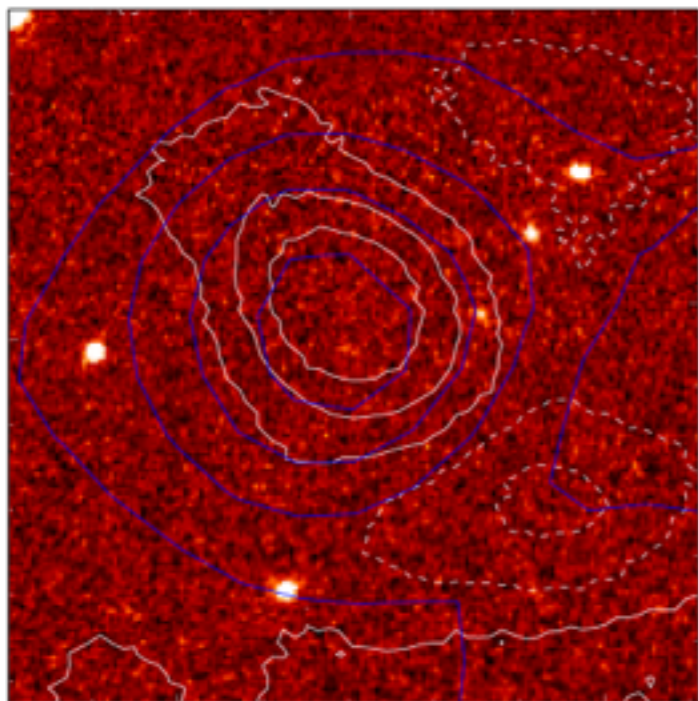# Cosmological source count models suggest an 80% lensing fraction
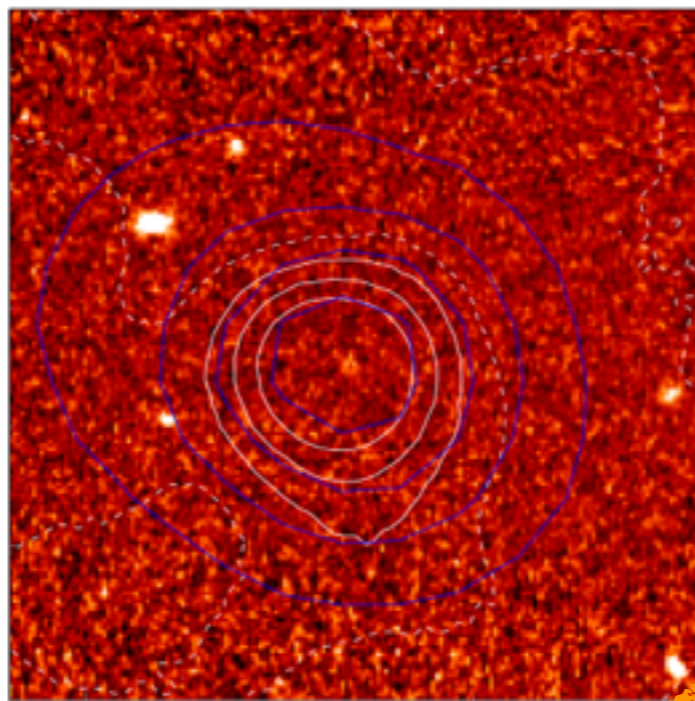

