

CSSOS-Euclid Photo-z sims

CSSOS-Euclid photo-z simulations

Angus H Wright

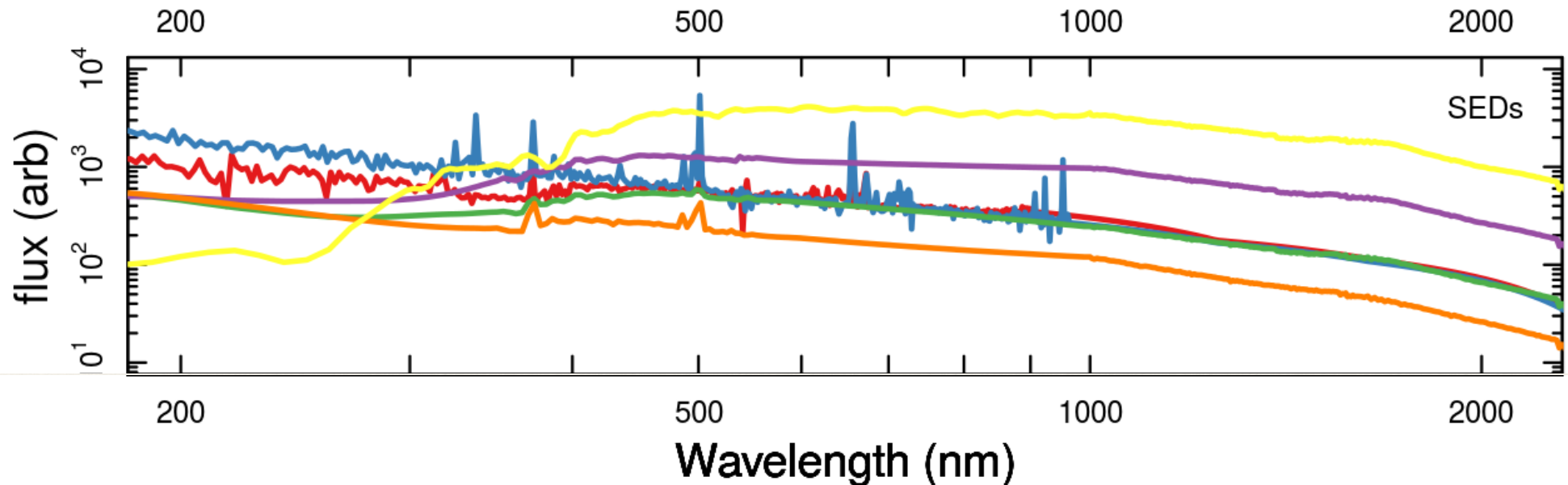
18 Dec 2018

Simulation Setup

- ❖ Define an arbitrary set of filter curves
- ❖ Model magnitudes for a set of template SEDs
 - SED types and redshift intervals modifiable
- ❖ Each SED scaled to it's relative fractional contribution a.f.o. z
- ❖ Noise added given the filter limiting magnitudes
- ❖ Each galaxy run through BPZ, and statistics calculated

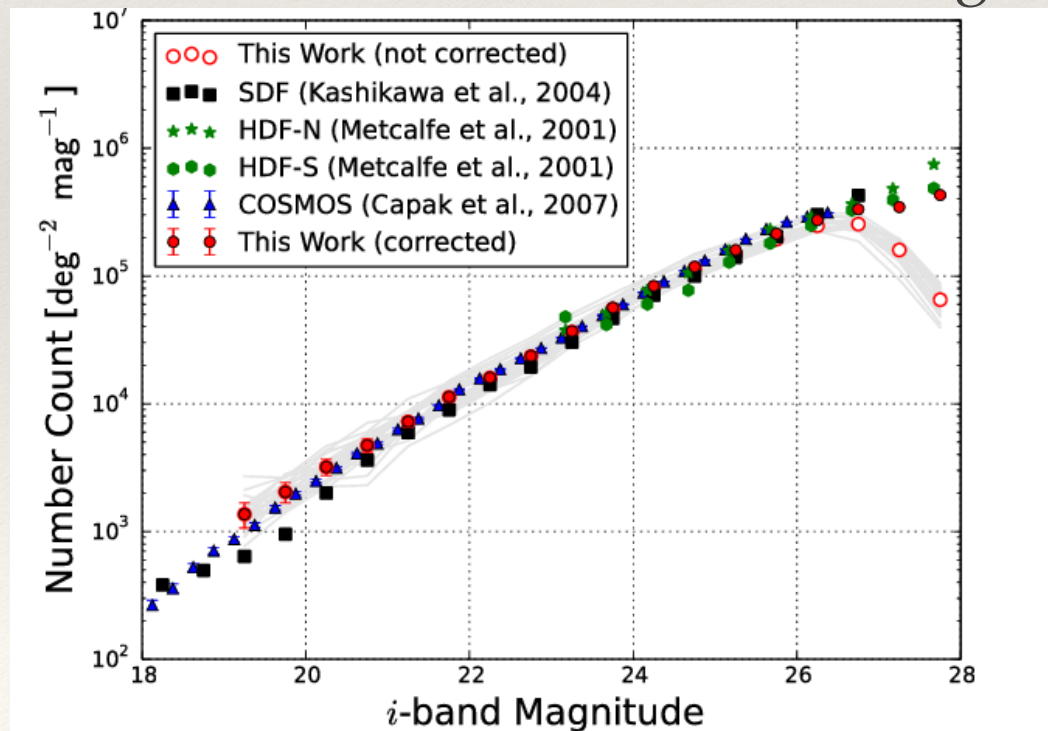
Choice of SEDs

- ❖ “El1”) yellow
- ❖ “Im”) orange
- ❖ “Sbc”) purple
- ❖ “SB2”) blue
- ❖ “Scd”) green
- ❖ “SB3”) red



