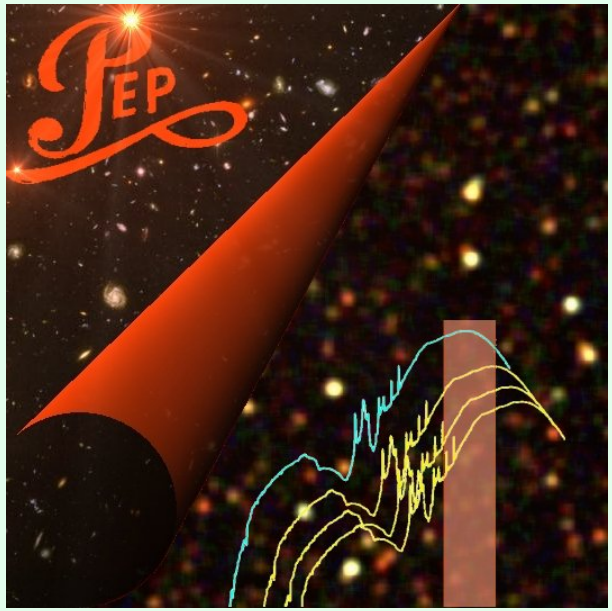
PEP: Dissecting the Cosmic IR Background

Stefano Berta
(MPE)



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D. Lutz,
B. Altieri,
H. Aussel,
& The PEP Team

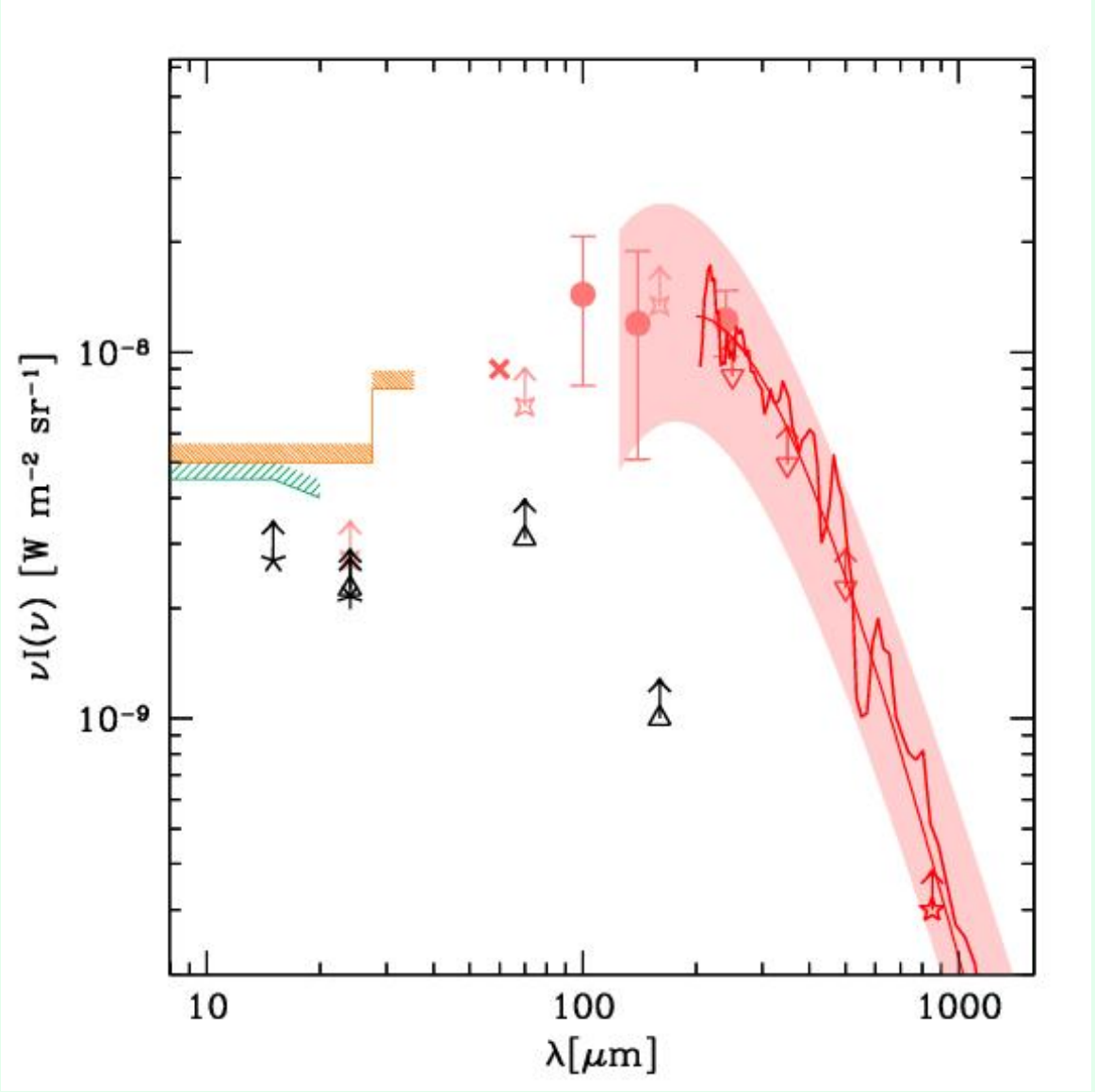
ESLAB 2010 – May 4th – 7th, 2010

The CIB with PEP...

PACS Evolutionary Probe

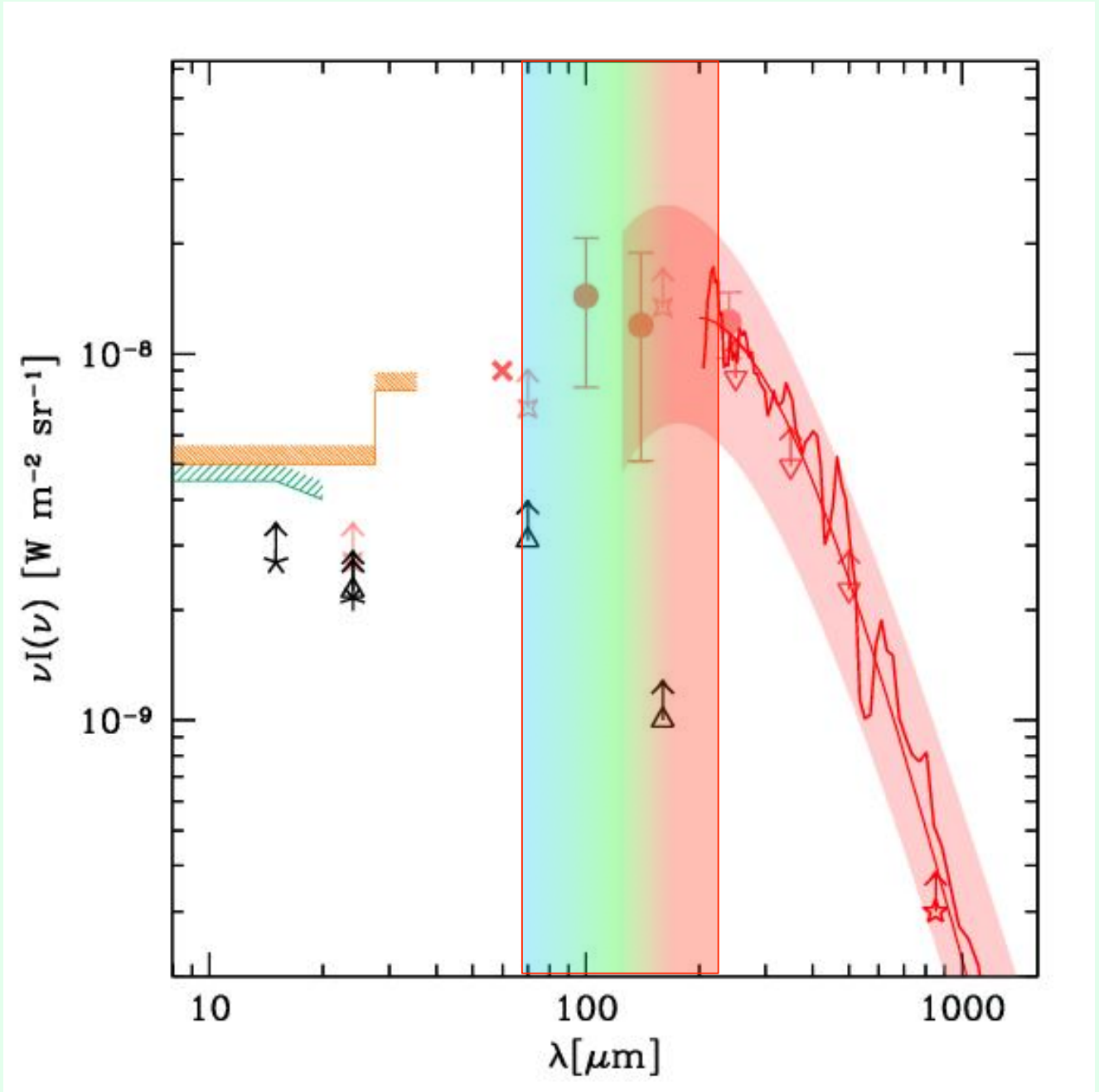
- ✓ What did we know before Herschel?
- ✓ Where is PEP?
- ✓ PEP blank-fields number counts
- ✓ Deep lensed number counts
- ✓ Redshift slices
- ✓ CIB resolved fraction

