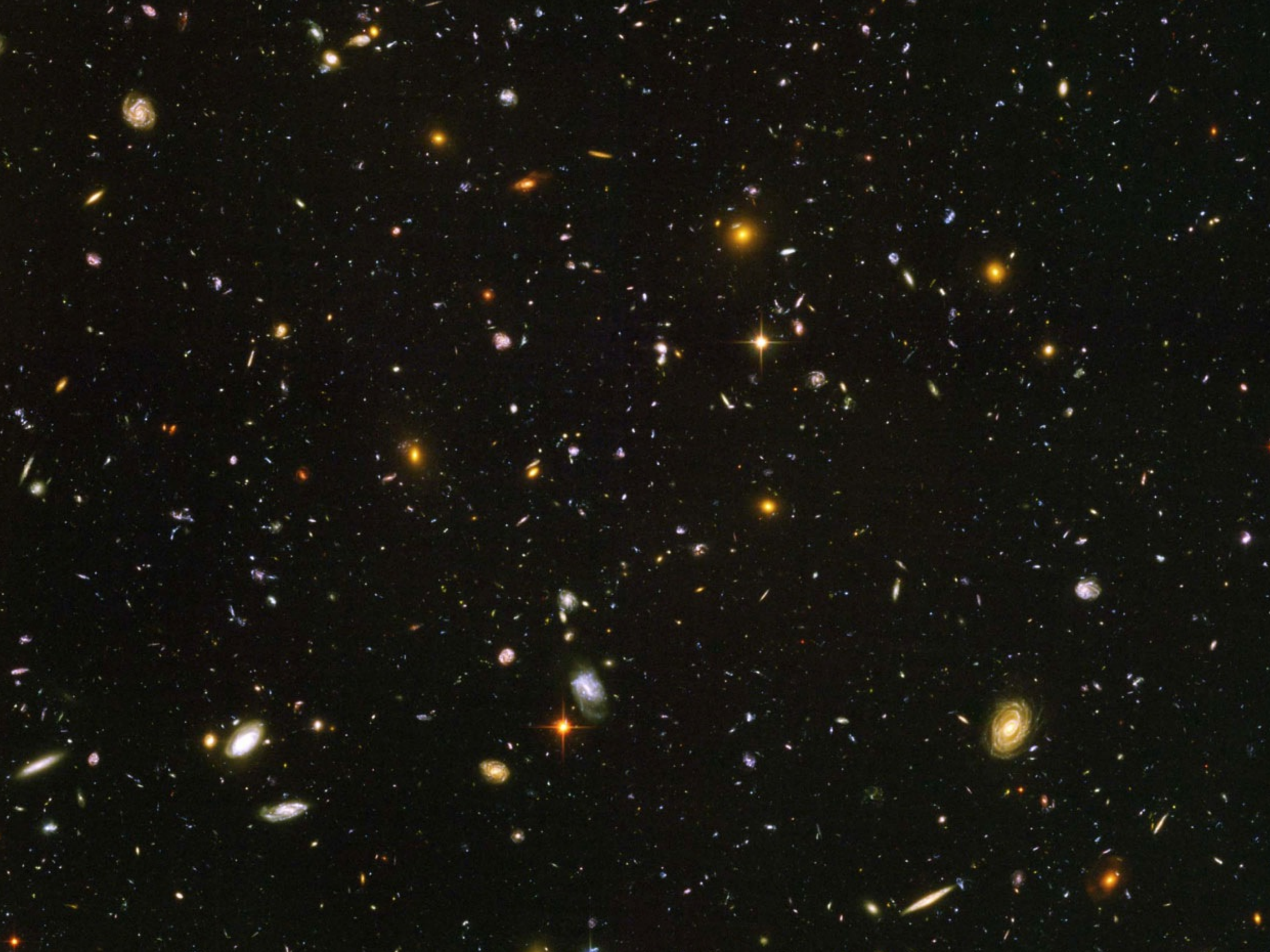
Clustering Measurements of $M_{halo}(M_\star)$ in CANDELS