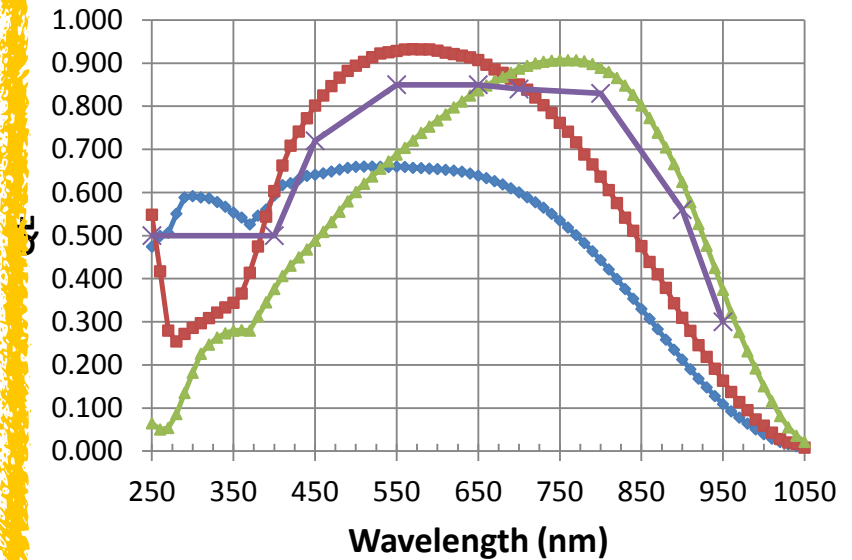
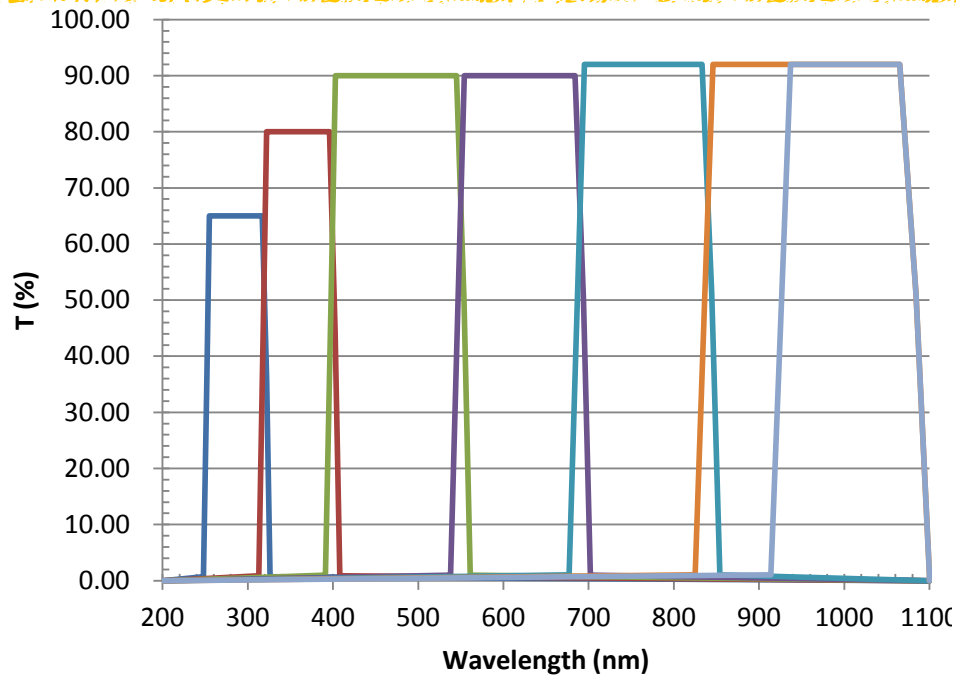
Simulation specifics

- ❖ 10sq deg on sky area
- ❖ Number counts from Capak 2007 COSMOS i-band
- ❖ 42006 model galaxy spectra over $0 \leq z \leq 7$ using 6 SEDs
 - ➔ SEDs all scaled to their relative population density
- ❖ Gives ~5.5million galaxy templates
- ❖ Limits for Euclid and CSSOS for various configurations



“Narrow Filters”