The CIB before Herschel

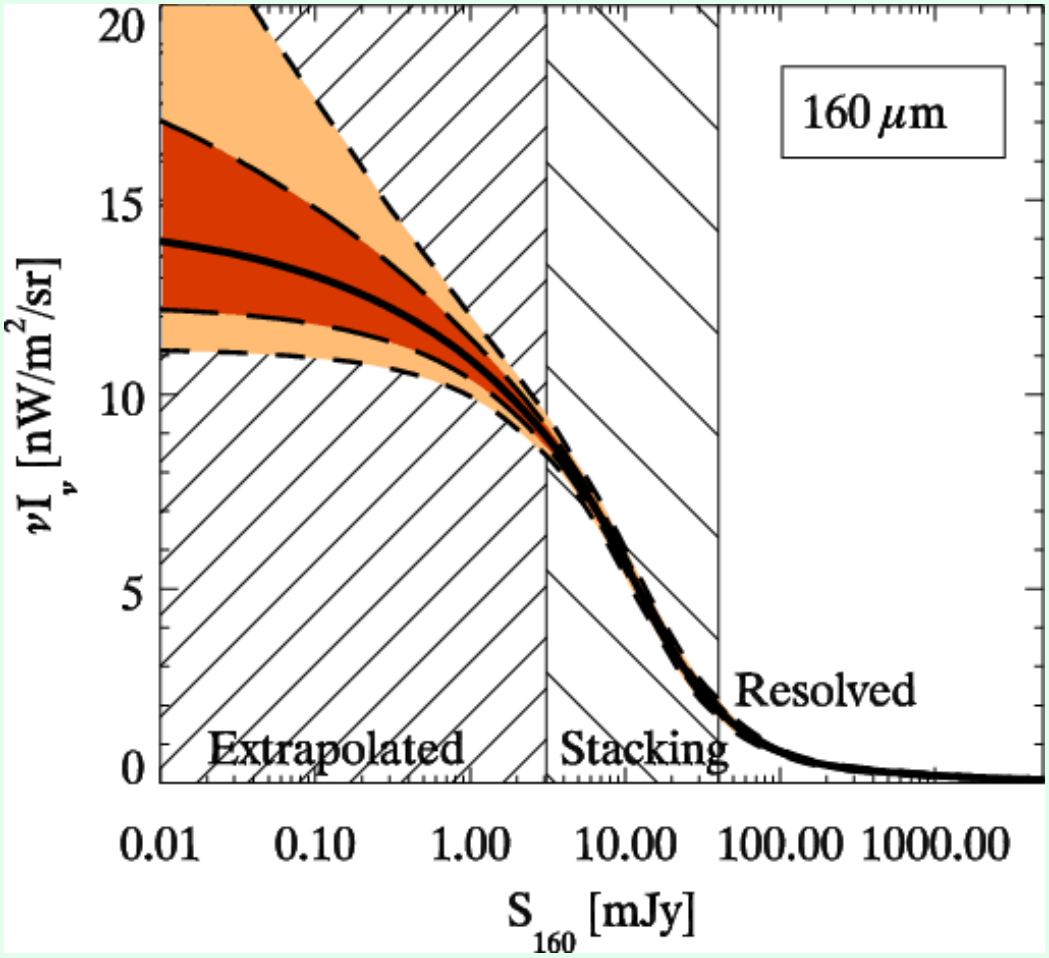


Including data from: Bethermin+ (2010), Franceschini+ (2010), Marsden+ (2009), Dole+ (2006), Elbaz+ (2002), Miville-Deschenes + (2002), Lagache+ (1999,2000), Fixsen+ (1998)

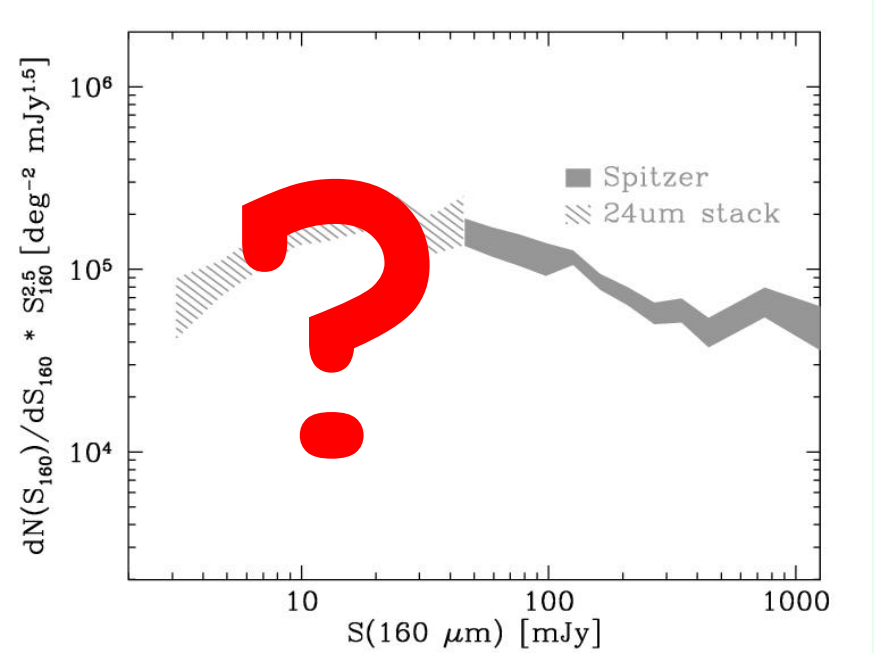
PEP and the CIB



FIR galaxy counts so far



Bethermin et al. (2010)



