Dust in the brightest star-forming galaxies in the Universe

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/me-how me-how-off-ski/

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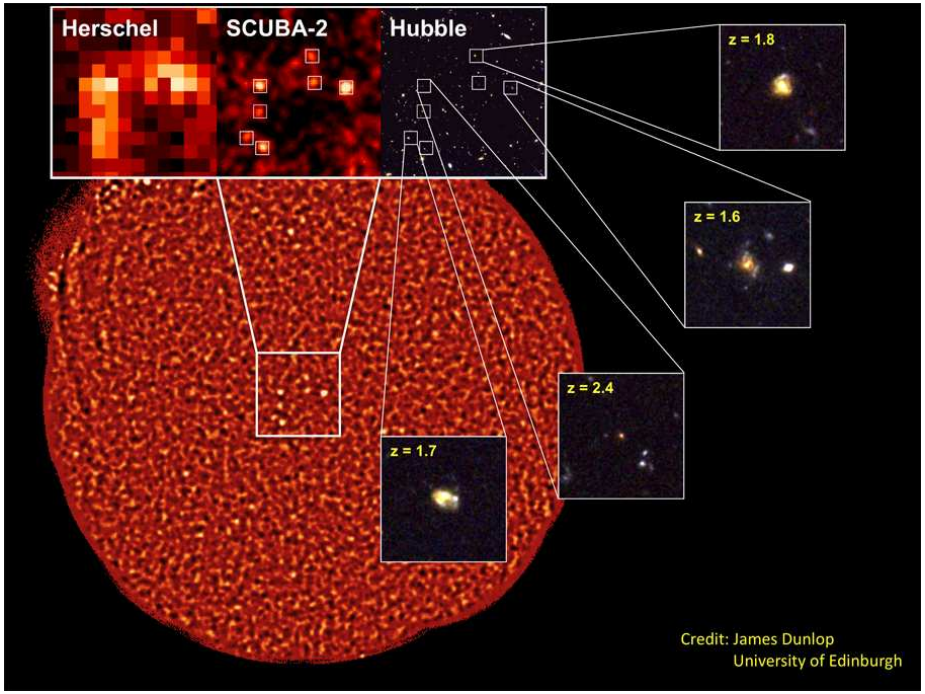
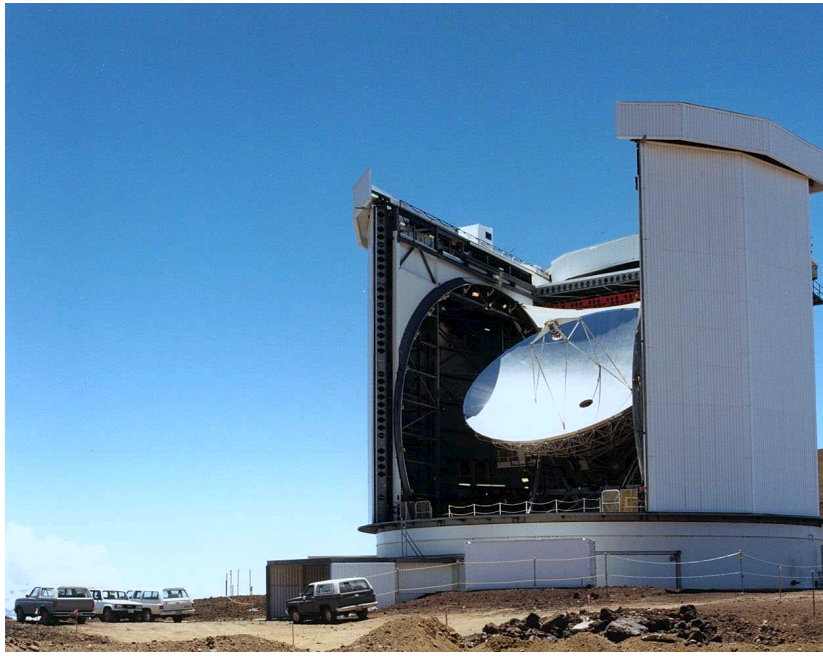
JWSTROE