Catherine White

3.19.15

Advisor: Harry Ferguson



Halo bias $b_h(M_{halo})$

Halo bias $b_h(M_{halo})$

+

Halo occupation model

Halo bias $b_h(M_{halo})$

+

Halo occupation model

+

+

Observed galaxy bias

Halo bias $b_h(M_{halo})$

+

Halo occupation model

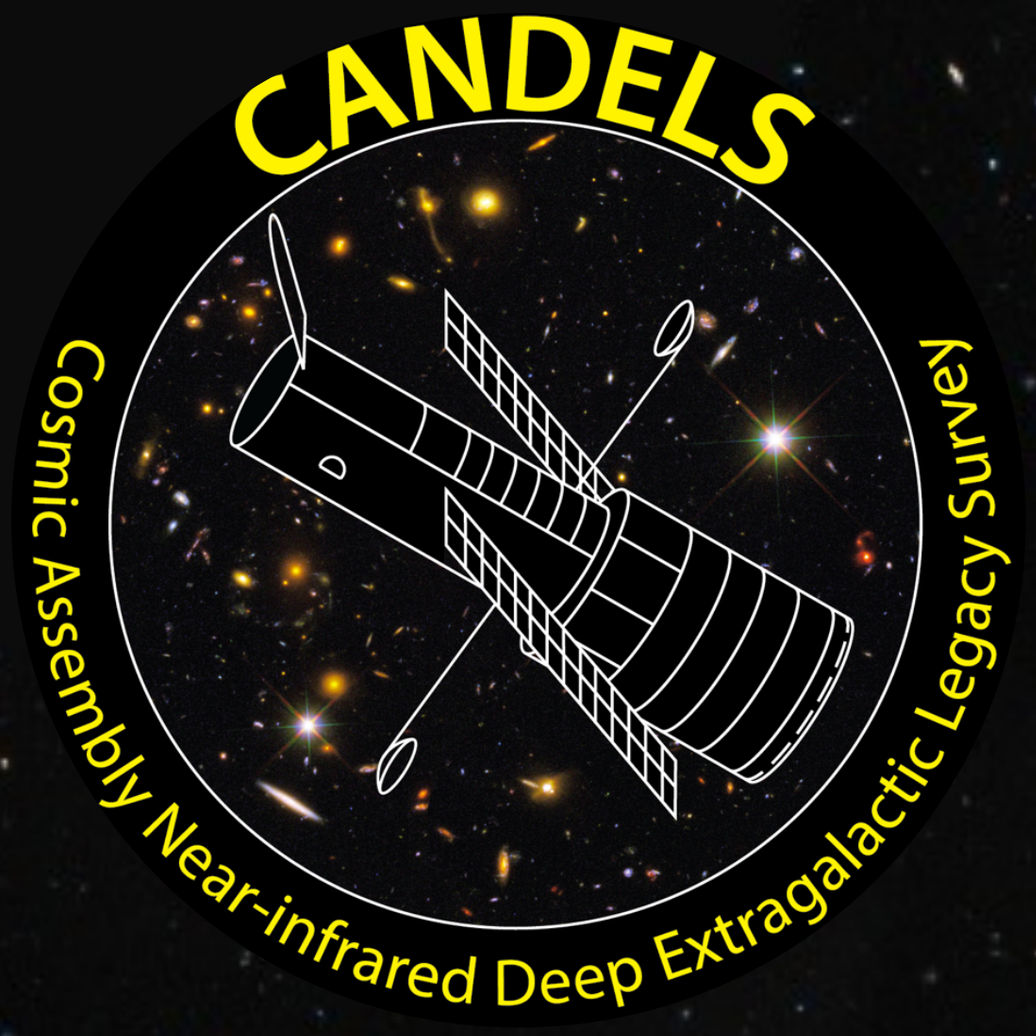
+

+

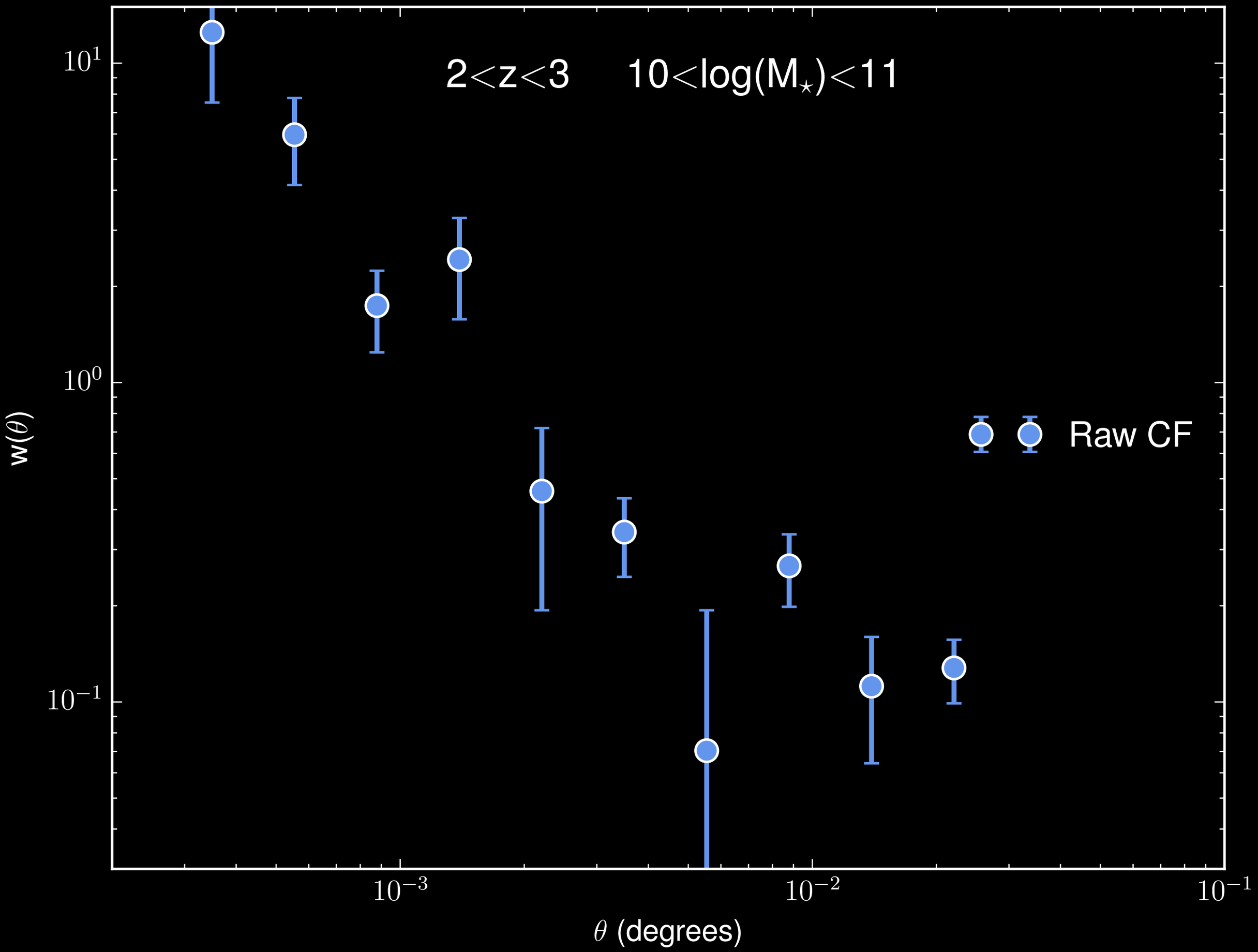
Observed galaxy bias

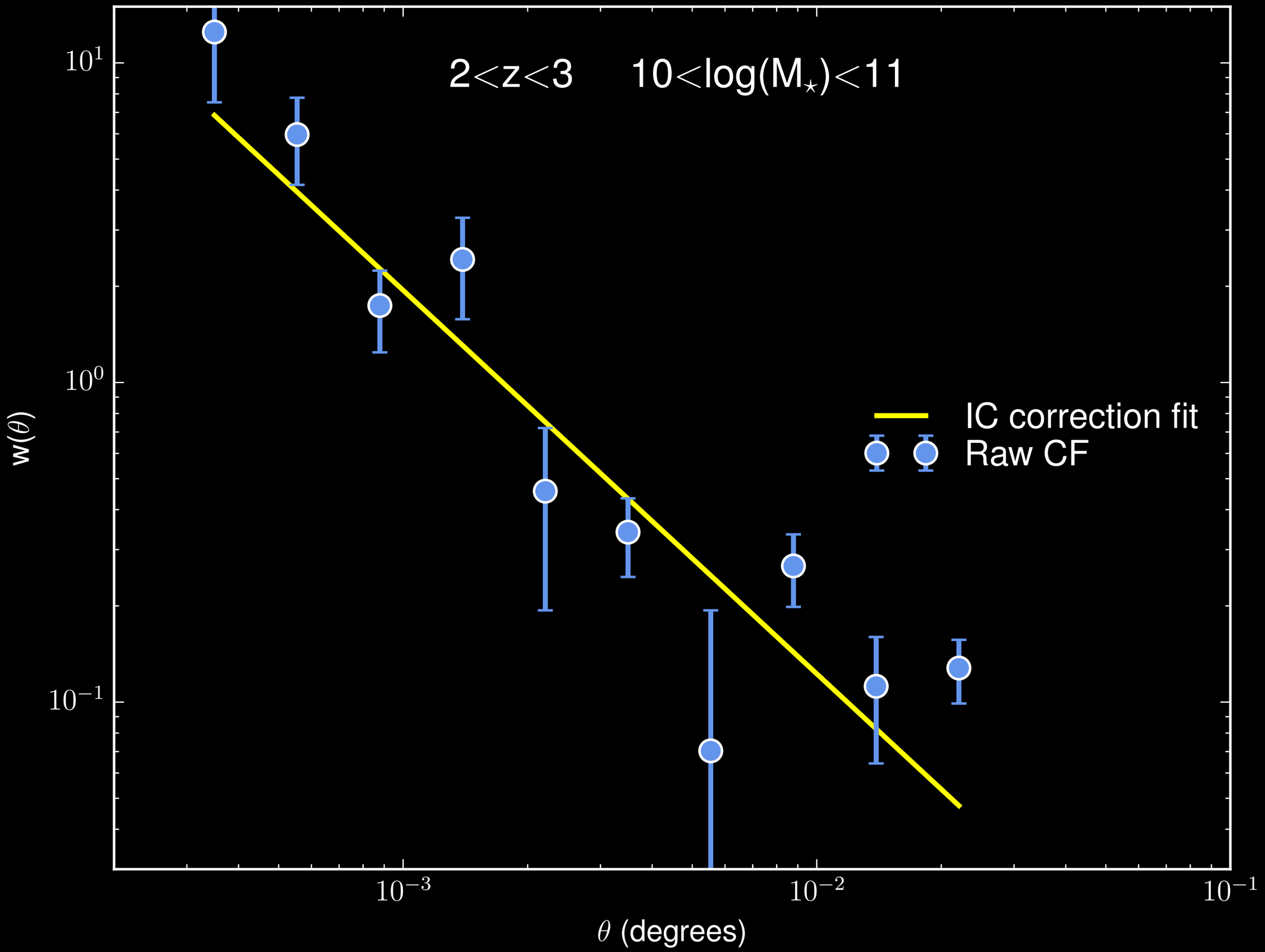
↓

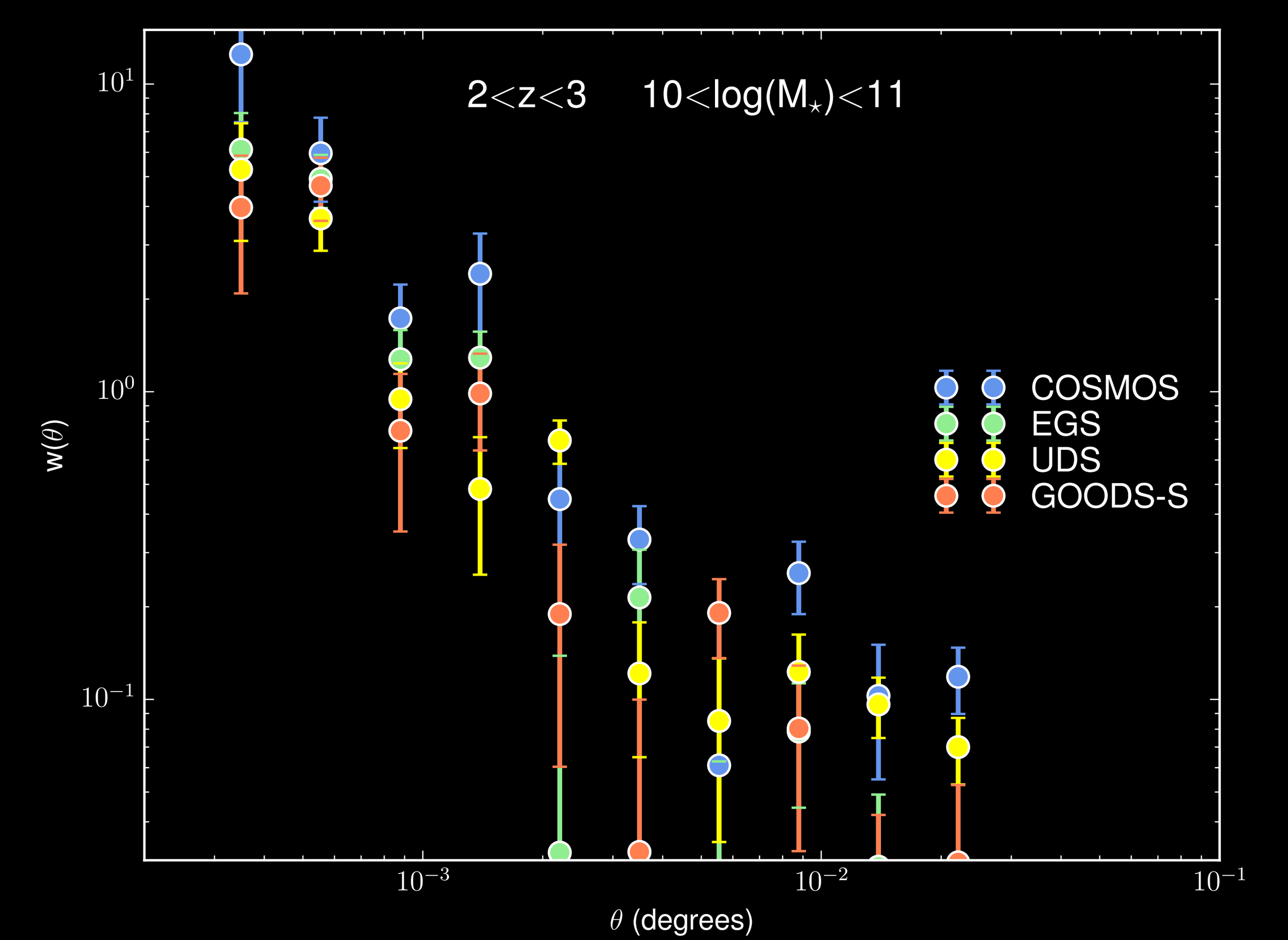