Filters & Limiting Mags

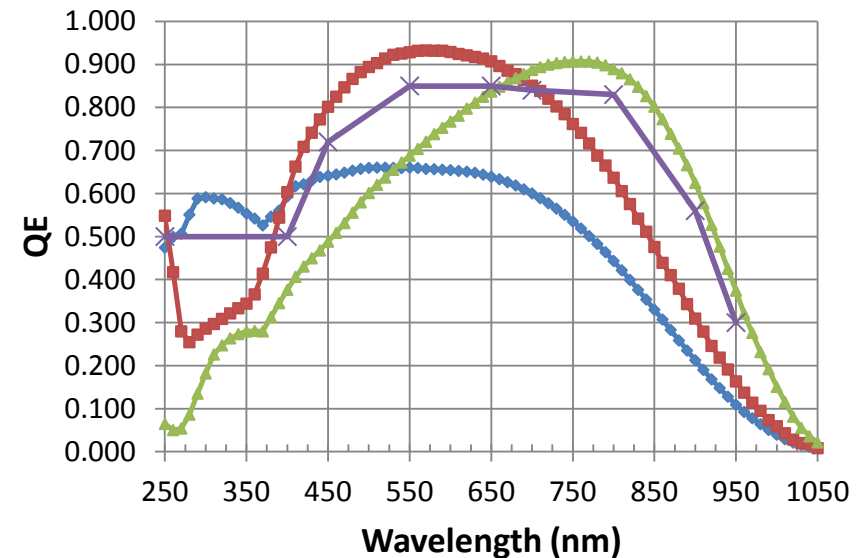
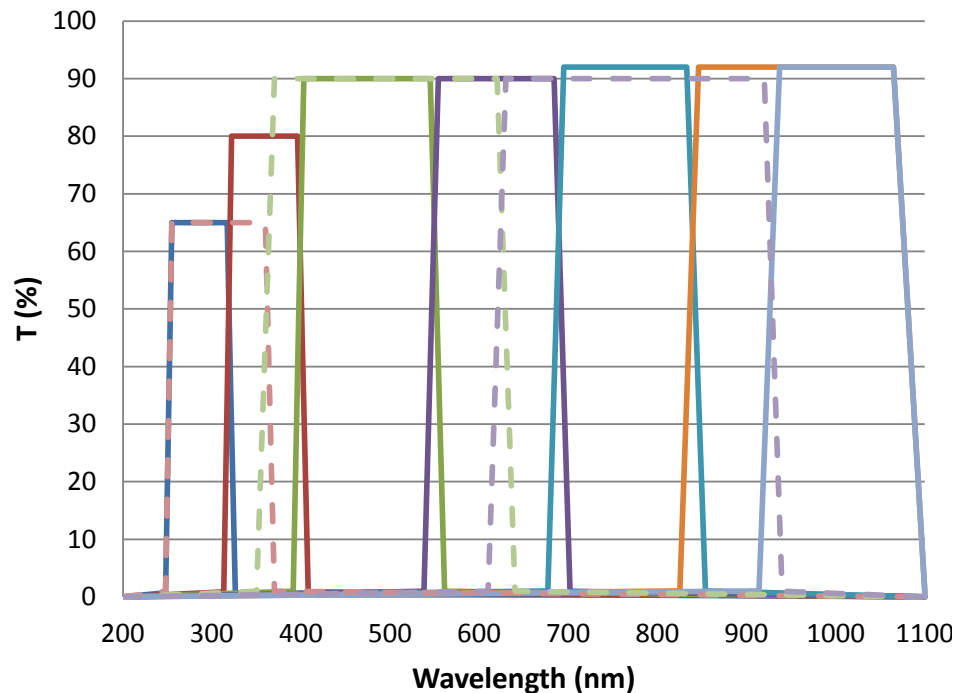


	Exp.	NUV	u	g	r	i	z	y
17500 \square°	$2 \times 150s$	25.4	25.4	26.3	26.0	25.9	25.2	24.4
400 \square°	$8 \times 250s$	26.7	26.7	27.5	27.2	27.0	26.4	25.7

NUV:u:g:r:i:z:y=2:1:1:1:1:1:2

“Broad Filters”

New Study of Filter Trade-offs

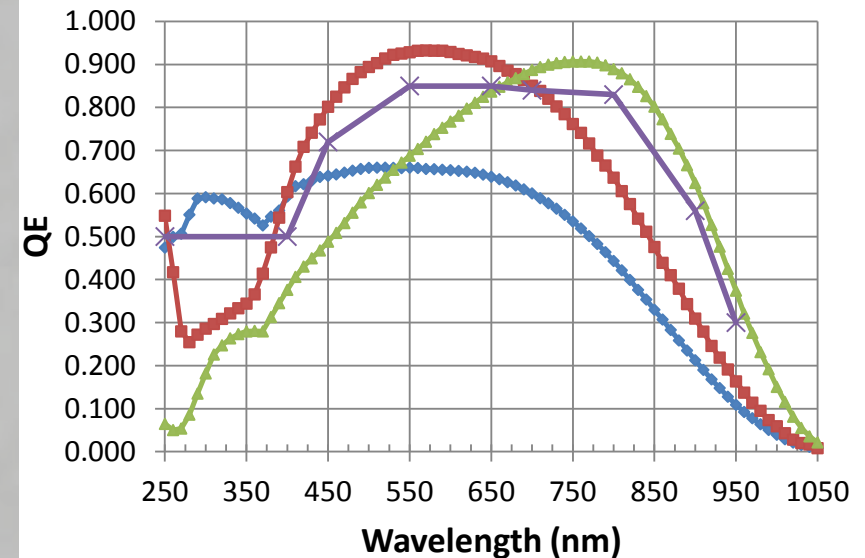
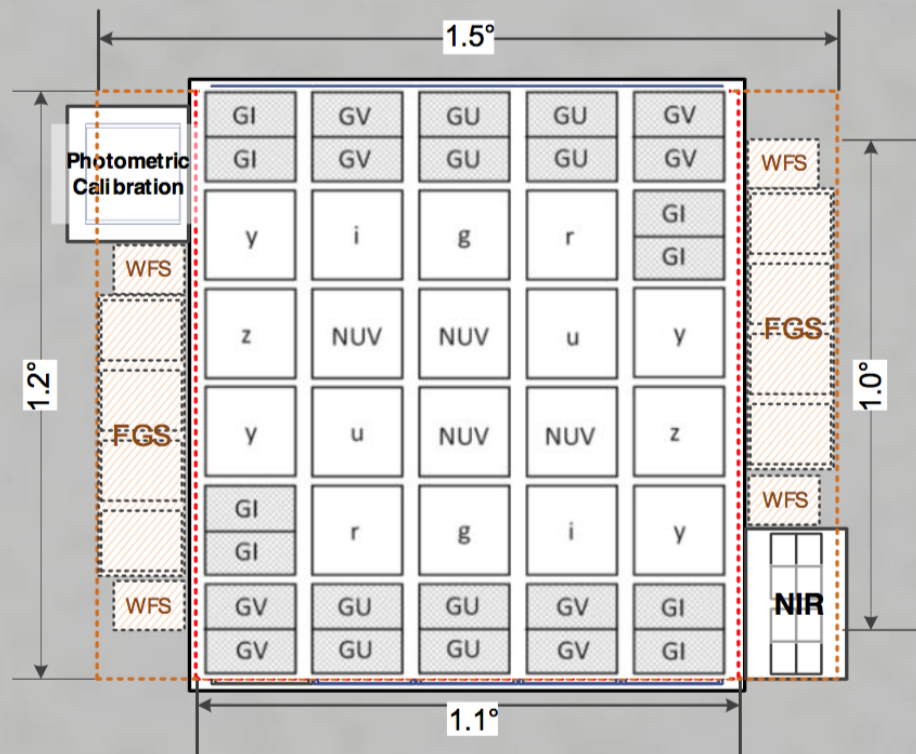