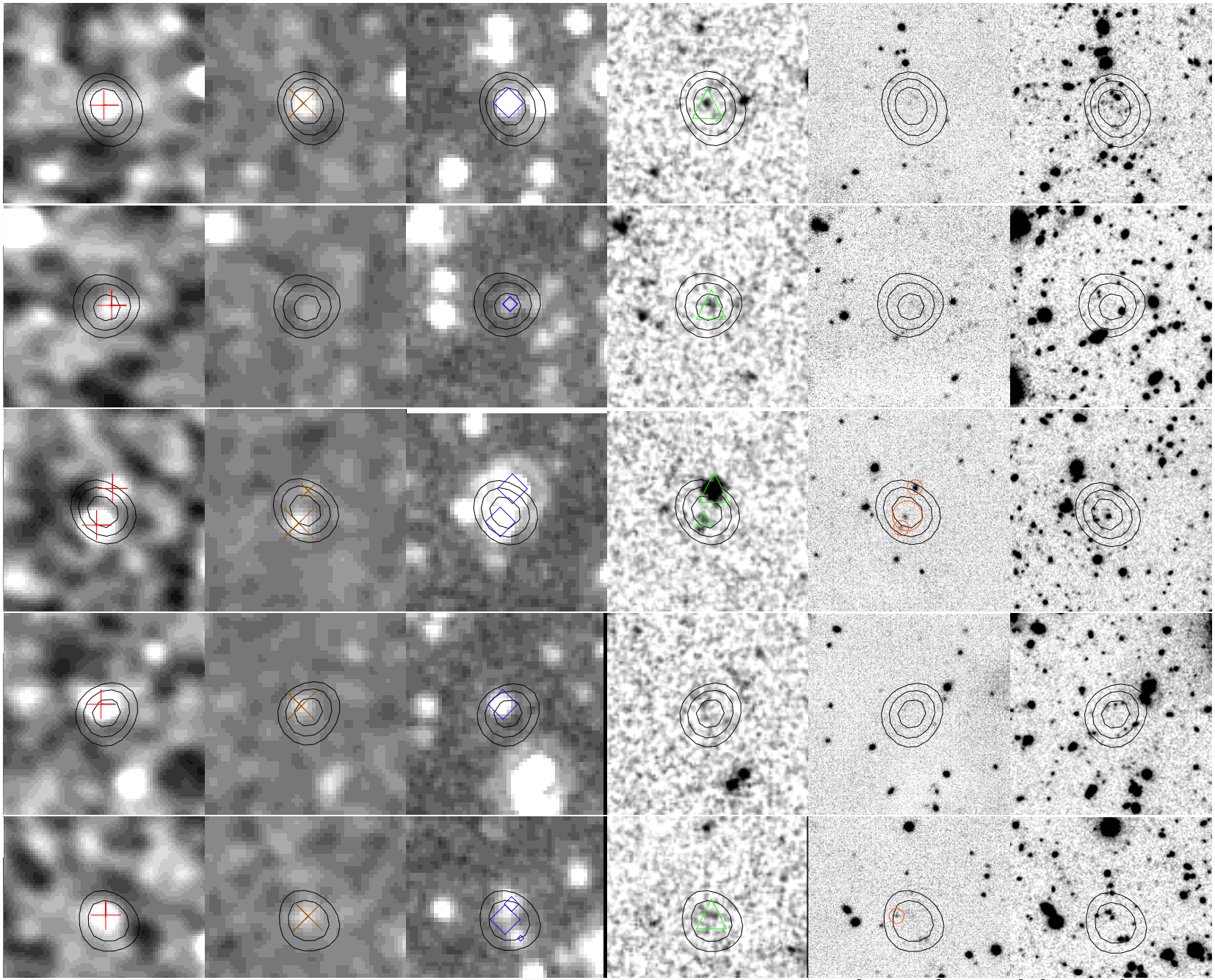
SCUBA2 Cosmology Legacy Survey



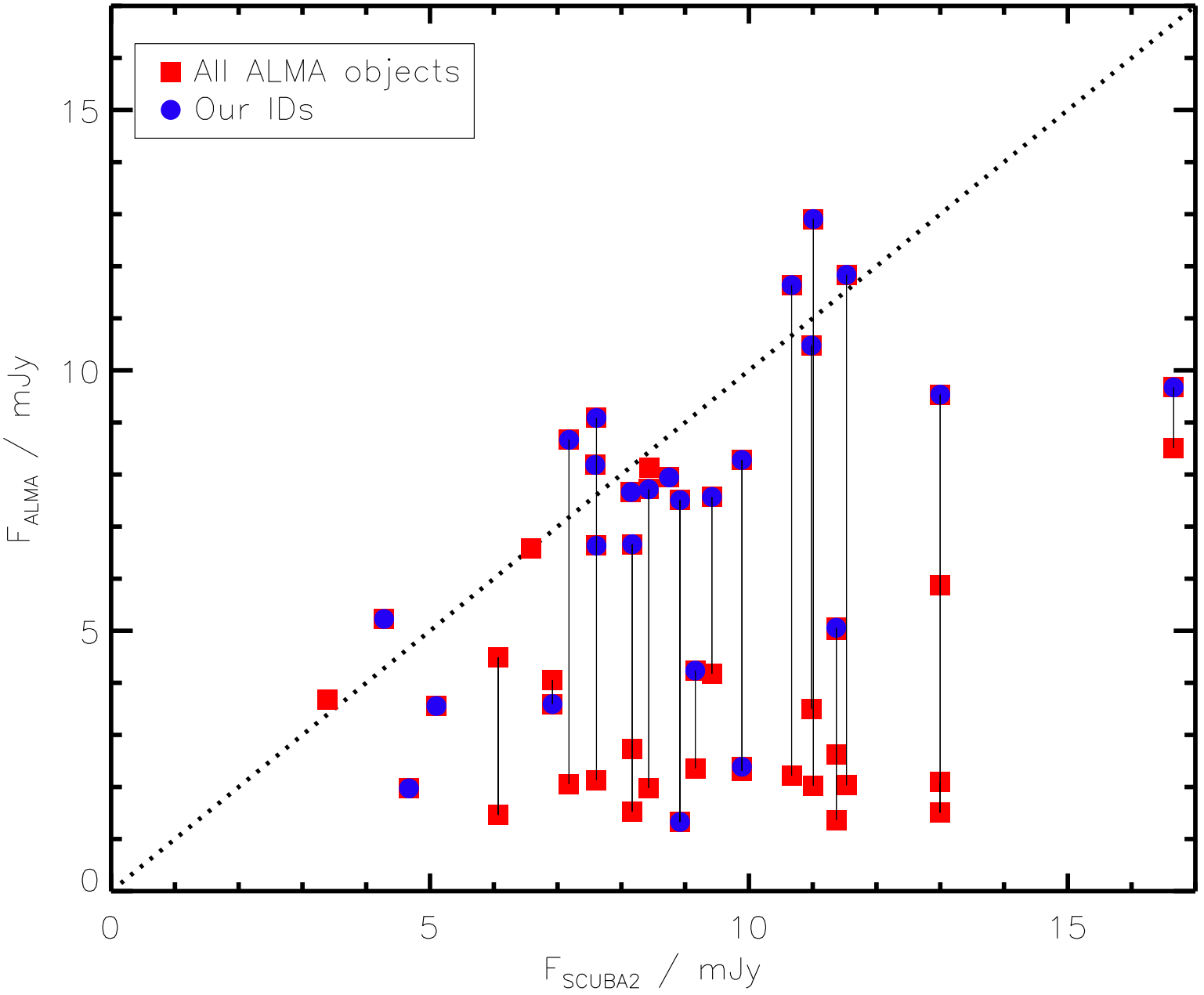


- 5 deg^2 with rms of 1.2 mJy at 850 μm
- 0.25 deg^2 with rms of 1.2 mJy at 450 μm
- 4000 hr, 5000 sources, 2011-2015
- COSMOS: 726 sources (1.22 deg^2),
  UDS: 1088 sources (0.96deg^2)