PEP Observations

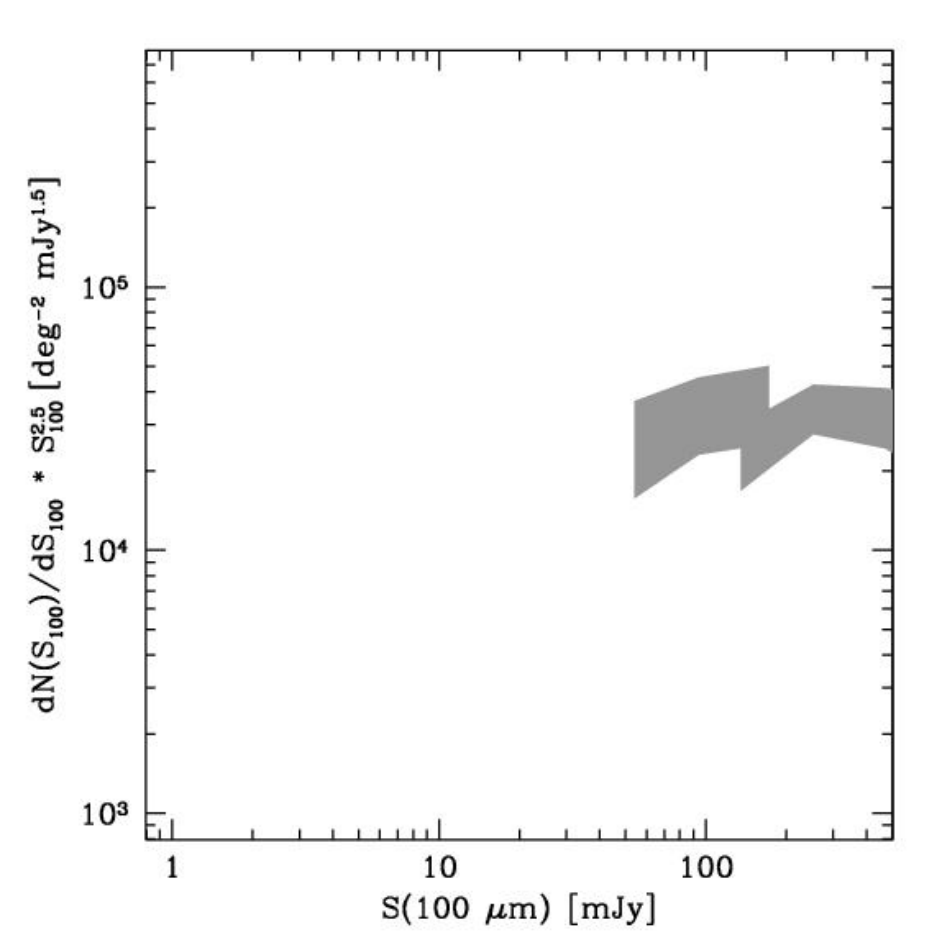
PACS Evolutionary Probe

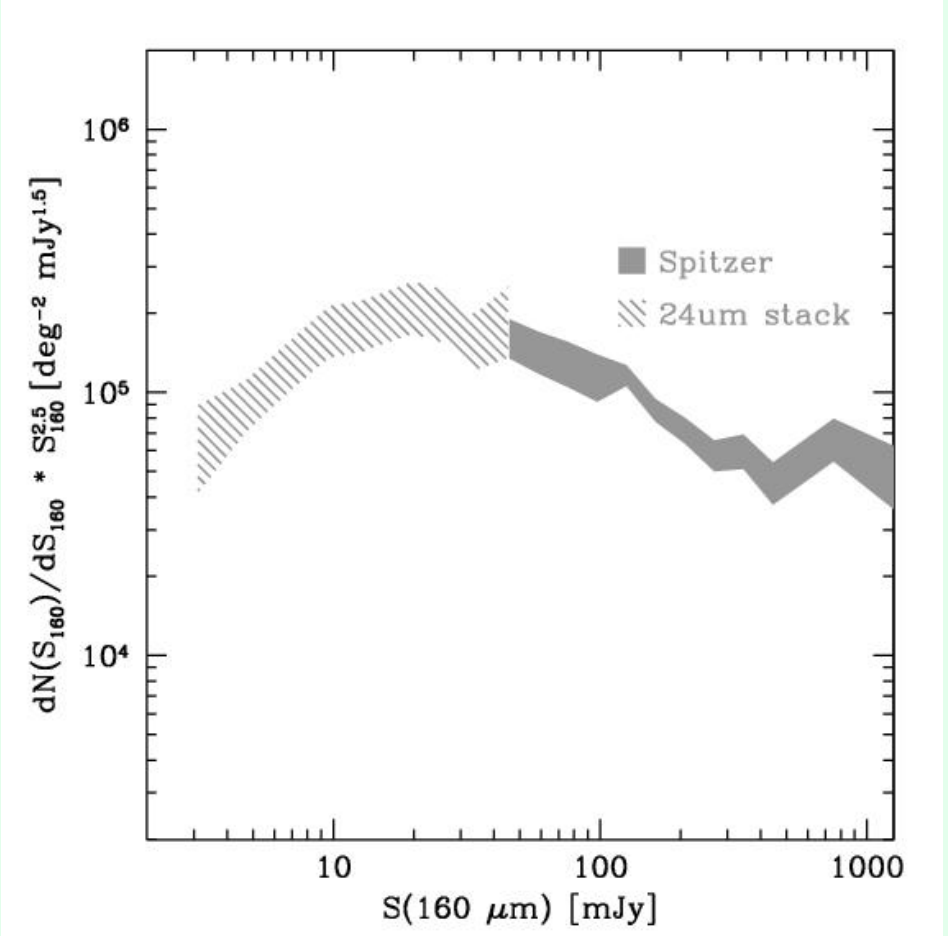
Field Band	Area arcmin	Exp. h	3σ mJy	N $> 3\sigma$	80% compl mJy
GOODS-N 100	10×15	30	3.0	291	5.5
GOODS-N 160	10×15	30	5.7	317	11.0
LH 100	24×24	35	∼4.0	780	∼7.0
LH 160	24×24	35	∼8.0	704	∼14.5
COSMOS* 100	85×85	182	∼6.0	5750	∼9.5
COSMOS* 160	85×85	182	∼12.0	4900	∼20.5
GOODS-S 70	10×15	113	1.1	375	2.1
GOODS-S 100	10×15	113	1.3	717	2.4
GOODS-S 160†	10×15	226	2.4	867	5.2

*: COSMOS will reach 213 hours of integration at full depth.

†: in deep 160 μm, rms values include confusion noise.