	Exp.	NUV	u	g	r	i	z	WU	WV	WI
17500 \square°	2 \times 150s	25.1	25.4	26.3	26.0	25.9	25.2	25.6	26.8	26.5
400 \square°	8 \times 250s	26.5	26.7	27.5	27.2	27.0	26.4	26.9	28.0	27.6

NUV, u, g, r, i, z, WU, WV, & WI, two pieces each. Deeper imaging, more galaxies, better photo-zs, potential improvement for stellar science, & redundancy.

Variable QE

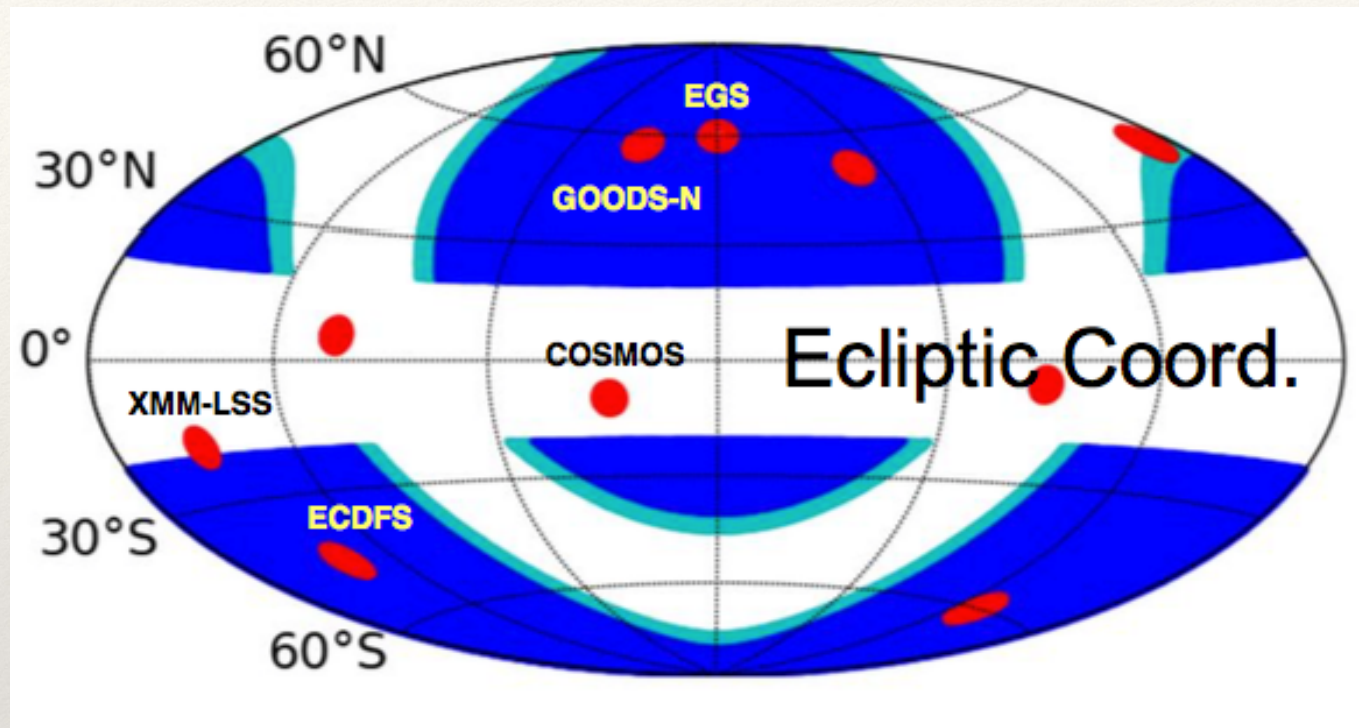
New Study of Filter Trade-offs



	Exp.	NUV	u	g	r	i	z	WU	WV	WI
17500□°	2×150s	25.1	25.4	26.3	26.0	25.9	25.2	25.6	26.8	26.5
400□°	8×250s	26.5	26.7	27.5	27.2	27.0	26.4	26.9	28.0	27.6

NUV, u, g, r, i, z, WU, WG, & WI, two pieces each. Deeper imaging, more galaxies, better photo-zs, potential improvement for stellar science, & redundancy.