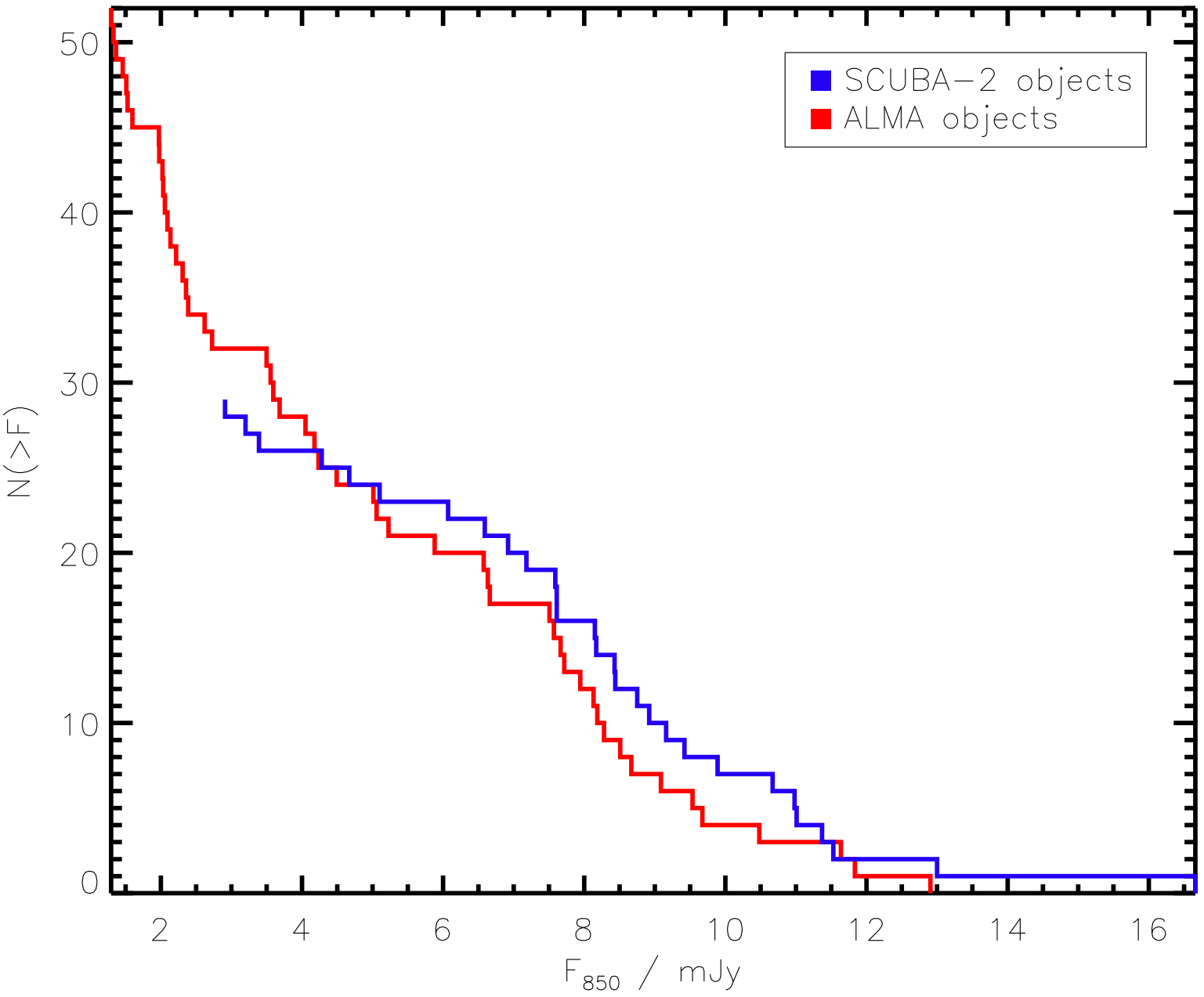
Multi-wavelength counterparts



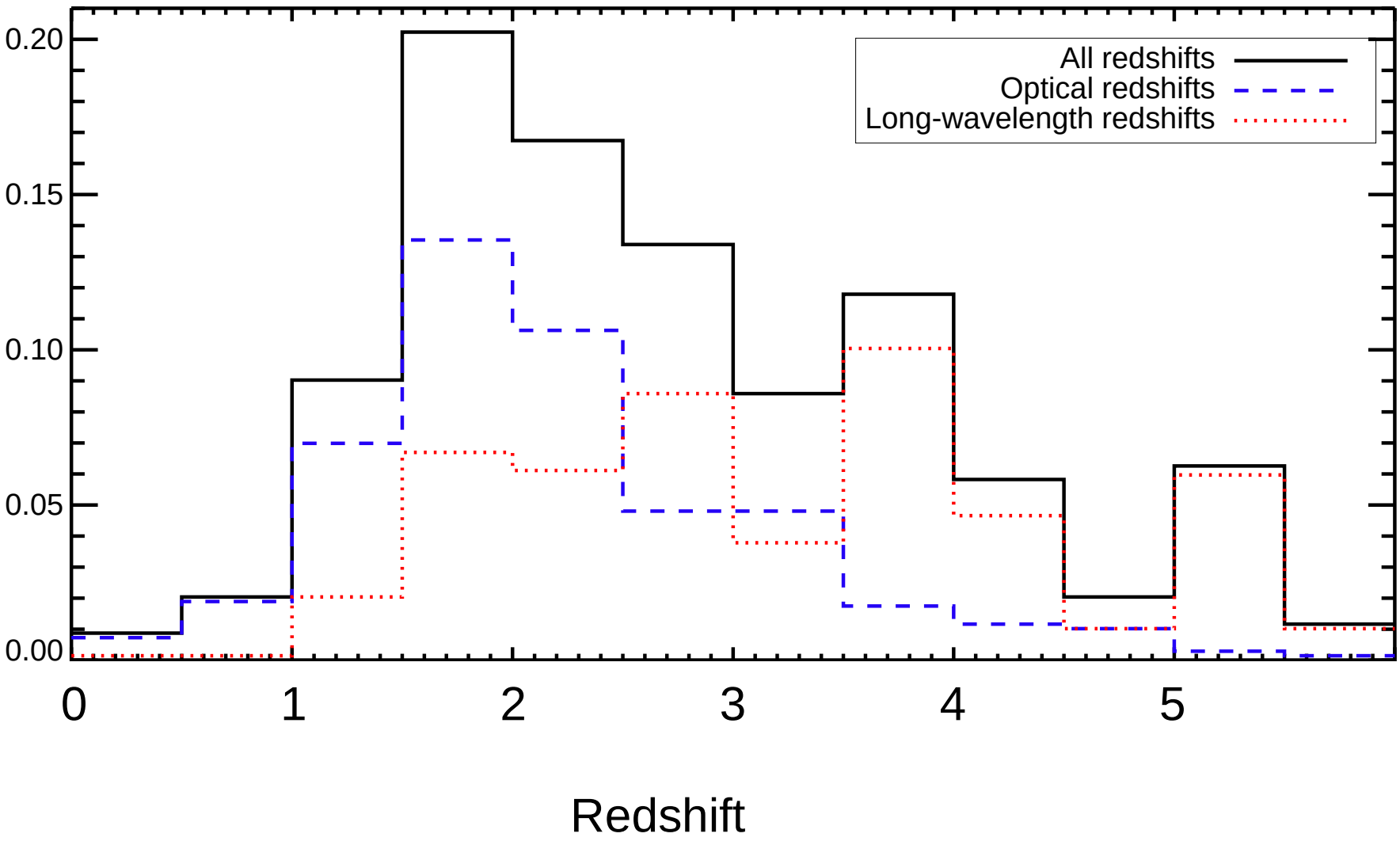
Testing IDs using ALMA