Cai et al. 2013

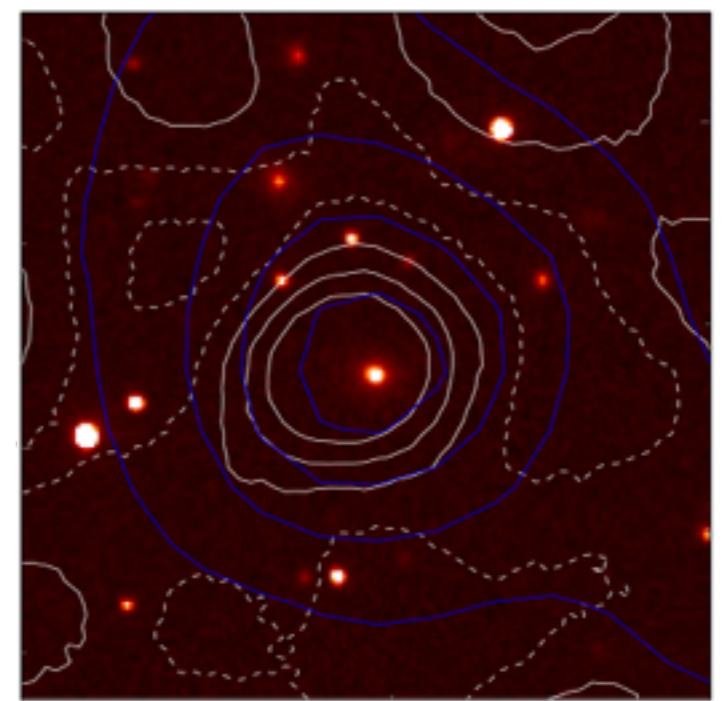# Preliminary analysis of VIKING data shows at least 70% lenses

No counterpart

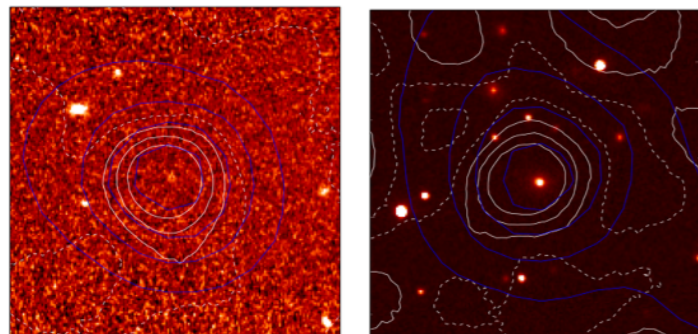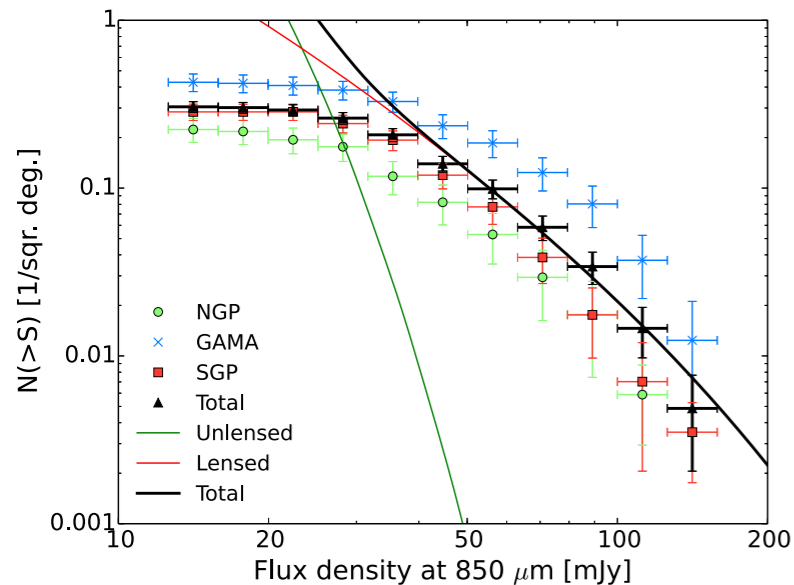Barely resolved