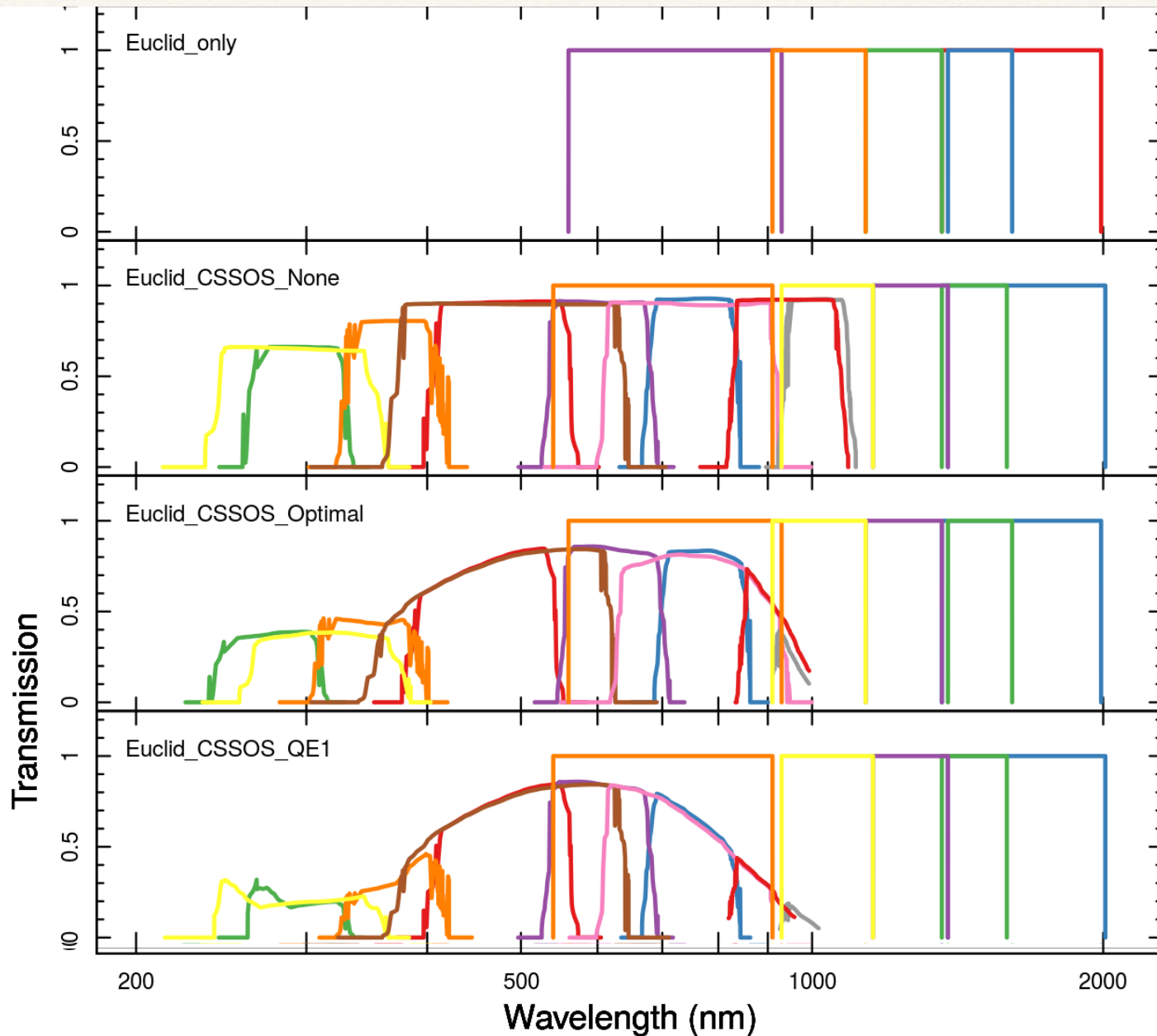
Analysis for both Shallow & Deep surveys



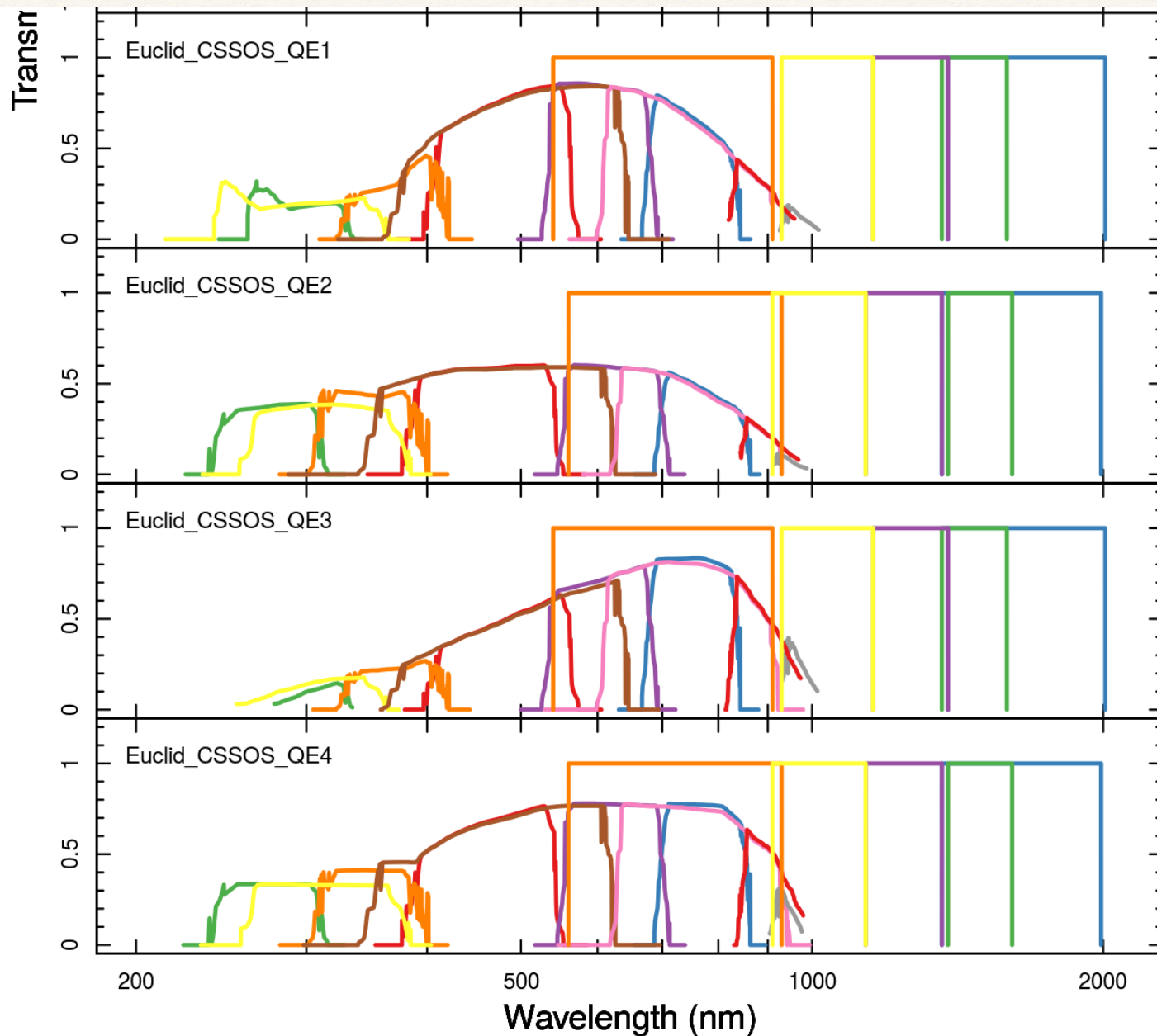
	Exp.	NUV	u	g	r	i	z	y
17500□°	2 × 150s	25.4	25.4	26.3	26.0	25.9	25.2	24.4
400□°	8 × 250s	26.7	26.7	27.5	27.2	27.0	26.4	25.7