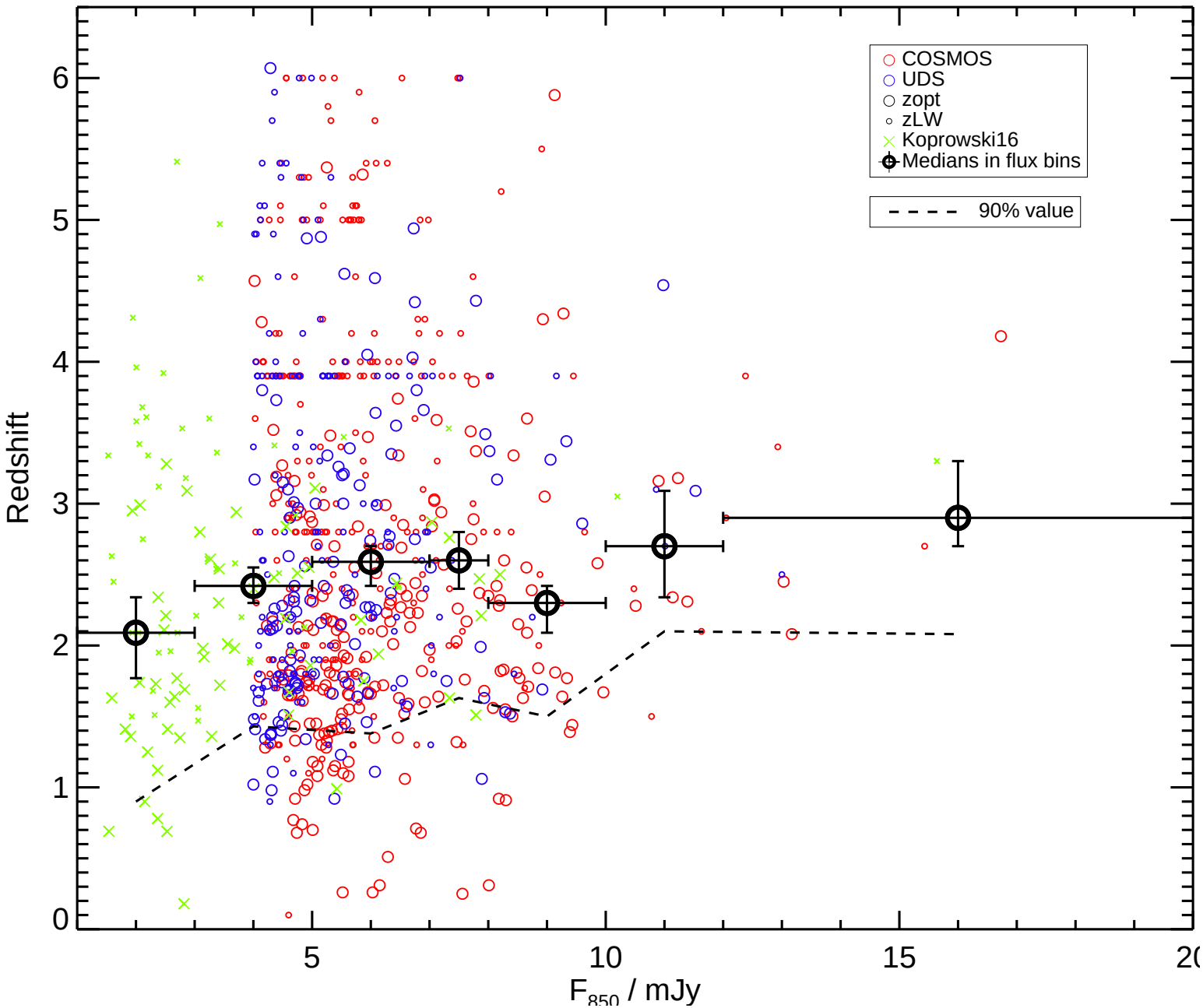
Testing IDs using ALMA



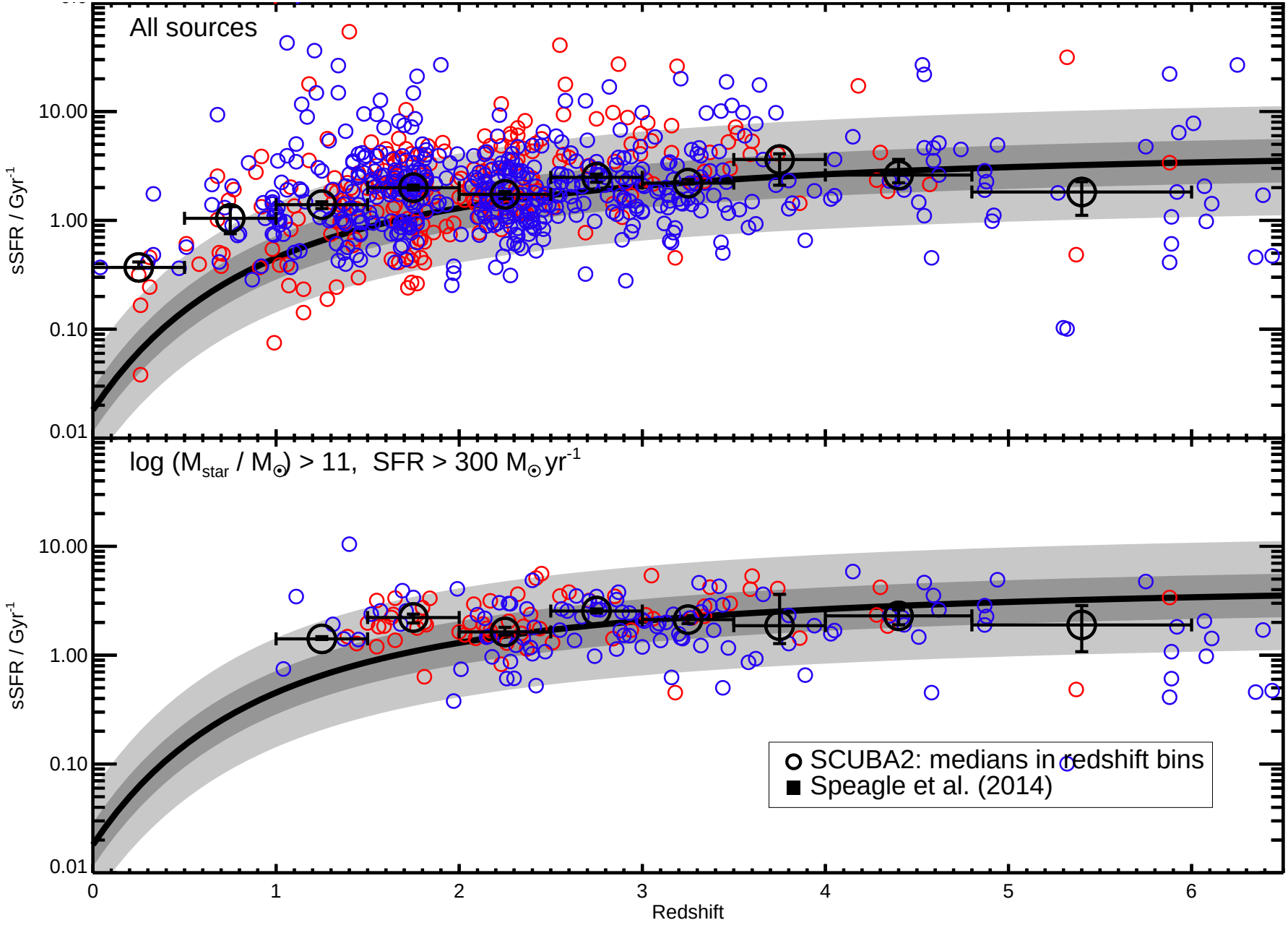
Redshift distribution

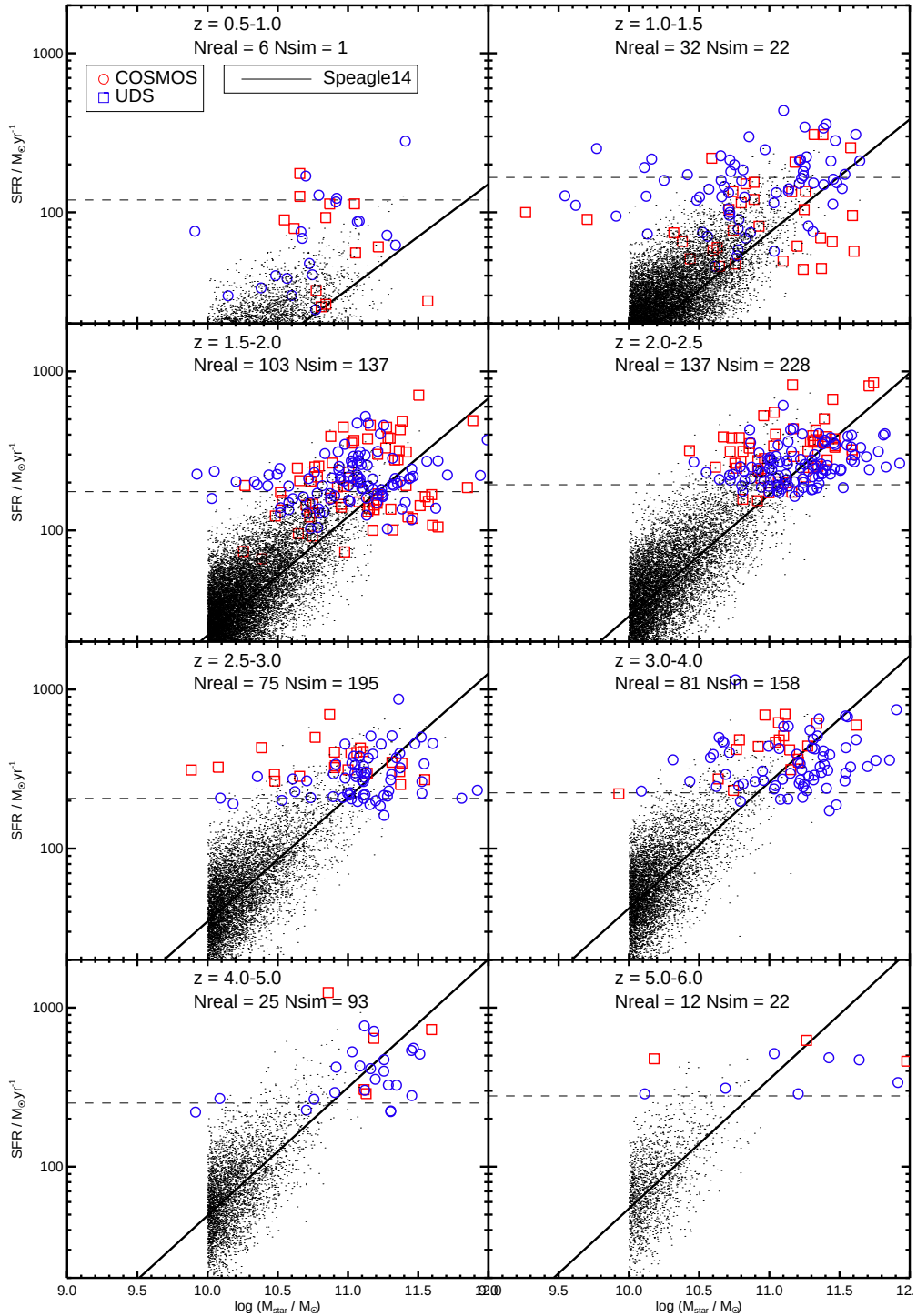