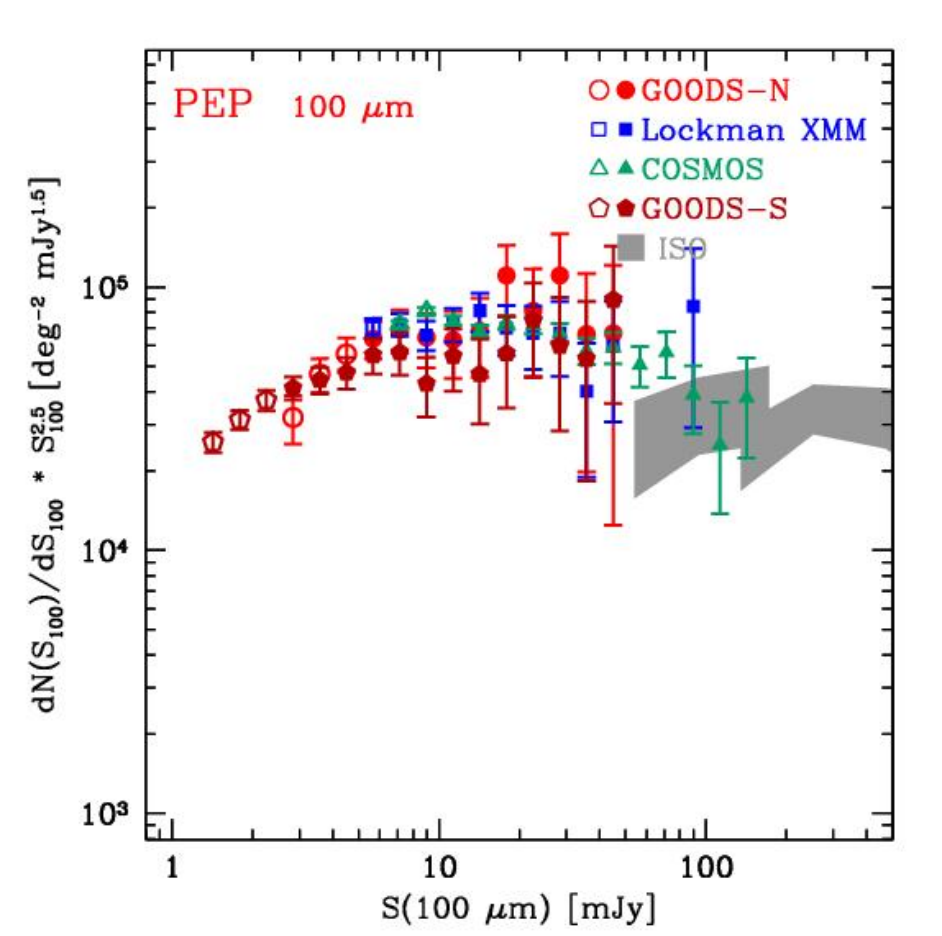
FIR number counts

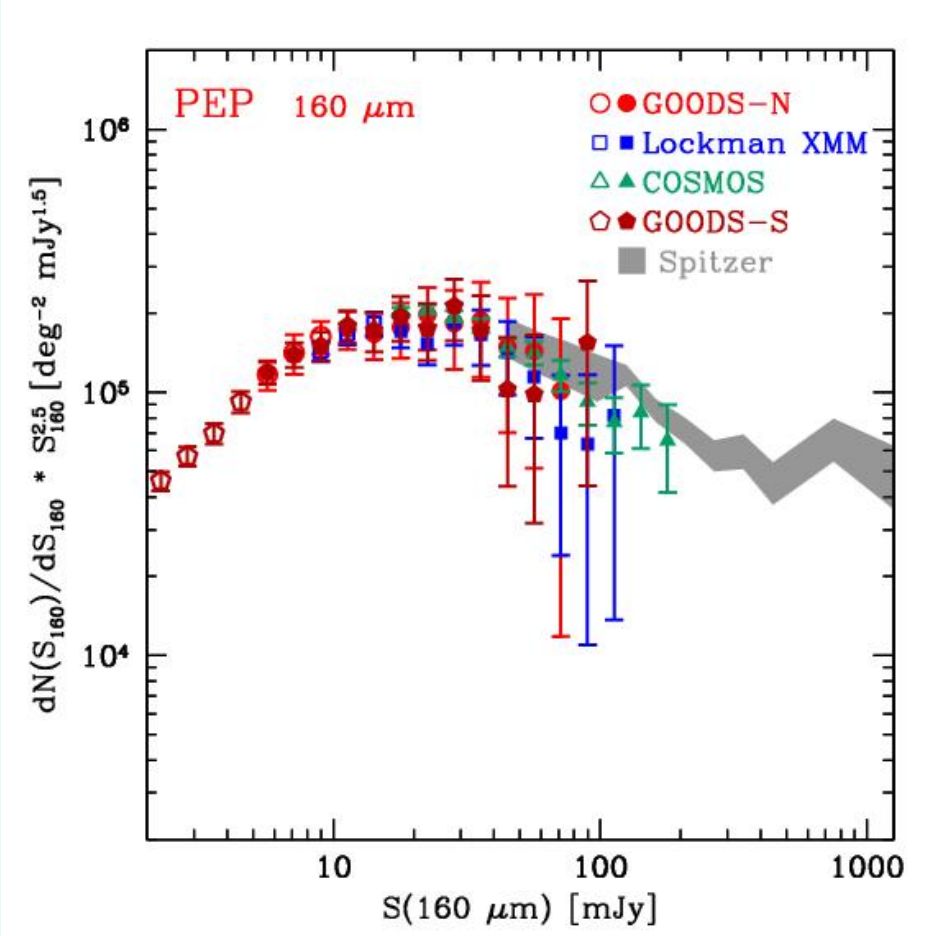




Bethermin et al. (2010), Rodighiero et al. (2004), Heraudeau et al. (2004)

PACS number counts

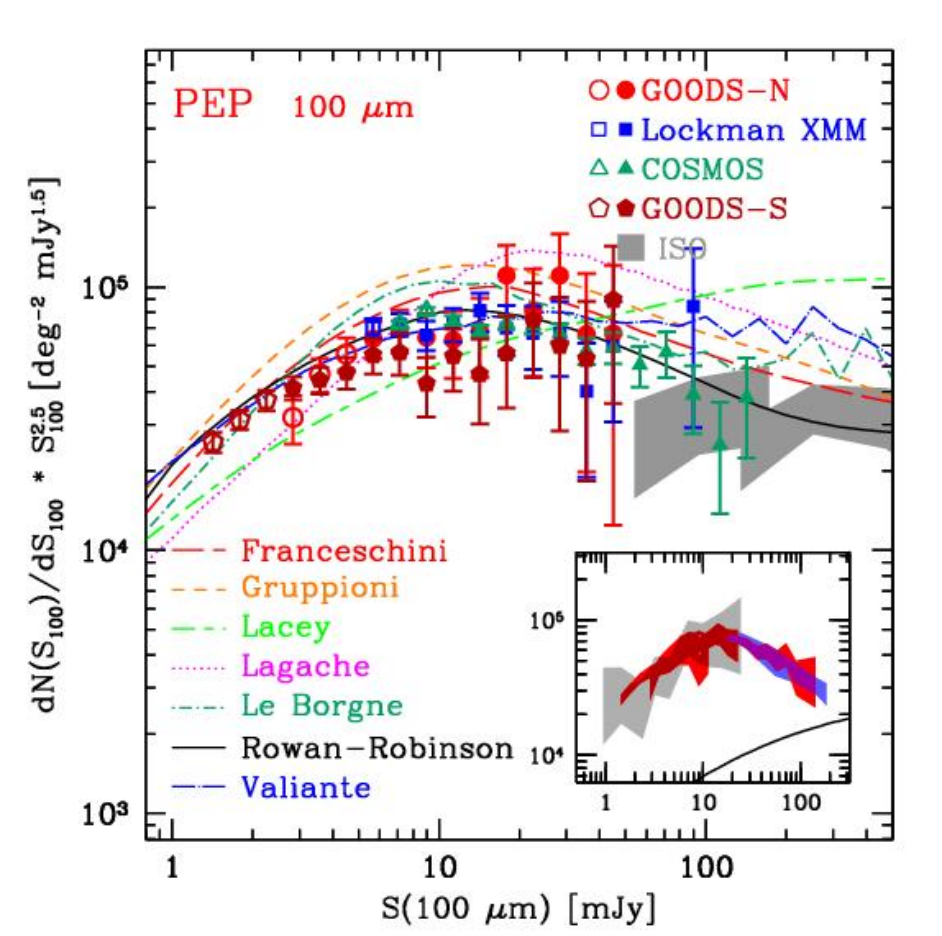


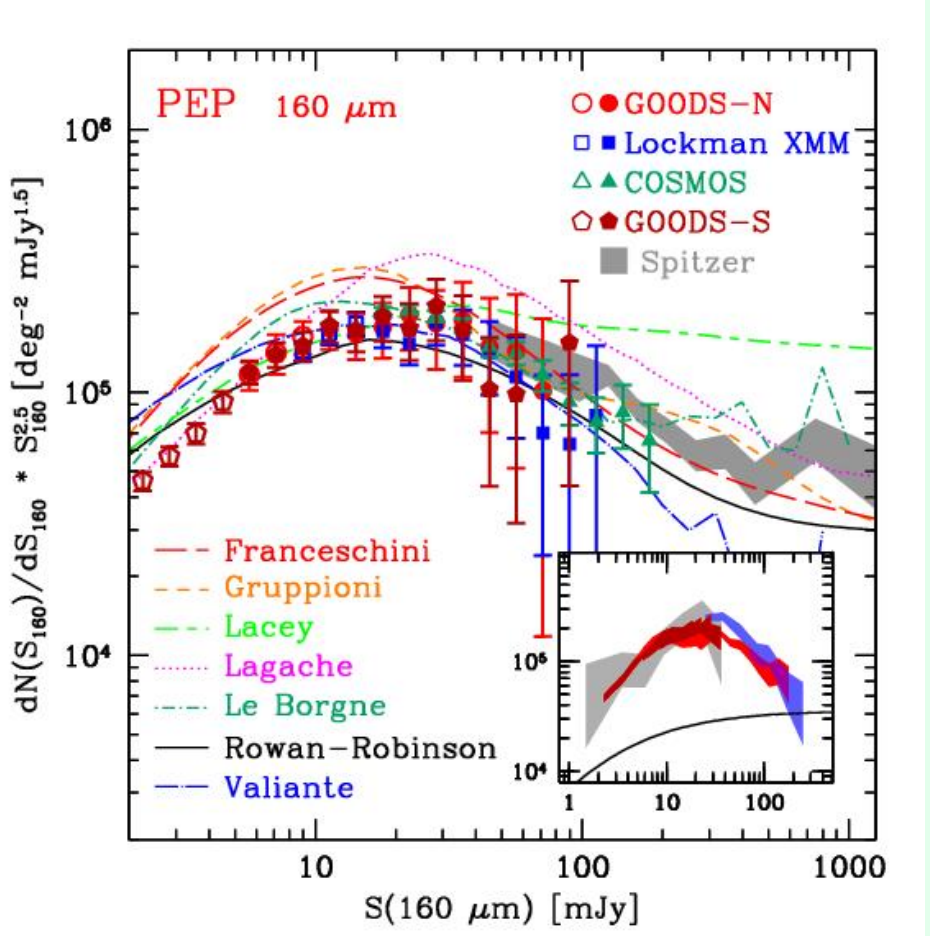


Berta et al.(2010)