Halo mass

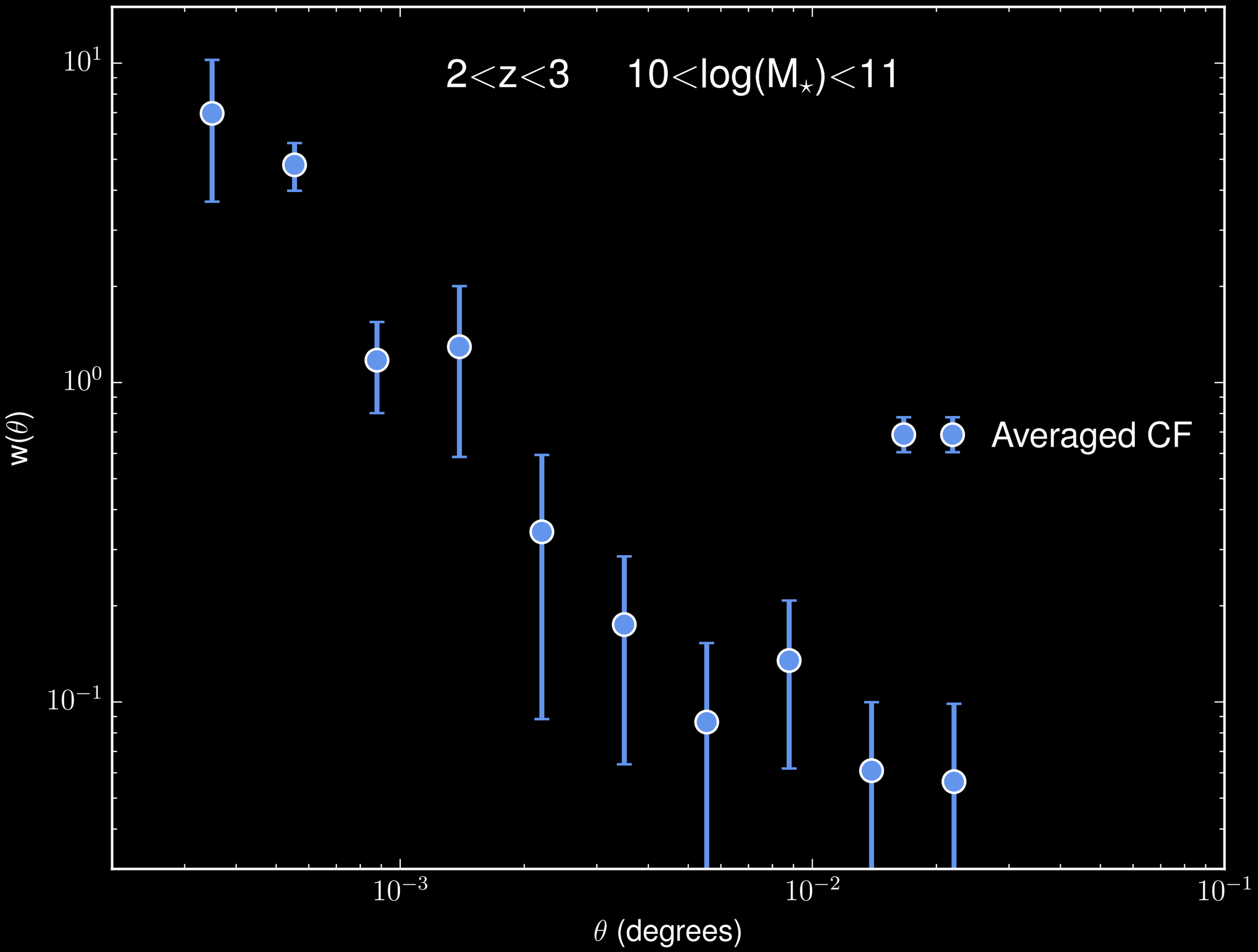

CANDELS
Cosmic Assembly Near-infrared Deep Extragalactic Legacy Survey

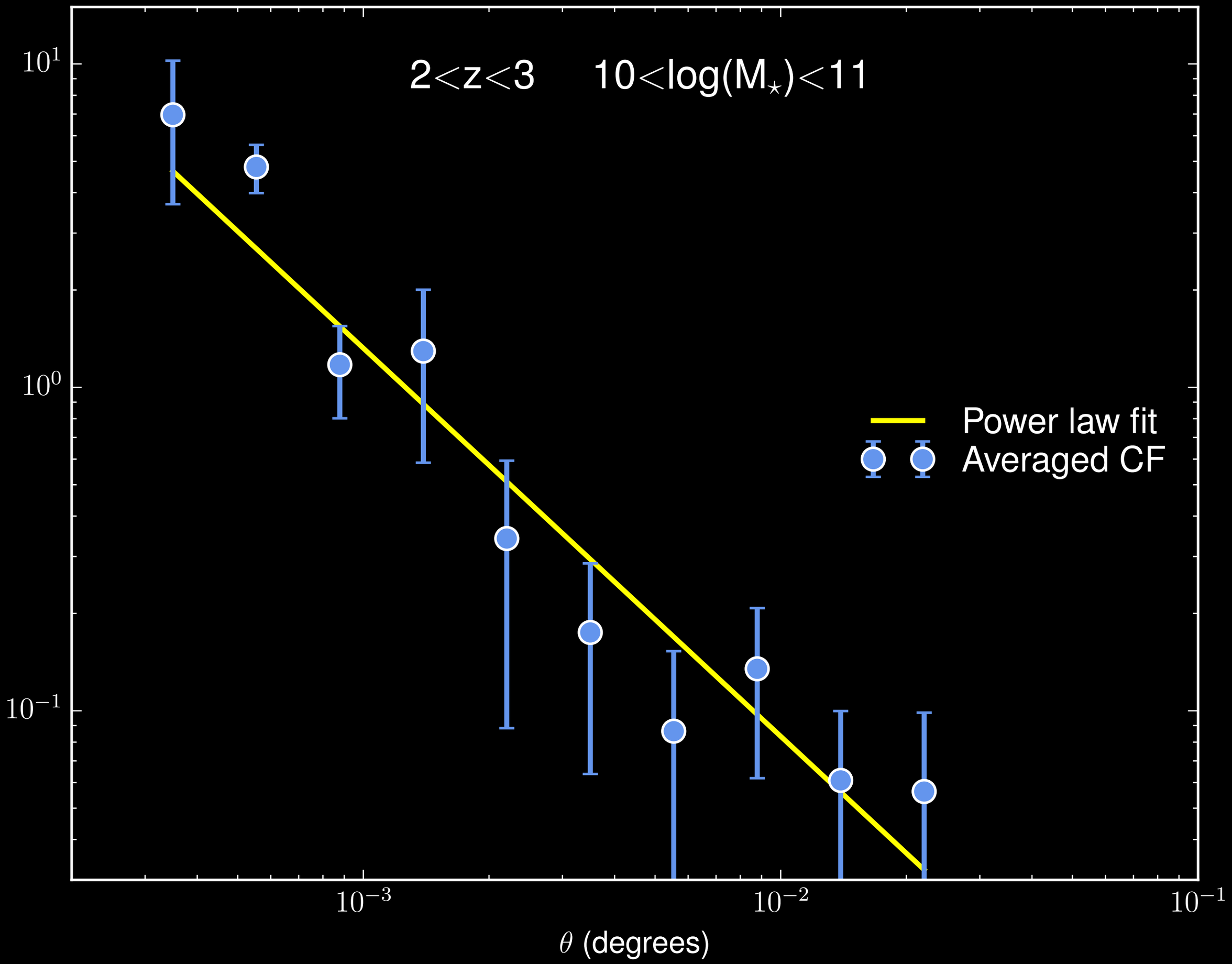
Process


2<z<3
10<log(M⋆)<11
Raw CF
w(θ)
θ (degrees)