Flux-redshift correlation

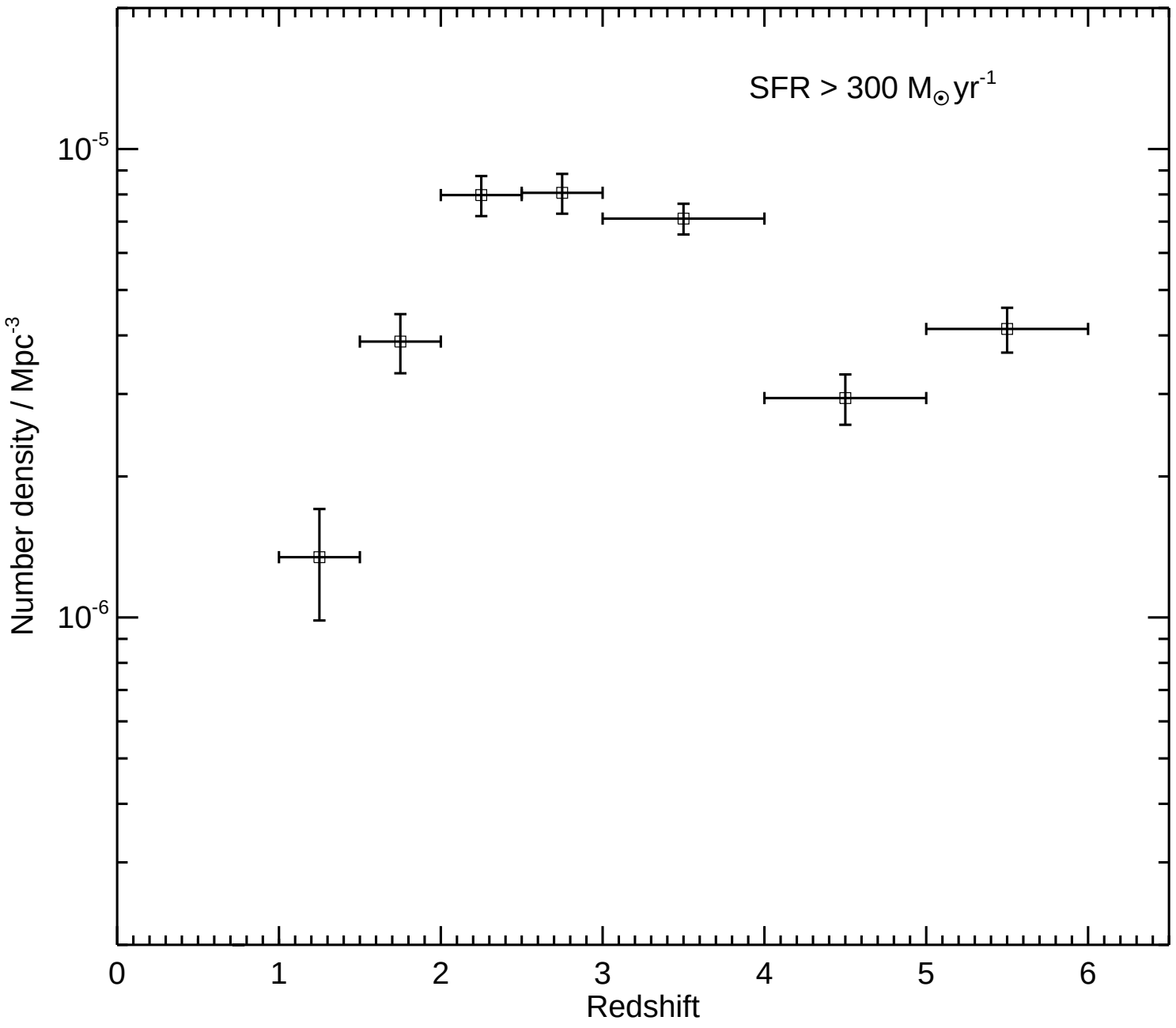


Main-sequence

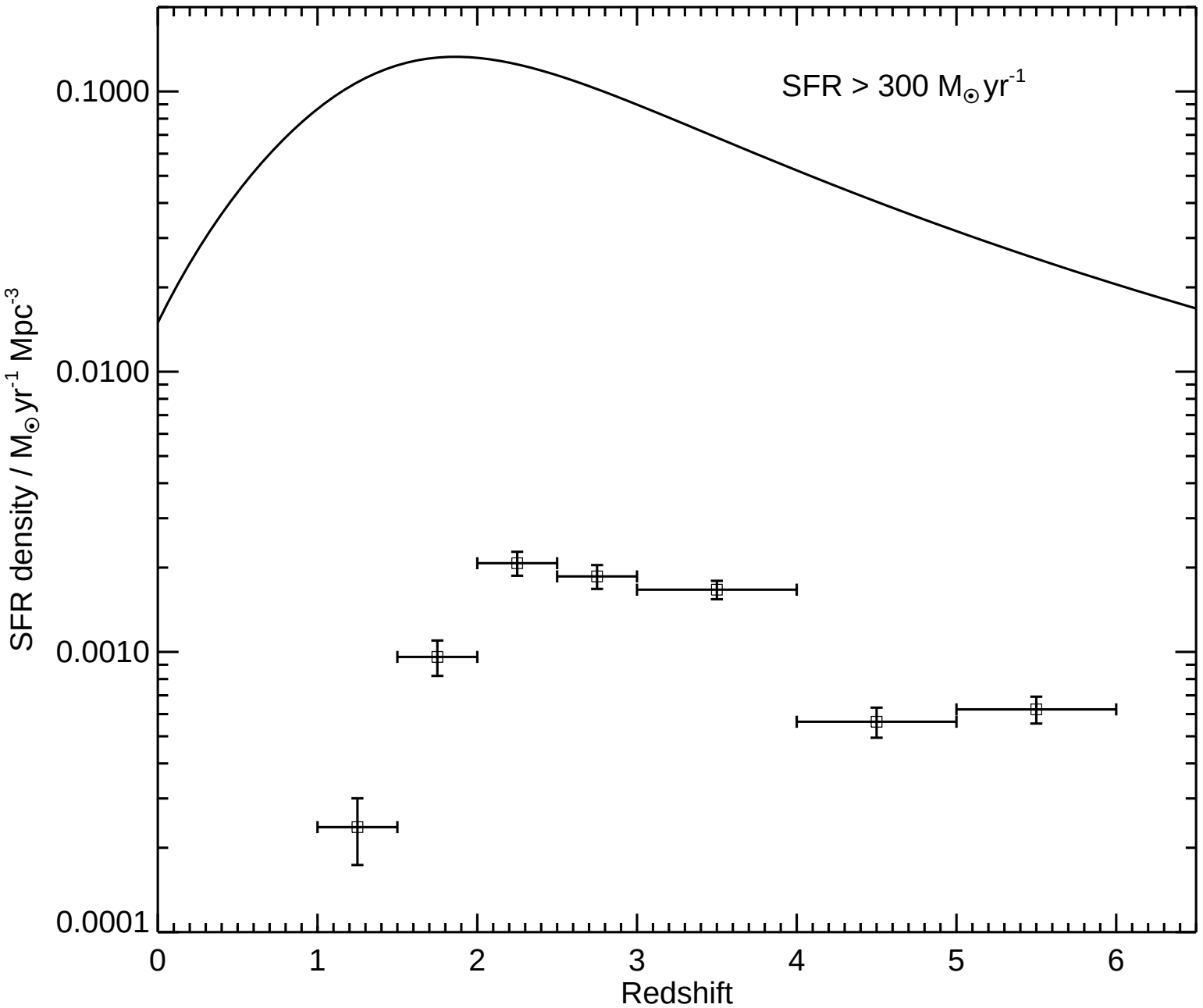



z = 0.5-1.0
Nreal = 6 Nsim = 1
COSMOS
UDS
Speagle14
z = 1.0-1.5
Nreal = 32 Nsim = 22
z = 1.5-2.0
Nreal = 103 Nsim = 137
z = 2.0-2.5
Nreal = 137 Nsim = 228
z = 2.5-3.0
Nreal = 75 Nsim = 195
z = 3.0-4.0
Nreal = 81 Nsim = 158
z = 4.0-5.0
Nreal = 25 Nsim = 93
z = 5.0-6.0
Nreal = 12 Nsim = 22
SFR / M⊙yr⁻¹
1000
100
9.0
9.5
10.0
10.5
11.0
11.5
12.0
log (M_star / M⊙)