PACS number counts

PEP blank fields

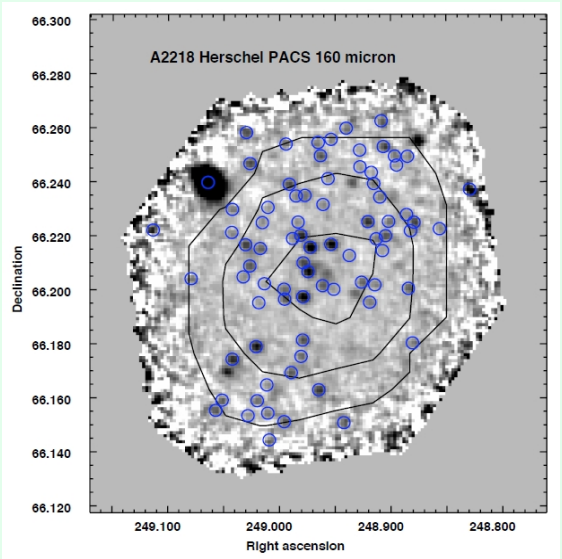


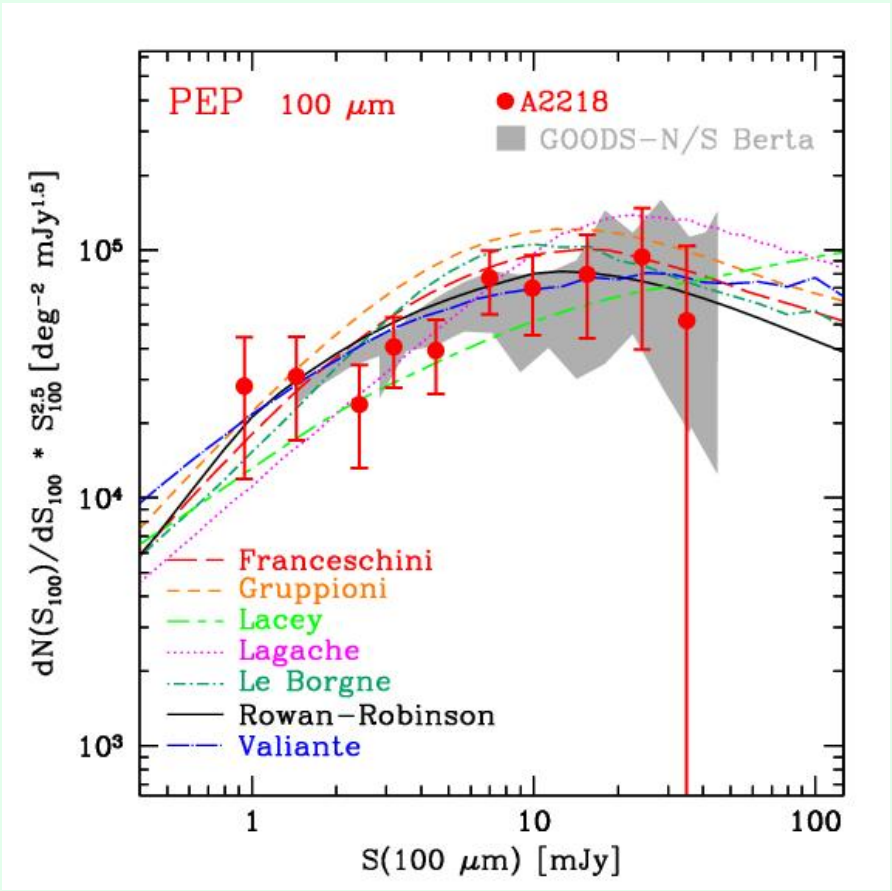


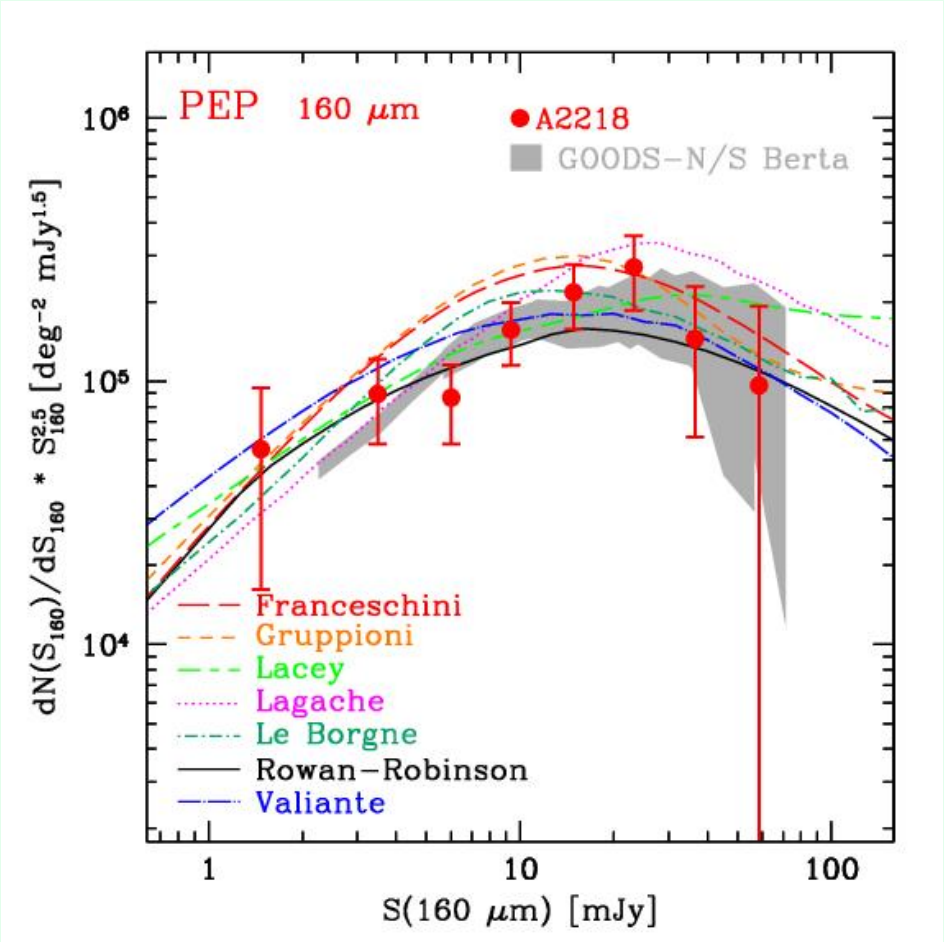
Berta et al. (2010)
see also Herve Aussel's poster