	Exp.	NUV	u	g	r	i	z	WU	WV	WI
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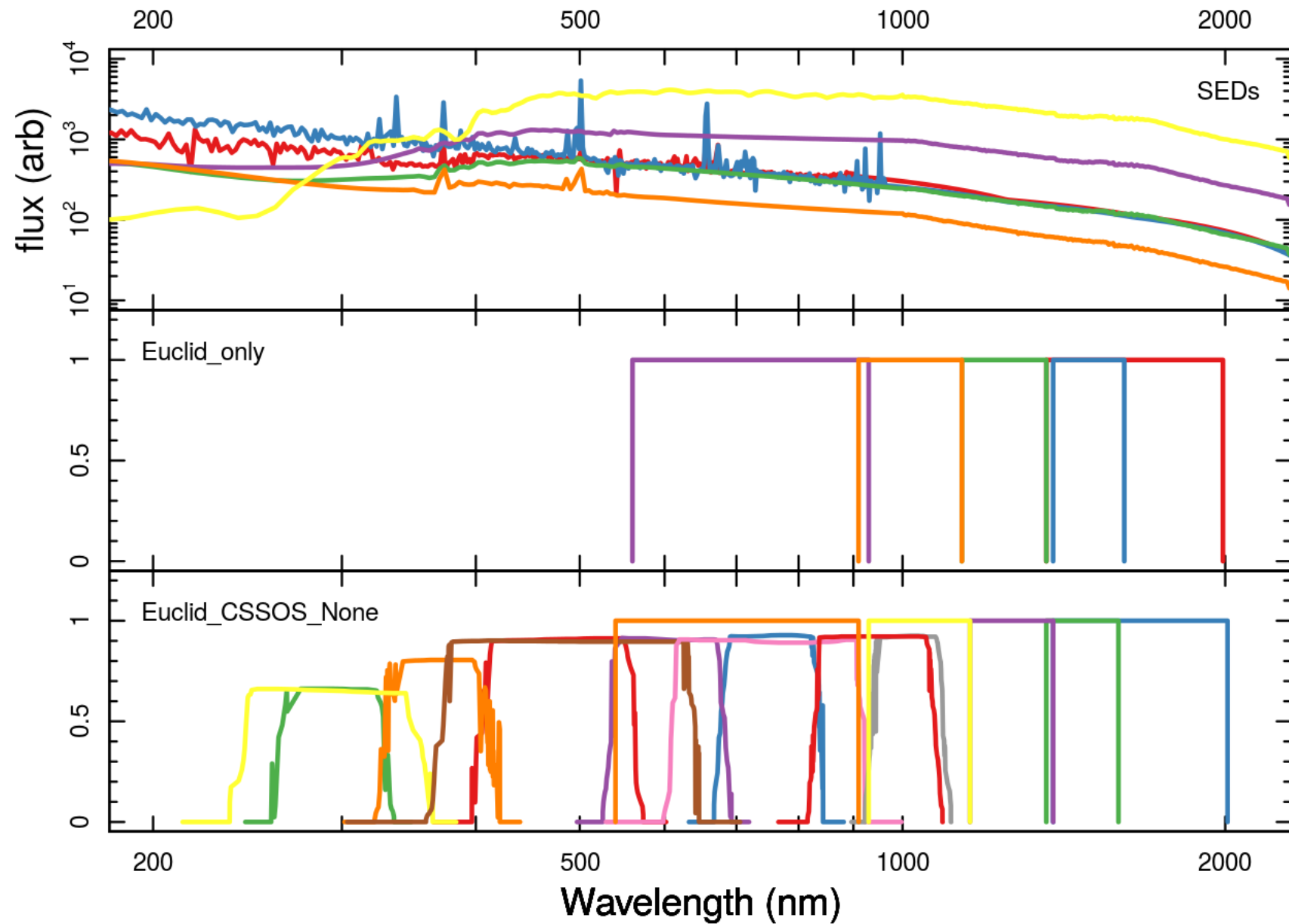
Different Filter + QE Combinations