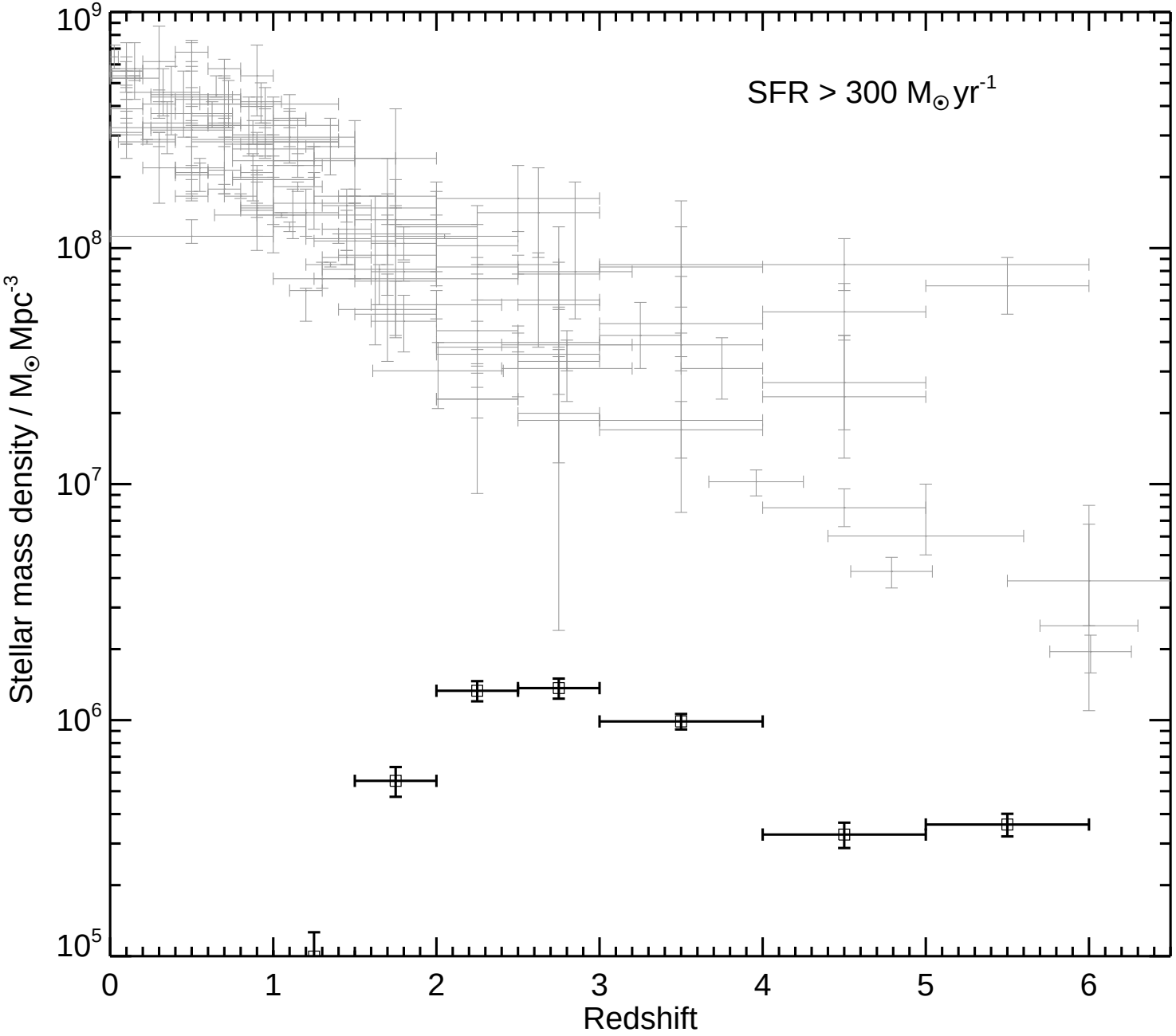
Densities


SFR > 300 $M_\odot yr^{-1}$
10^{-5}
10^{-6}
Number density / Mpc^{-3}
0
1
2
3
4
5
6
Redshift

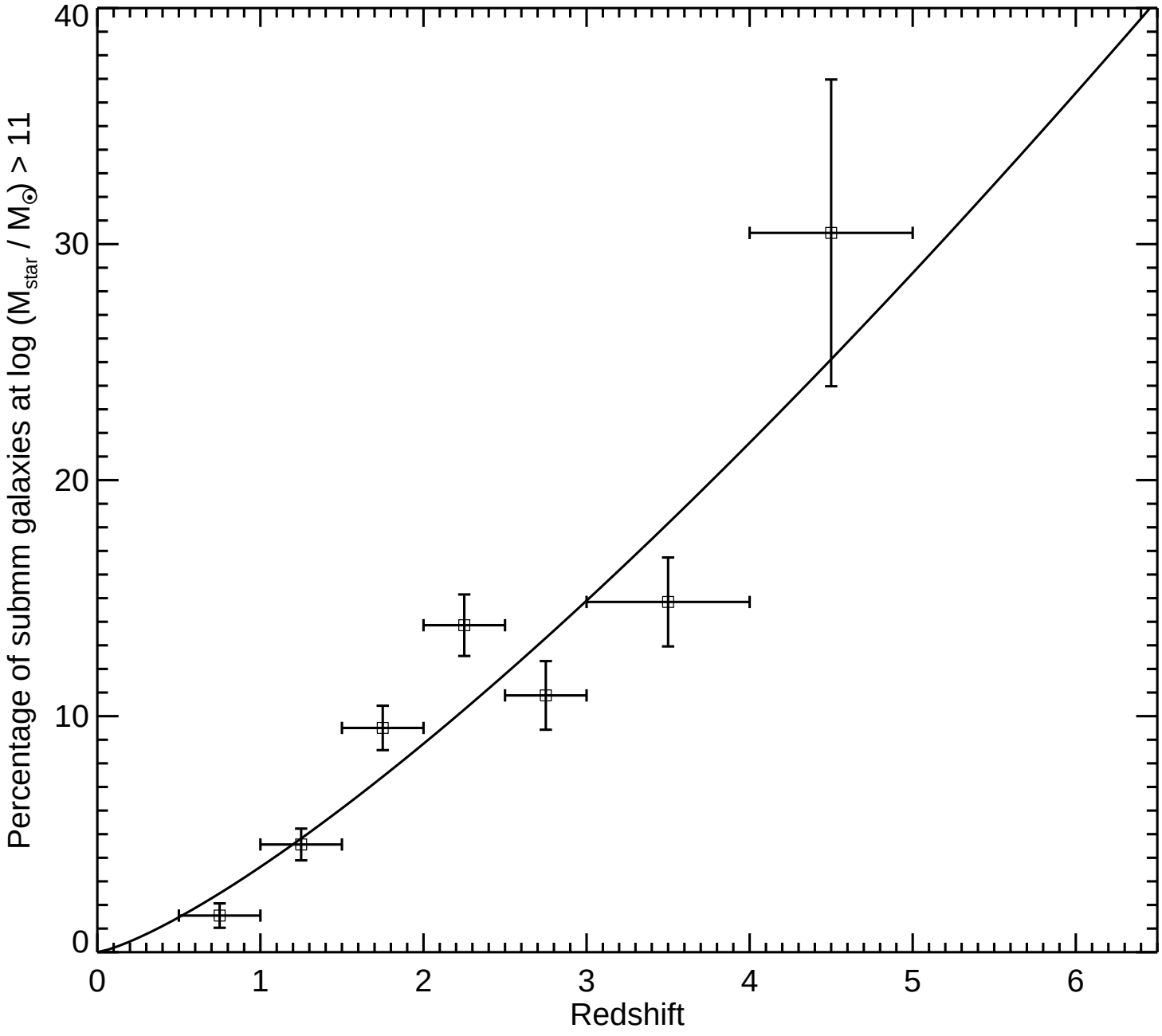
Densities


SFR > 300 $M_\odot yr^{-1}$
SFR density / $M_\odot yr^{-1}$ Mpc^{-3}
0.1000
0.0100
0.0010
0.0001
0
1
2
3
4
5
6
Redshift

Densities


SFR > 300 $M_\odot yr^{-1}$
Stellar mass density / $M_\odot Mpc^{-3}$
Redshift
10^9
10^8
10^7
10^6
10^5
0
1
2
3
4
5
6

Fraction of submm galaxies among massive galaxies



Conclusions

- $\sim$ 2000 submm galaxies: median redshift $z \sim 2$
- $\sim$ 2% at $z > 4$ (or $\sim$ 20% including long-wavelength redshifts)
- flux-redshift correlation: brighter submm galaxies are at high z
- submm galaxies are on the main-sequence
- they contribute $\sim$ 2–10% to the cosmic SFR and M_* densities
- fraction of dusty galaxies among massive galaxies is growing with redshift
- more details in Michałowski et al. (MNRAS, in prep.)