Deep lensed counts

in Abell 2218

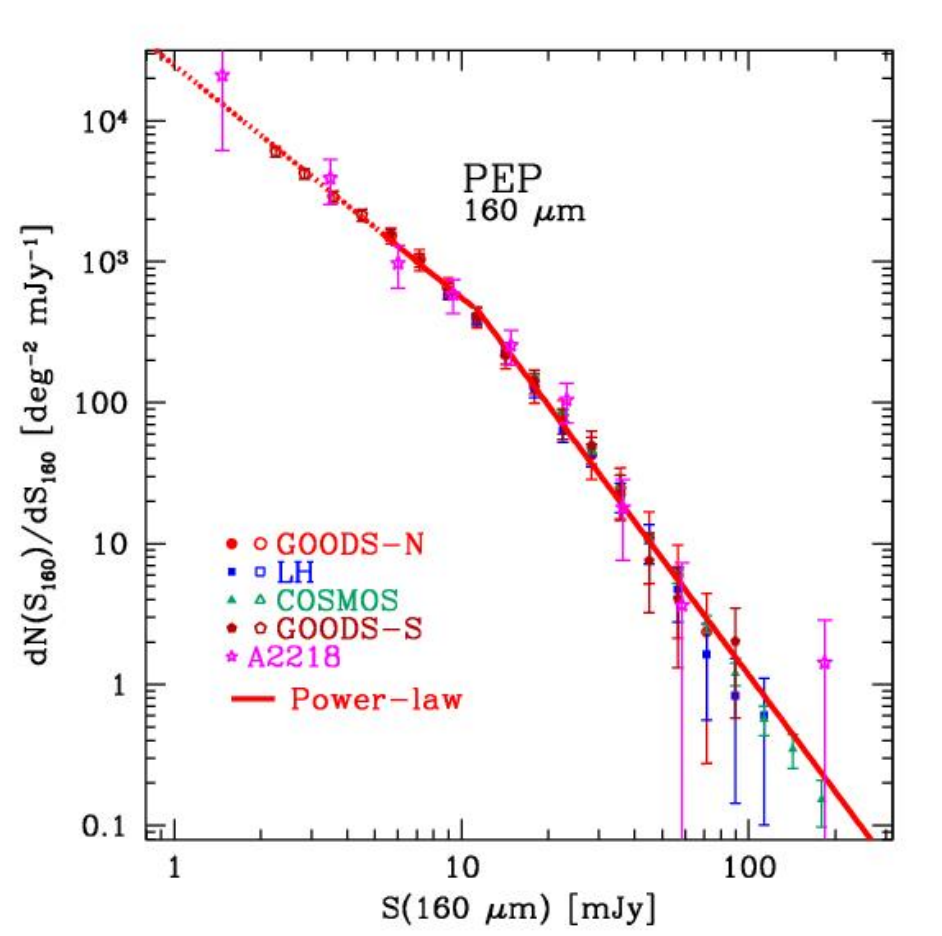


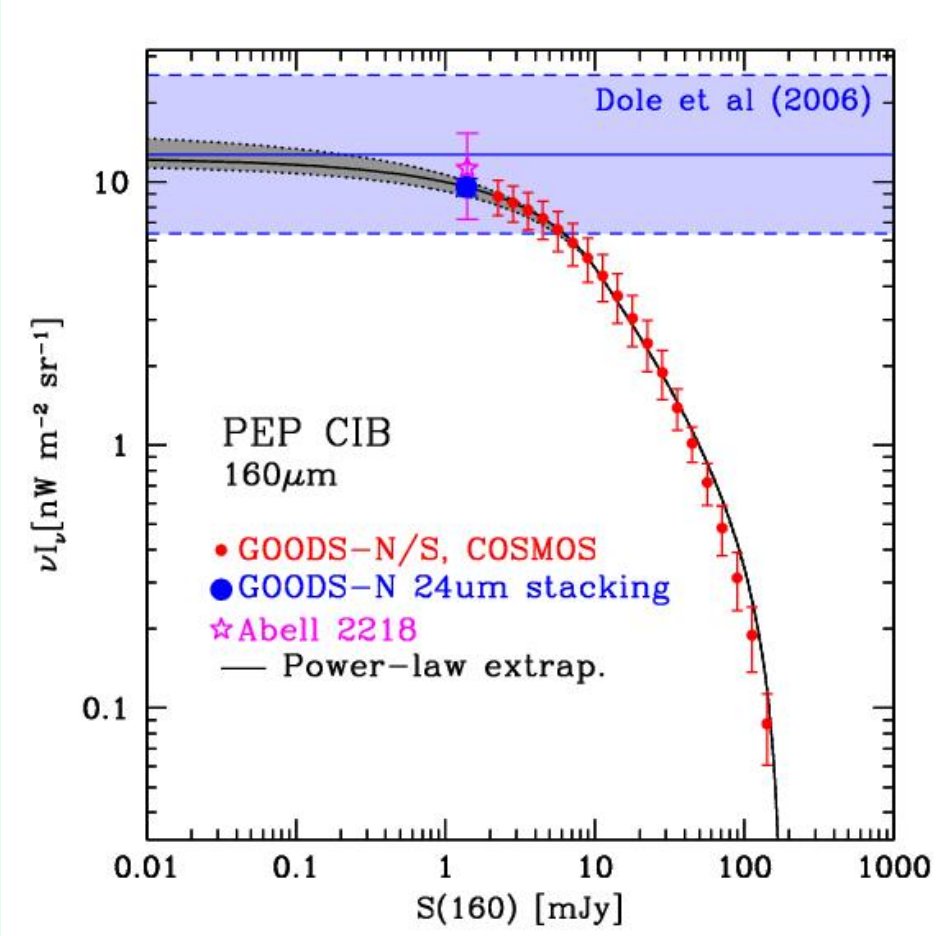




Altieri et al. (2010)

PEP resolves the CIB

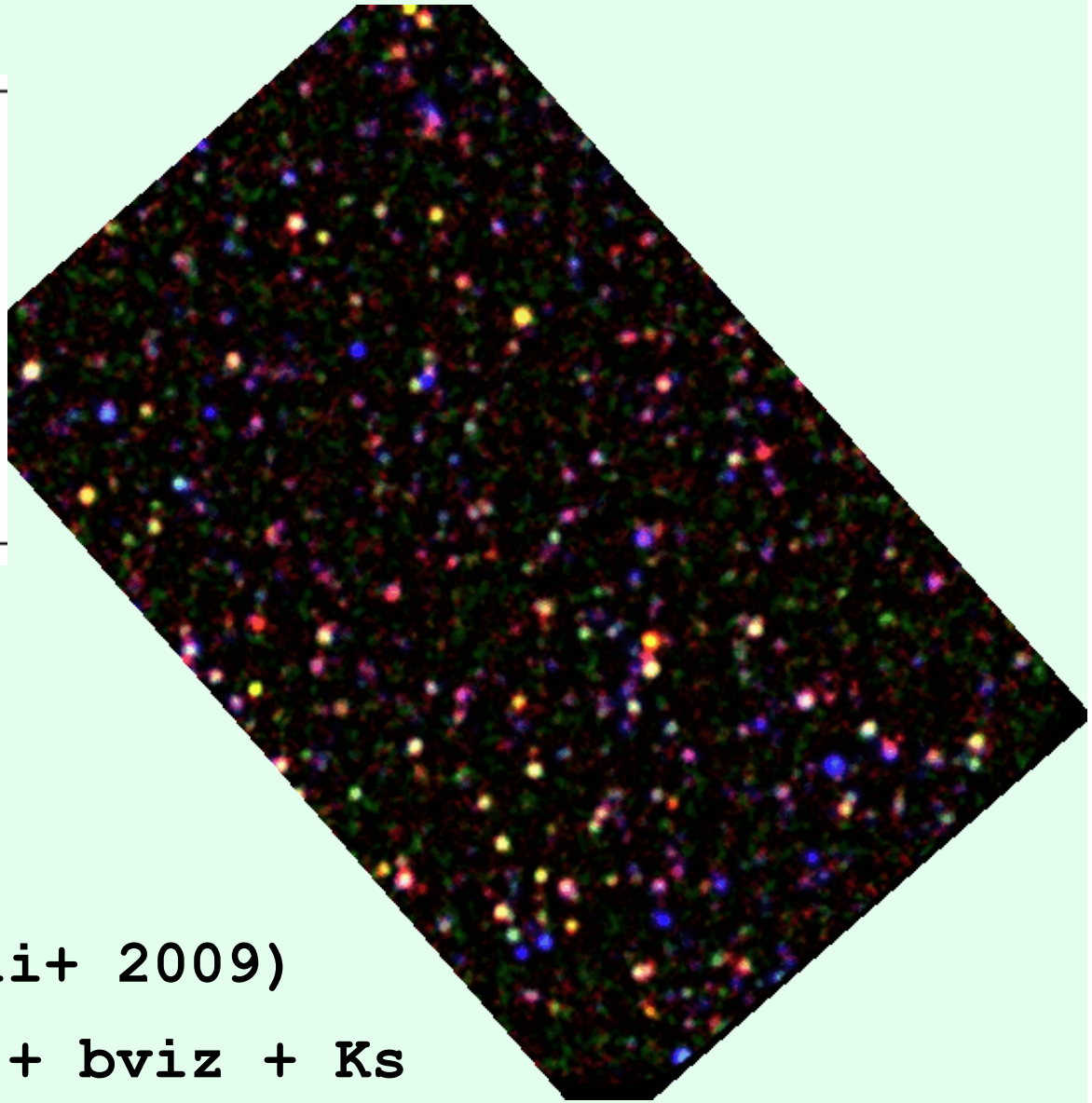




GOODS-N/S + LH + COSMOS resolve ~70% (55%) of the CIB at 160um (100um)

