

CSS-OS FILTERS AND PHOTO-Z ACCURACY IMPROVING

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TWO FILTER SCHEMES

- Preset (solid line)

NUV(4), u(2), g(2), r(2), i(2),
z(2), y(4)

- Alternative

NUV(2), u(2), g(2), r(2), i(2),
z(2), WNUV(2), Wg(2), Wi(2)

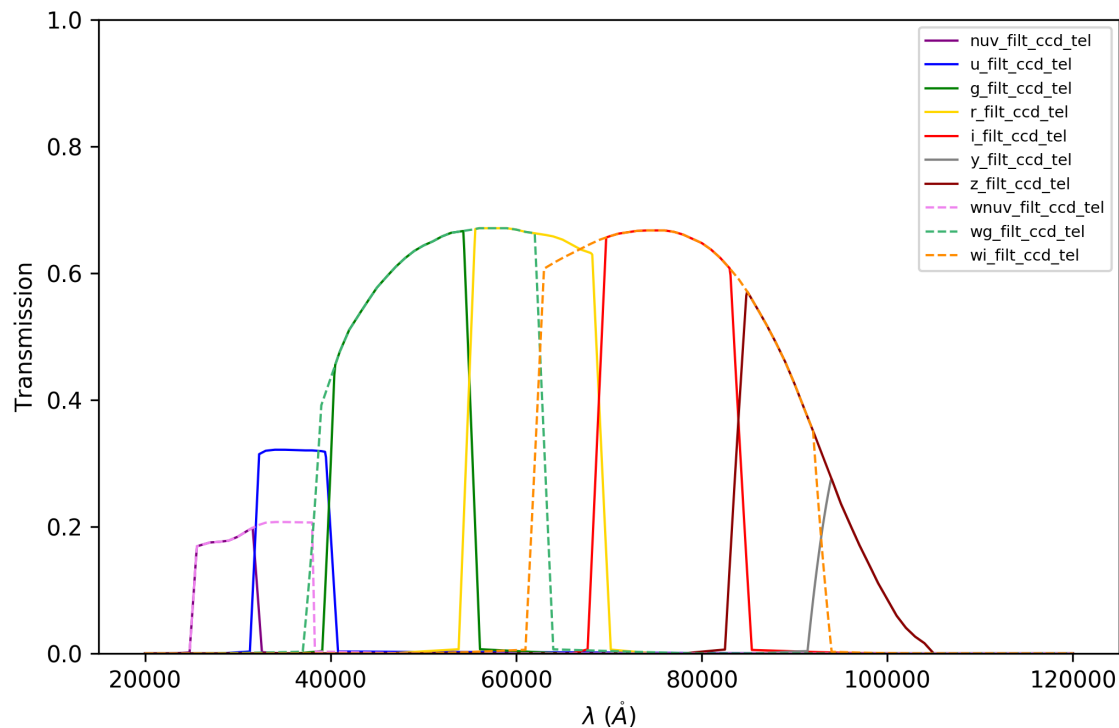


IMAGE SIMULATION - DATA

- COSMOS ACS 2.0 Mosaic
- F814W (broad I) band
- Select 4×4 tiles for image simulation
- 507s×4 exposure, drizzled to have 0.03" pixel scale
- limiting depth AB=27.2 (point, 5 σ)
- 0.095" PSF width

109	110	111	112	113	114	115	116	117
097	098	099	100	101	102	103	104	105
085	086	087	088	089	090	091	092	093
073	074	075	076	077	078	079	080	081
061	062	063	064	065	066	067	068	069
049	050	051	052	053	054	055	056	057
037	038	039	040	041	042	043	044	045
025	026	027	028	029	030	031	032	033
013	014	015	016	017	018	019	020	021

IMAGE SIMULATION - CSSOS

- Use HST ACS F814W image to simulate all CSSOS bands images
- Scale F814W count rate to match galaxy model SEDs

Model SED:

Re-Fitted SED using Ilbert et al (2009)'s multi-band data, fixing its photo-z

- PSF match

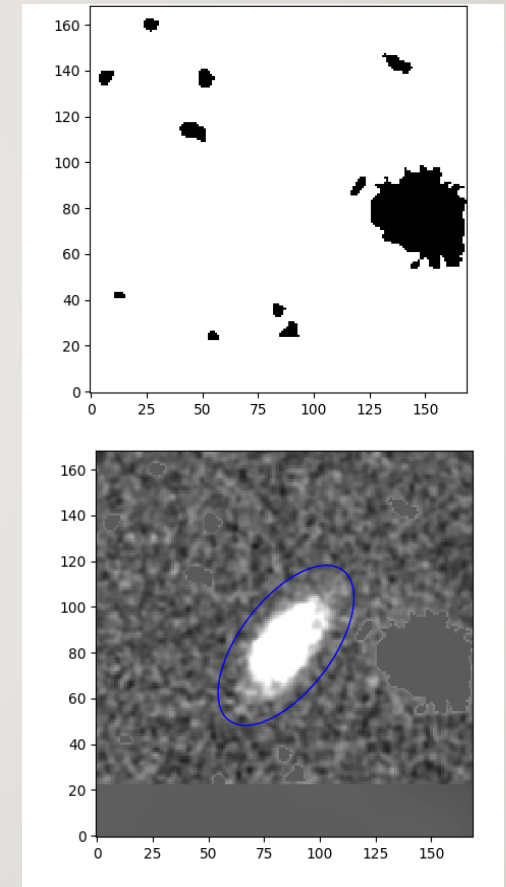
HST ACS 0.095" →

CSSOS z-band 0.165" (80% energy enclosure radius) & stability 0.017" (1σ)

IMAGE SIMULATION - CSSOS

- SED match
 - cut a stamp image for each object
 - segmentation, background subtraction (iteratively)
 - photometry (mask other objects), $Ne_cntrate$
- Ne_model for each band:

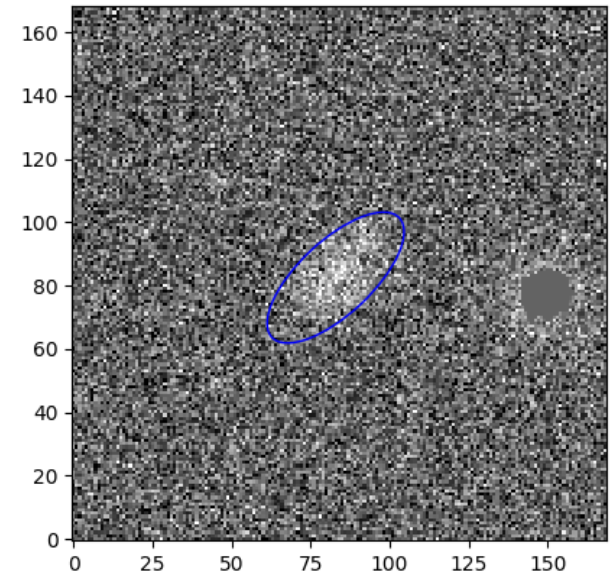
$$N_{le} = t \cdot Area \cdot \int_{\lambda_1}^{\lambda_2} f_{\lambda} \cdot T(\lambda) \cdot d\lambda / h\nu$$
- Scale stamp image to match SED by $\times Ne / Ne_cntrate$



PHOTOMETRY

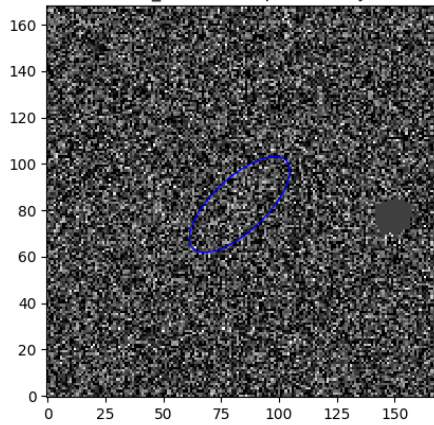
- Add additional noises:
 - sky background, dark current, photon shooting noises
 - readout noises
- Gain
- Stack NUV, u, g, r, i, z, y bands images as detection image D_{img}
- calculate Kron radius on stacked image
- Force photometry:
 - Use aperture defined on stacked image
 - measure fluxes inside aperture