Different Filter + QE Combinations



Focus



CSS-OS Filter Choice

Set	Limit	ODDS	N	Frac	sigma	outlier	core_sigma
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BRIGHT END

Broad&Shallow	22.0	0.00	117330	100.00	0.0244	0.22	0.0160
Narrow&Shallow	22.0	0.00	117328	100.00	0.0234	0.35	0.0140
Broad&Deep	22.0	0.00	117328	100.00	0.0127	0.00	0.0127
Narrow&Deep	22.0	0.00	117328	100.00	0.0099	0.01	0.0097

FULL DEPTH

Broad&Shallow	25.9	0.00	562102	100.00	0.1584	11.38	0.0423
Narrow&Shallow	25.9	0.00	562039	100.00	0.1652	13.63	0.0444
Broad&Deep	27.0	0.00	562102	100.00	0.0540	1.27	0.0229
Narrow&Deep	27.0	0.00	562102	100.00	0.0552	1.71	0.0218

Euclid w/ CSS-OS improvement

Set	Limit	ODDS	N	Frac	sigma	outlier	core_sigma
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FULL DEPTH***

Euclid only	Y<22.0	0.00	147967	100.00	0.3838	25.84	0.0634
CSS+E.H Broad	22.0	0.00	117328	100.00	0.1341	1.07	0.0201
CSS+E.H Narrow	22.0	0.00	117328	100.00	0.1686	2.10	0.0179
CSS+E.H2 Broad	22.0	0.00	117328	100.00	0.1300	0.98	0.0255
CSS+E.H2 Narrow	22.0	0.00	117328	100.00	0.1469	1.69	0.0235

- ❖ Significant (>20x) reduction in catastrophic outlier rate
- ❖ Factor of 3x reduction in scatter
- ❖ Numbers will change ~today as the magnitude calibration is improved

CSS-OS w/ Euclid improvement

Set		Limit	ODDS	N	Frac	sigma	outlier	core_sigma
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FULL DEPTH

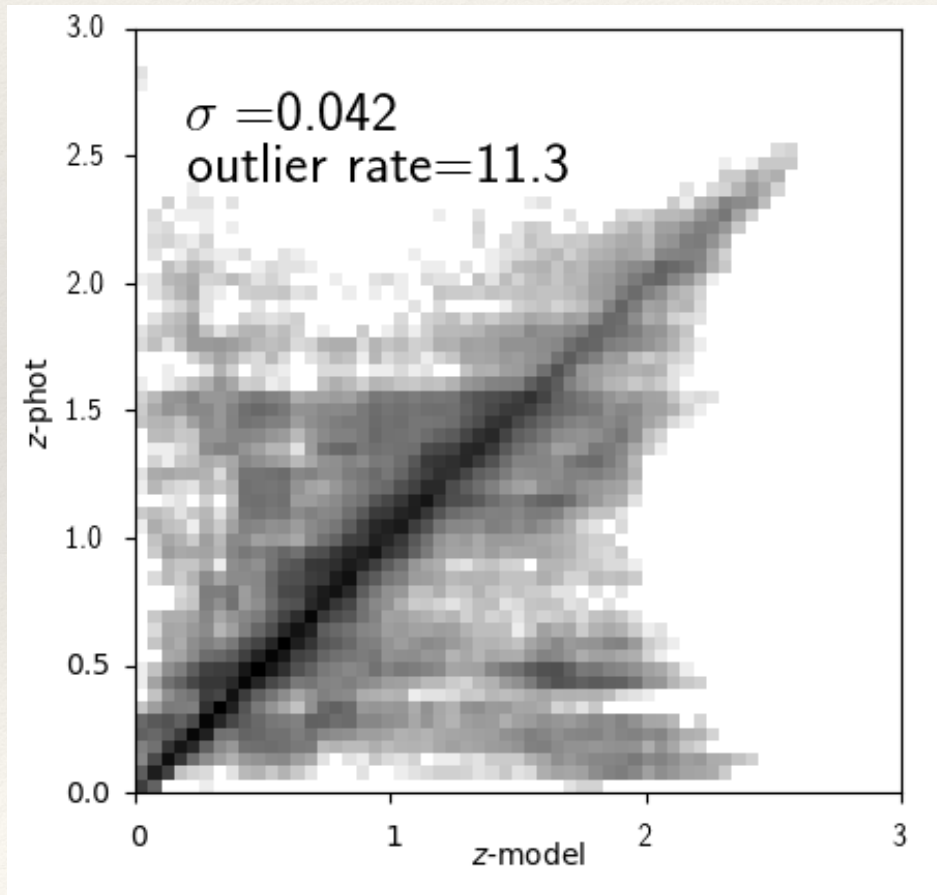
CSS	B&Sh	25.9	0.00	562102	100.00	0.1584	11.38	0.0423
CSS+E.H	B&Sh	25.9	0.00	562039	100.00	0.1271	7.03	0.0414
CSS+E.H2	B&Sh	25.9	0.00	562039	100.00	0.1141	6.70	0.0438
CSS+E.H	N&Sh	25.9	0.00	562039	100.00	0.1480	9.24	0.0430
CSS+E.H2	N&Sh	25.9	0.00	562039	100.00	0.1275	8.92	0.0451
CSS	N&Sh	25.9	0.00	562039	100.00	0.1652	13.63	0.0444

- ❖ Addition of Euclid leads to magical reduction in scatter, but drops of ~percent in outlier rate