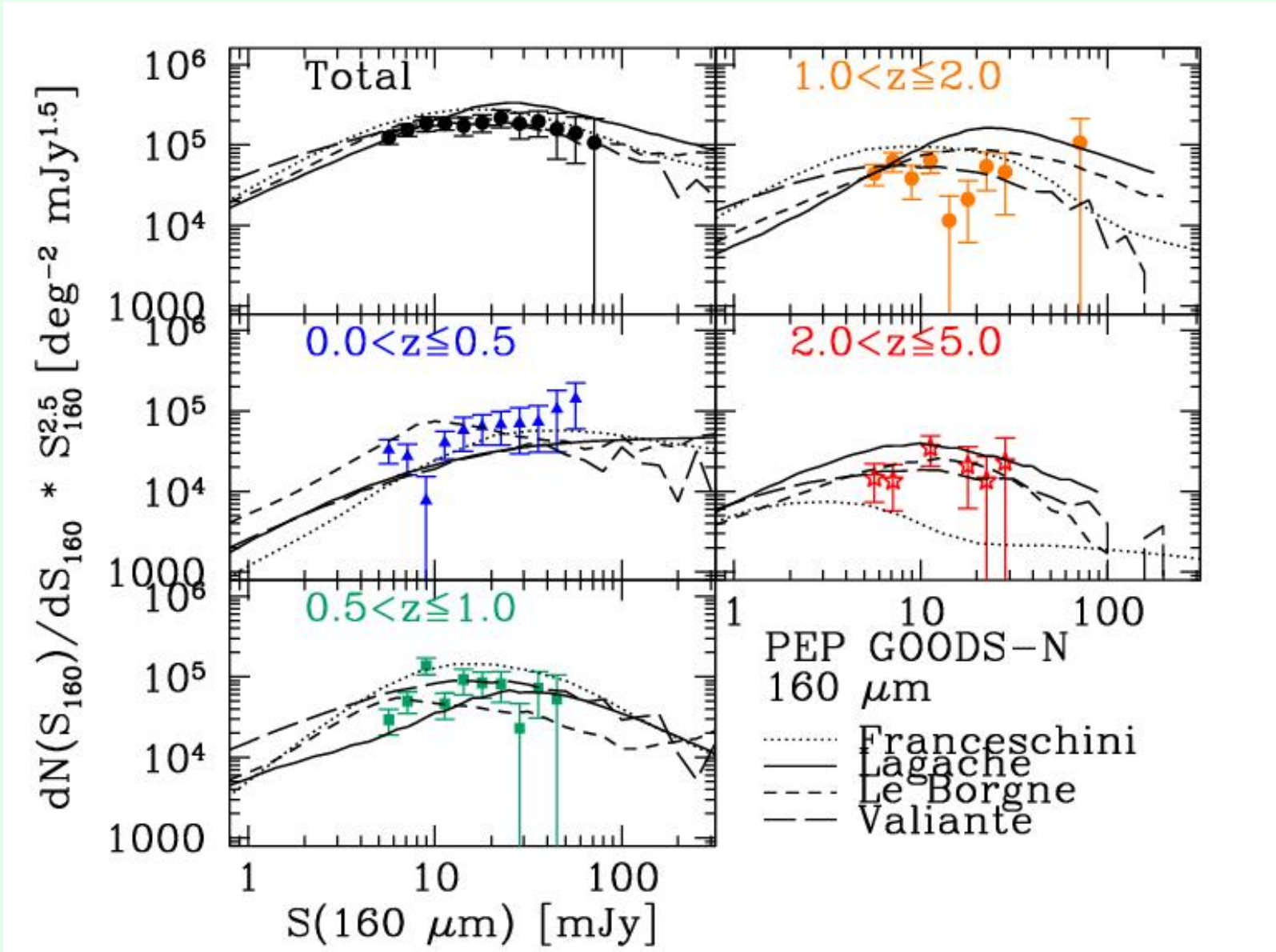
GOODS-N ancillary data

GOODS-N 100	291
GOODS-N 160	317
100+multi	254
160+multi	274
100+multi+zspec	162
160+multi+zspec	169



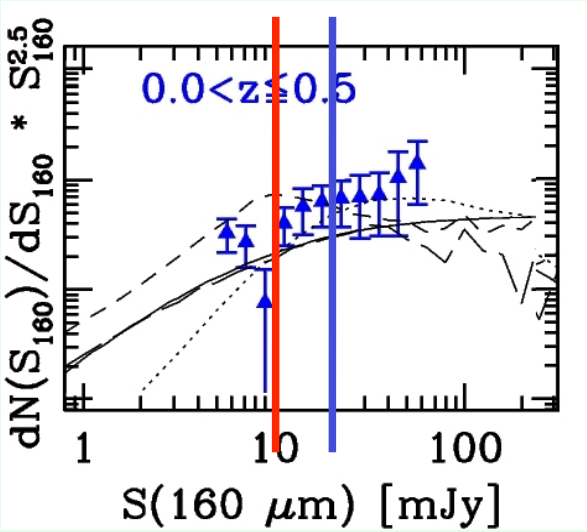
- ✓ **ACS bviz**
- ✓ **FLAMINGOS JHK**
- ✓ **IRAC 4 bands**
- ✓ **MIPS 24um (Magnelli+ 2009)**
- ✓ **Barger+ (2008): U + bviz + Ks + 24um + GALEX + z-spec + Xray (+radio)**

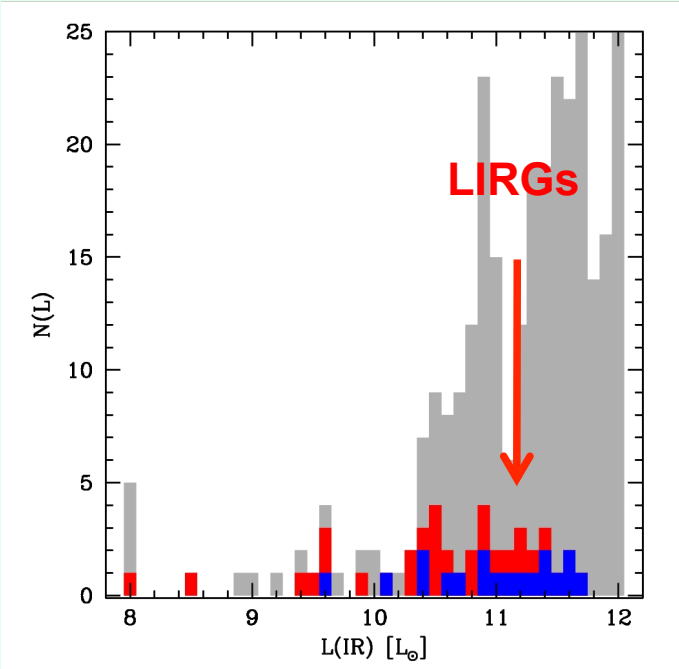
Slicing number counts

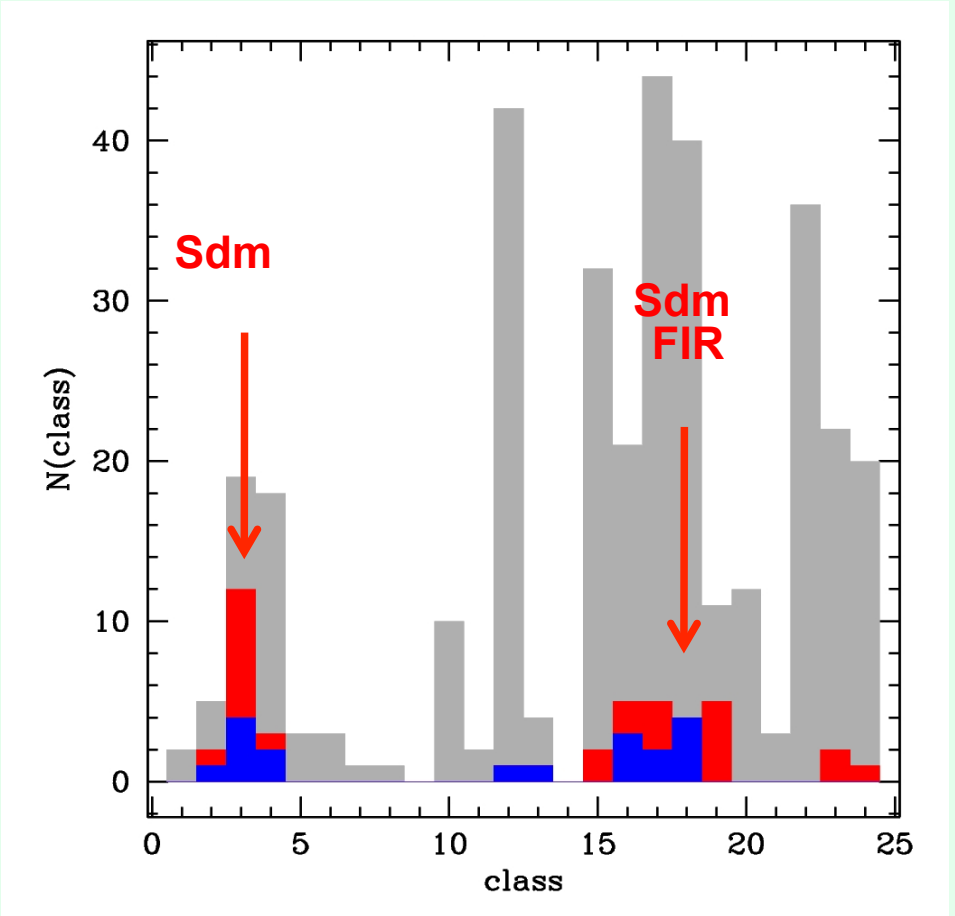


Berta et al. (2010)