10^1
10^0
10^−1
10^−3
10^−2
10^−1


2<z<3
10<log(M⋆)<11
IC correction fit
Raw CF
w(θ)
θ (degrees)
10^1
10^0
10^−1
10^−3
10^−2
10^−1

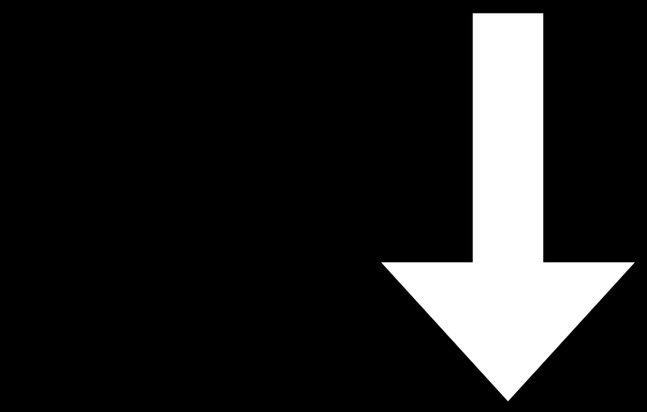

2<z<3
10<log(M⋆)<11
COSMOS
EGS
UDS
GOODS-S
w(θ)
θ (degrees)
10^1
10^0
10^−1
10^−3
10^−2
10^−1


2<z<3
10<log(M⋆)<11
Averaged CF
w(θ)
θ (degrees)
10^1
10^0
10^−1
10^−3
10^−2
10^−1


2<z<3
10<log(M⋆)<11
Power law fit
Averaged CF
w(θ)
θ (degrees)
10^1
10^0
10^−1
10^−3
10^−2
10^−1