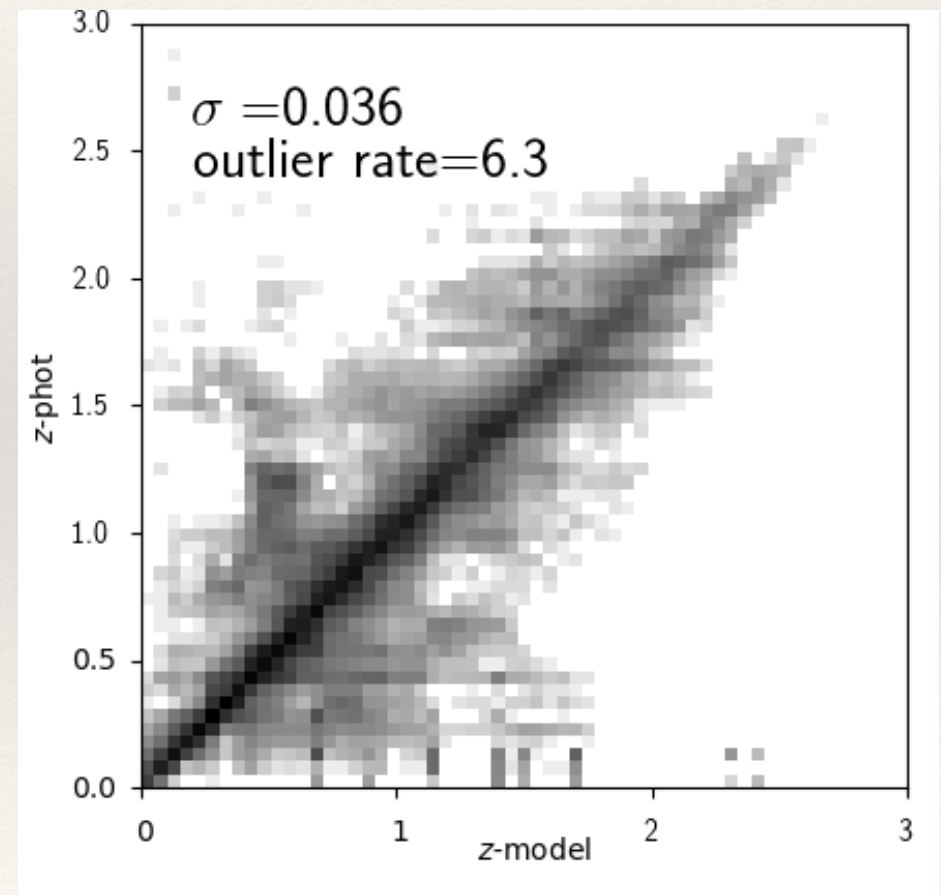
CSS-OS Filter Choice

Broad

CSS-OS



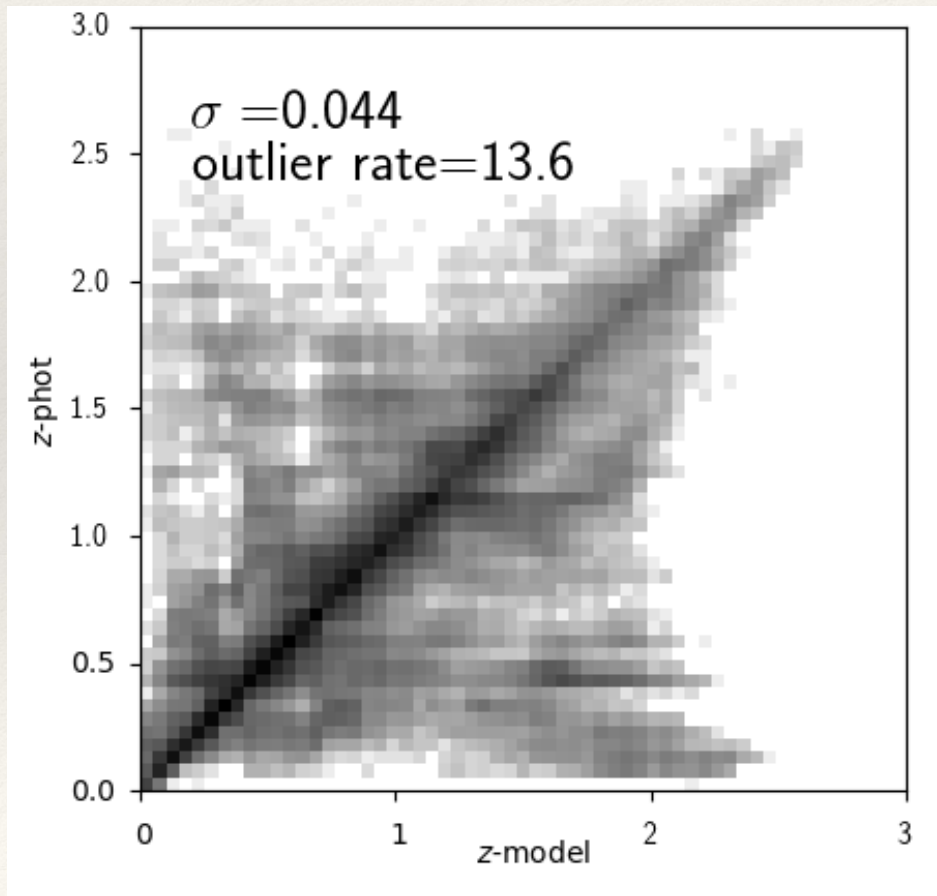
CSS-OS + Euclid



CSS-OS Filter Choice

Narrow

CSS-OS



CSS-OS + Euclid