SEDs of low-z bright sources





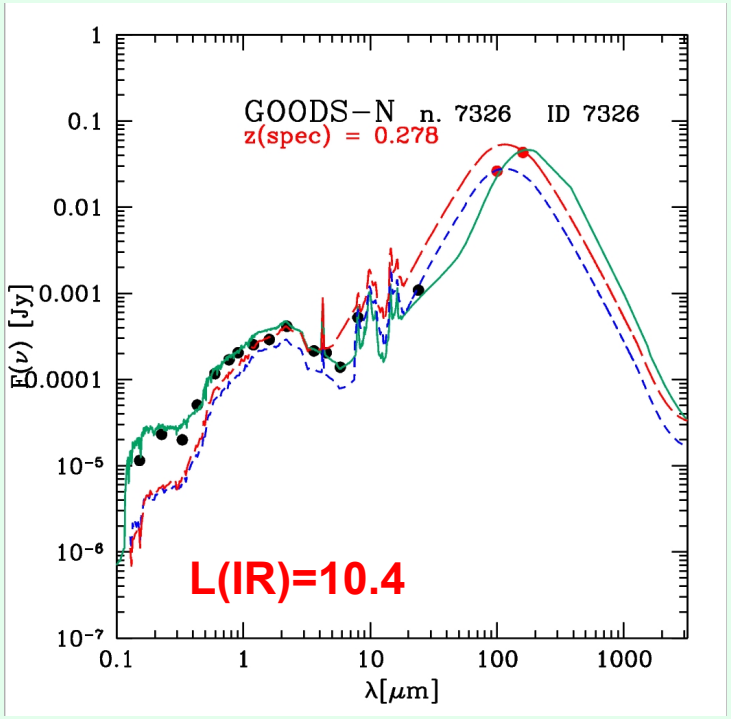


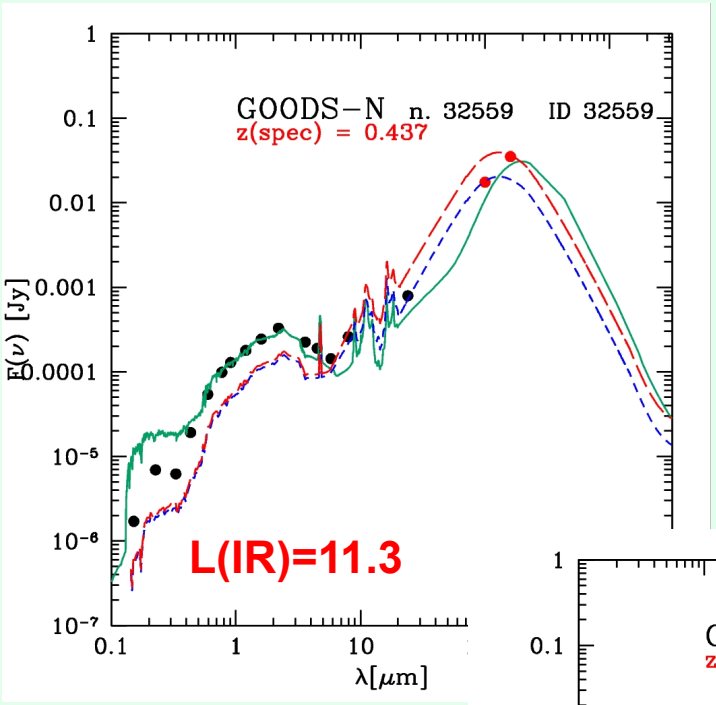
Red: F(160) > 10 mJy

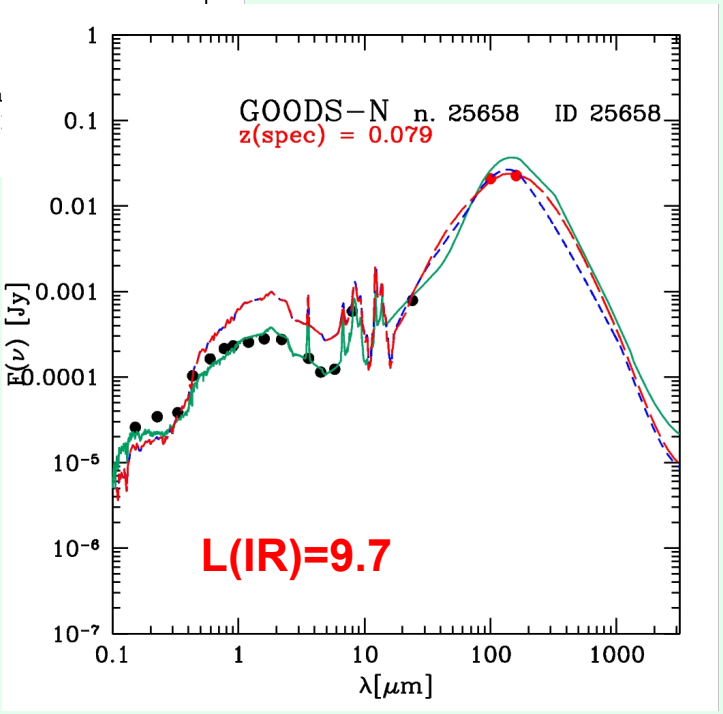
Blue: F(160) > 20 mJy

Berta et al. (2010), Rodighiero et al. (2010)

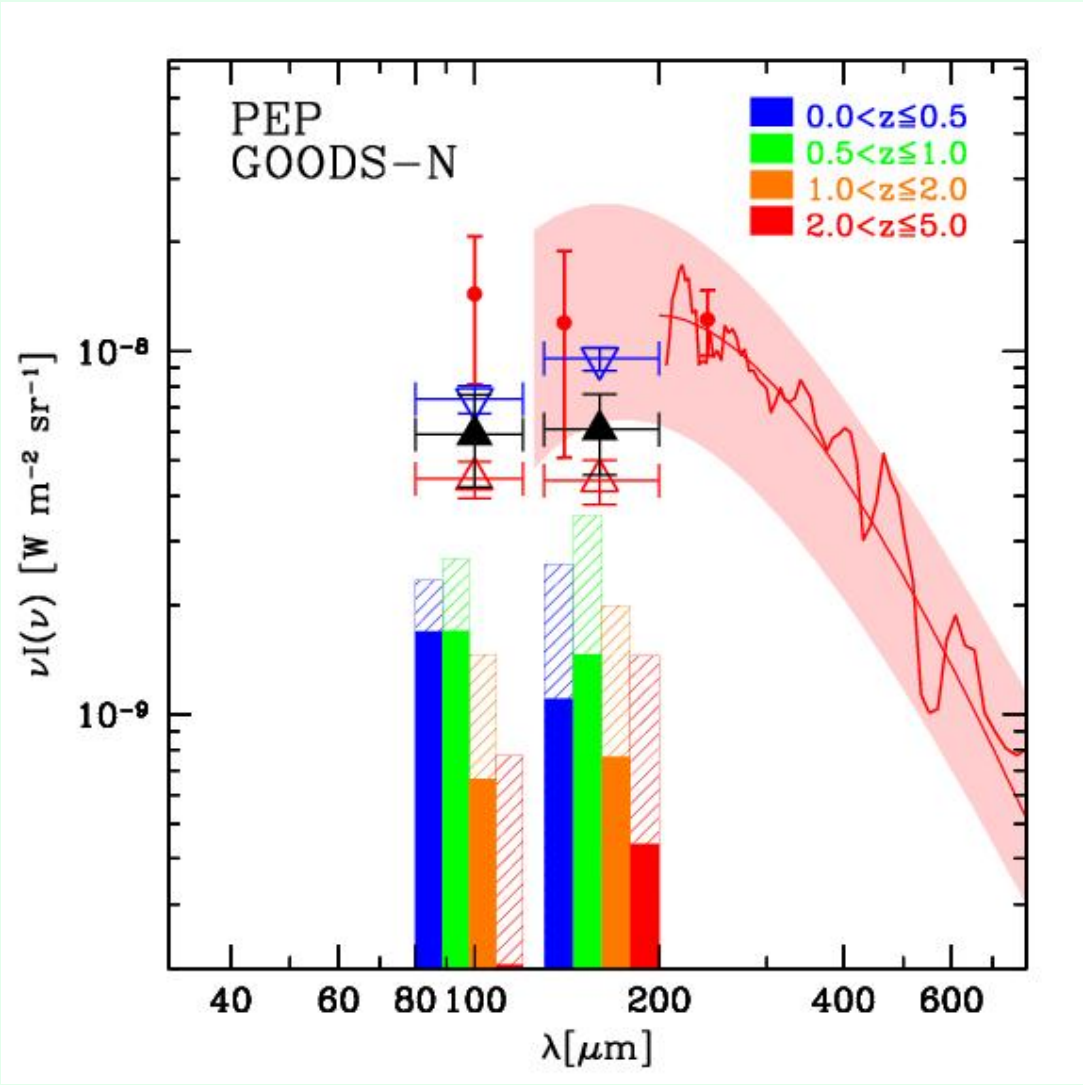
SEDs of low-z bright sources







Dissecting the CIB!



80-90% LIRGs
60-70% ULIRGS
100% ULIRGs

Berta et al. (2010)

Conclusions

- ✓ GOODS-N/S, Lockman, COSMOS number counts (100 and 160 um): extend between few mJy to ~200 mJy
- ✓ Abell 2218 lensed counts break the confusion limit, down to ~1 mJy
- ✓ Using all fields, PEP resolves ~70% (55%) of the CIB at 160 (100) micron
- ✓ GOODS-N multi-wavelength data: split the counts and CIB into redshift bins.
- ✓ Possible confirmation of low-z cold galaxy population
- ✓ The bulk of the resolved CIB was emitted at z<1; the CIB peaks at higher z at 160um than at 100um