$$w(\theta) = A\,\theta^{-\beta}$$

$$w(\theta) = A\,\theta^{-\beta}$$



$$\xi(r) = (r/r_0)^{-\gamma}$$

$r_{o,y}$ → bias

$r_{o,y}$ → bias

↓

halo mass

Uncertainties

Integral constraint

Uncertainties

Integral constraint

Power law fit

Uncertainties

Integral constraint

Power law fit

N(z) for Limber equation

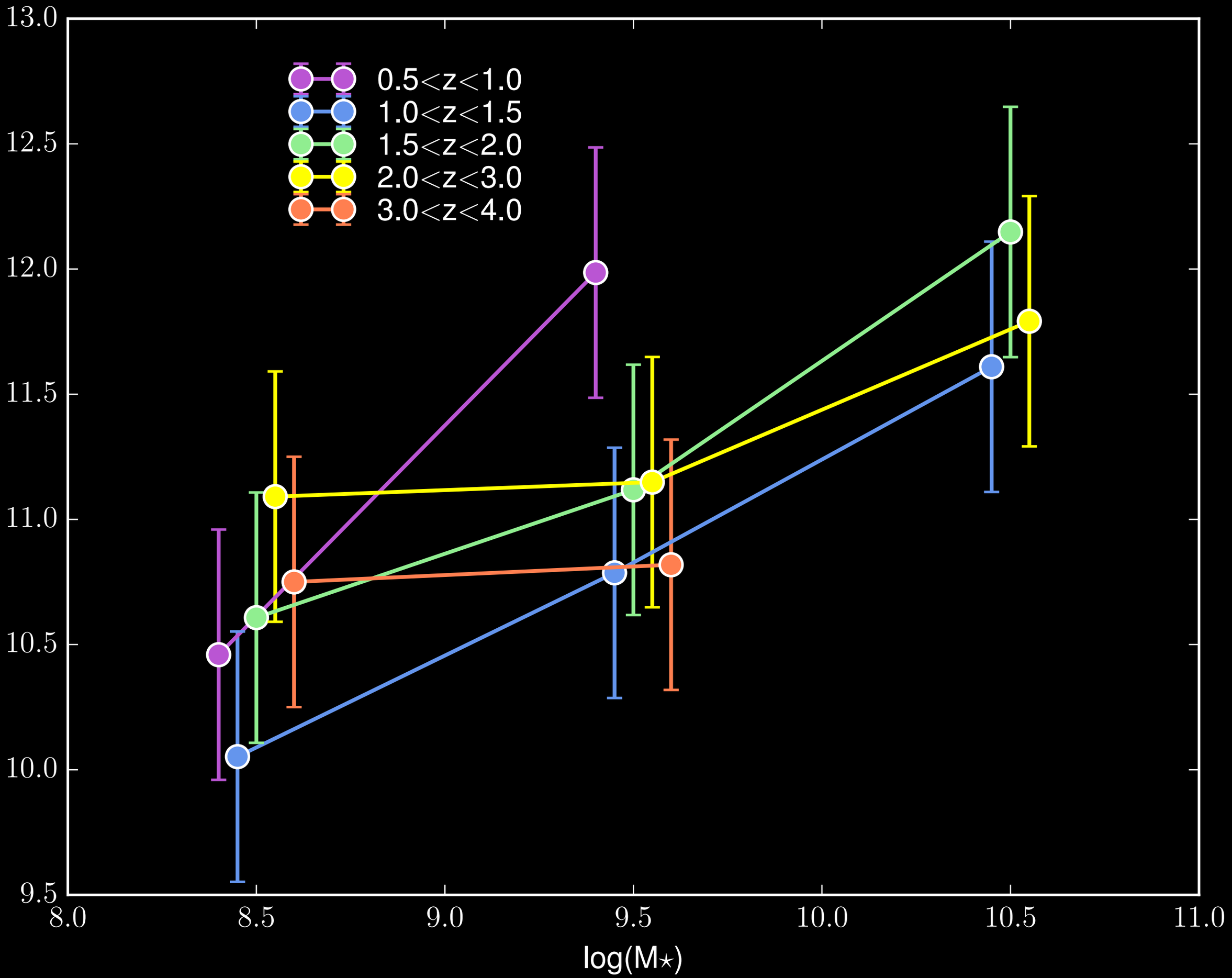
Uncertainties

Integral constraint

Power law fit

N(z) for Limber equation

Bias to halo mass


0.5<z<1.0
1.0<z<1.5
1.5<z<2.0
2.0<z<3.0
3.0<z<4.0
log(M$_H$)
log(M⋆)
13.0
12.5
12.0
11.5
11.0
10.5
10.0
9.5
8.0
8.5
9.0
9.5
10.0
10.5
11.0

Behroozi et al. 2013
1.5<z<2.0

log(M$_H$)

log(M⋆)

13.0
12.5
12.0
11.5
11.0
10.5
10.0
9.5

8.0
8.5
9.0
9.5
10.0
10.5
11.0

Going Forward

Improve integral constraint / fitting

Going Forward

Improve integral constraint / fitting

Proper error computation

Going Forward

Improve integral constraint / fitting

Proper error computation

Use halo occupation distribution

Going Forward

Improve integral constraint / fitting

Proper error computation

Use halo occupation distribution

More science!

Collaborators

Harry Ferguson, Jeff Newman, Peter Behroozi, Casey Papovich, Steve Finkelstein, Christina Williams, Guillermo Barro, Rachel Somerville