Clear counterpart
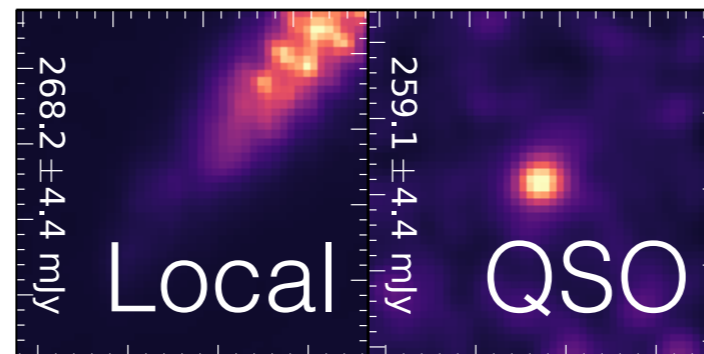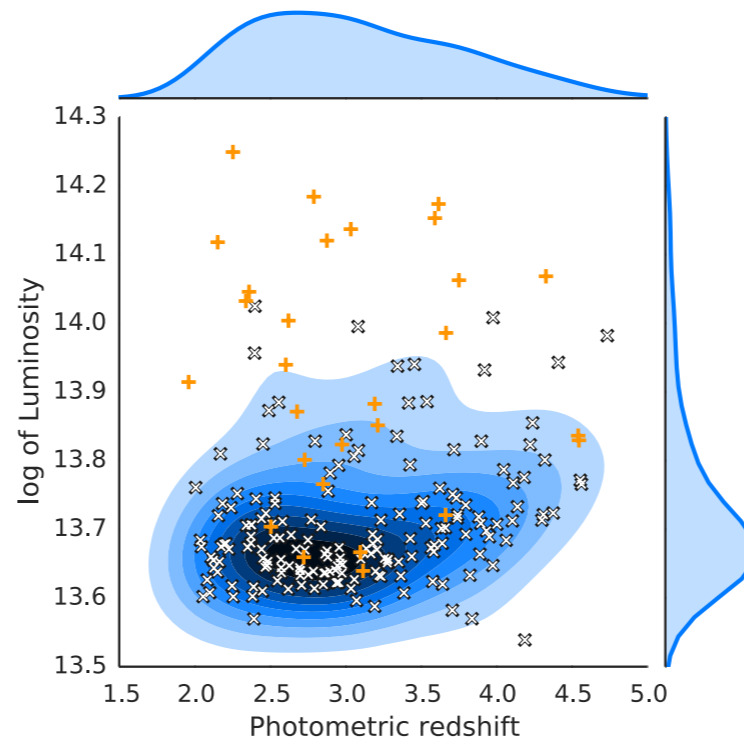

8%

19%

73%

Preliminary!!!

A lensed sample that probes the Cosmic Star Formation History

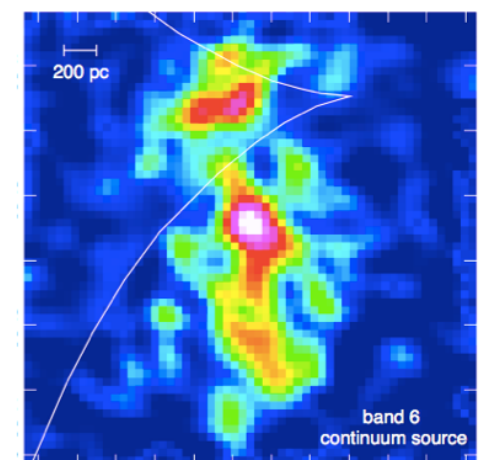Of our 189 SCUBA-2 observed galaxies, we expect 150 galaxies to be lensed

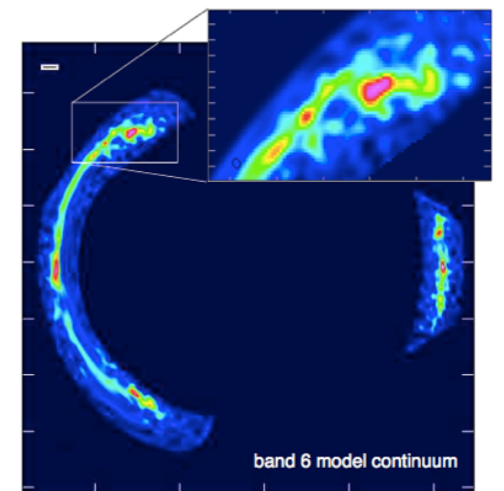## Lensing estimates

HerBS sample

Hi-res Lenses

The HerBS sample

Finding lenses in the wide-area, sub-mm
H-ATLAS survey with SCUBA-2 observations

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Cardiff University