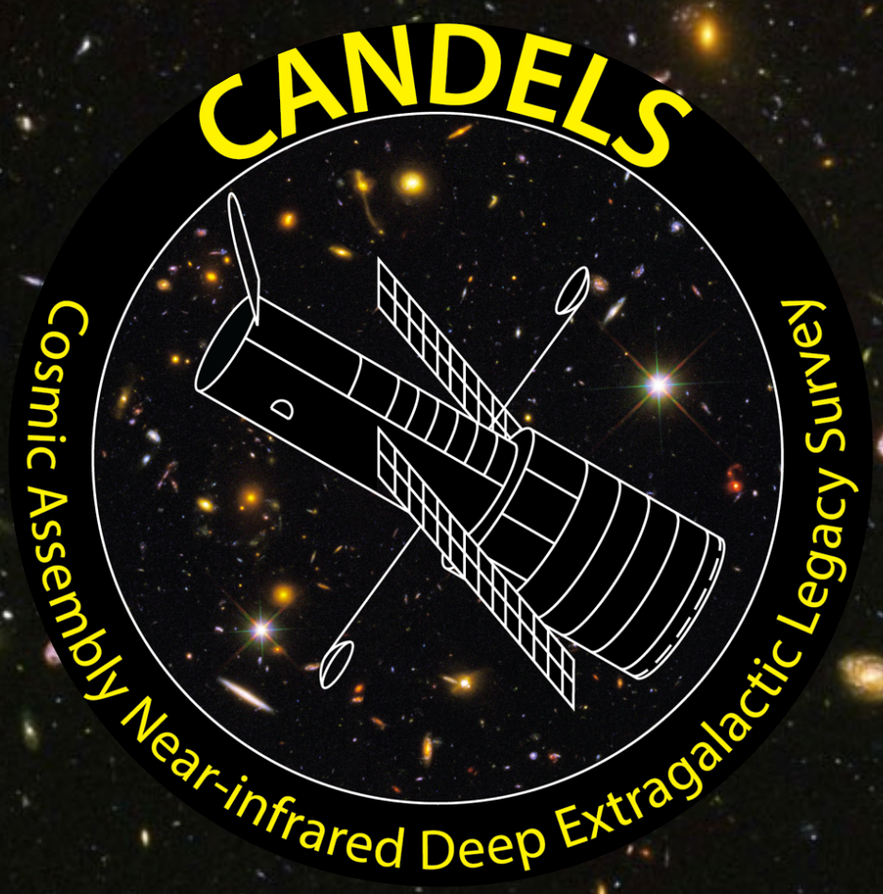
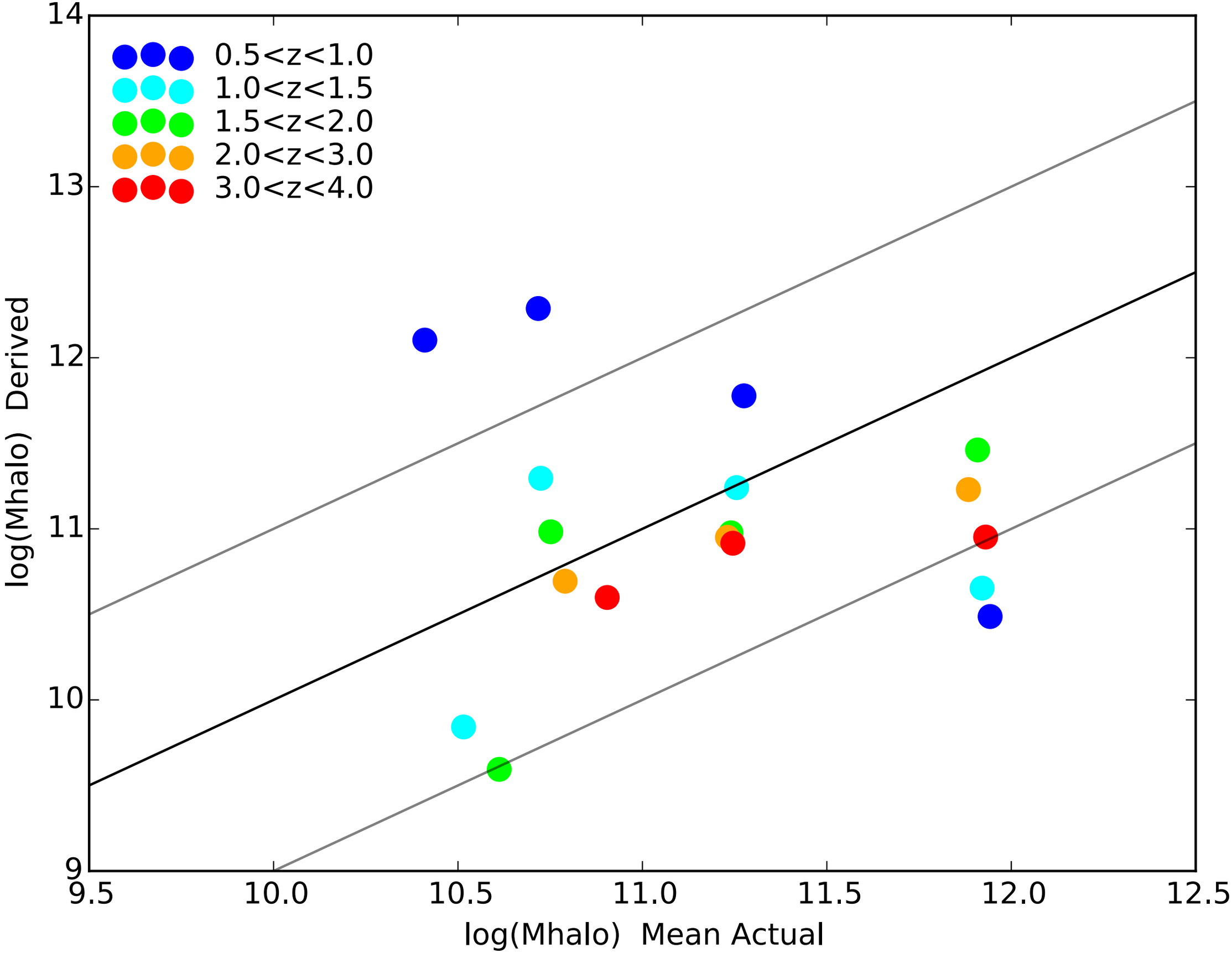


Image Sources

http://hubblesite.org/

http://candels.ucolick.org/

0.5<z<1.0
1.0<z<1.5
1.5<z<2.0
2.0<z<3.0
3.0<z<4.0
log(M_H) β not fixed
log(M_H) Fixed β
13
12
11
10
9
8
7
9.5
10.0
10.5
11.0
11.5
12.0
12.5


0.5<z<1.0
1.0<z<1.5
1.5<z<2.0
2.0<z<3.0
3.0<z<4.0
log(Mhalo) Derived
log(Mhalo) Mean Actual
14
13
12
11
10
9
9.5
10.0
10.5
11.0
11.5
12.0
12.5