766072 Stack's central object & aperture photometry

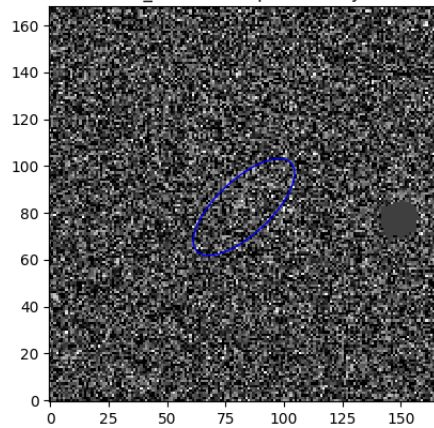


PHOTOMETRY

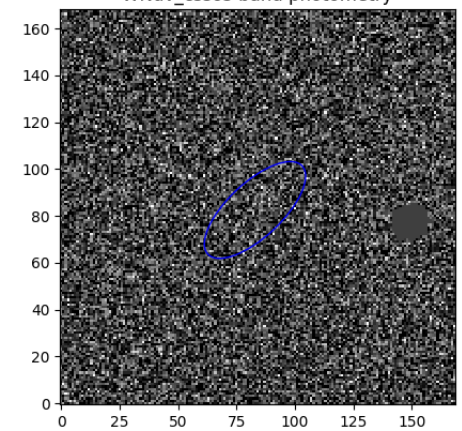
Nuv_cssos-band photometry



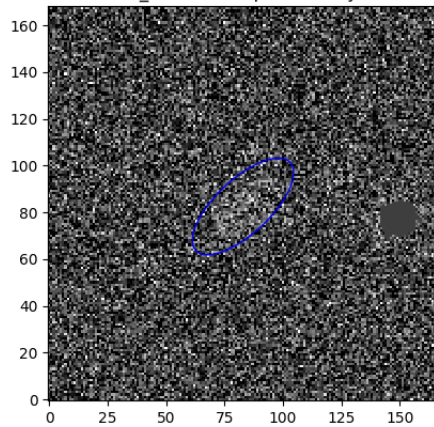
u_cssos-band photometry



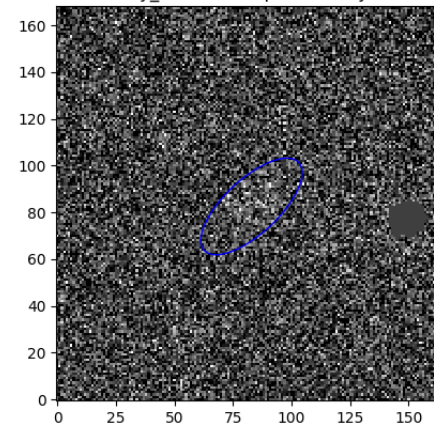
WNuv_cssos-band photometry



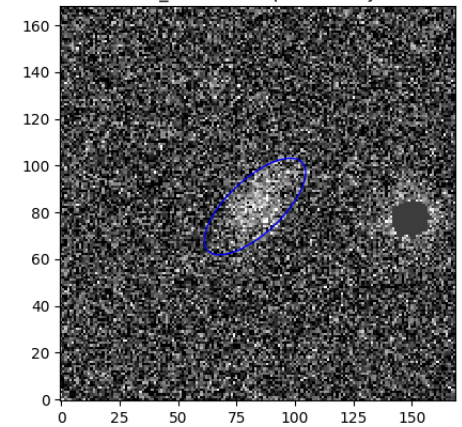
r_cssos-band photometry



y_cssos-band photometry



Wi_cssos-band photometry



GALAXY DENSITY

- Sample Selection:
 - $\text{SNR}_g \geq 5$ & $\text{SNR}_r \geq 5$ & $\text{SNR}_i \geq 5$ & $\text{SNR}_z \geq 5$
 - $\text{SNR}_r \geq 7$ & $\text{SNR}_i \geq 7$
 - $\text{SNR}_g \geq 10$
 - $\text{SNR}_r \geq 10$
 - $\text{SNR}_i \geq 10$
 - $\text{SNR}_z \geq 10$
 - Galaxy density: 36 gal / arcmin²

PHOTO-Z COMPARISON

- Photo-z fitting using LePhare code
- number of sample
 - ~6700 galaxies have all Preset bands SNR>1
 - compare their photo-z directly to the alternative
 - no significance difference is found

$$\sigma_{\text{NMAD}} = 1.48 \times \text{median} \left(\left| \frac{\Delta z - \text{median}(\Delta z)}{1 + z_{\text{input}}} \right| \right)$$

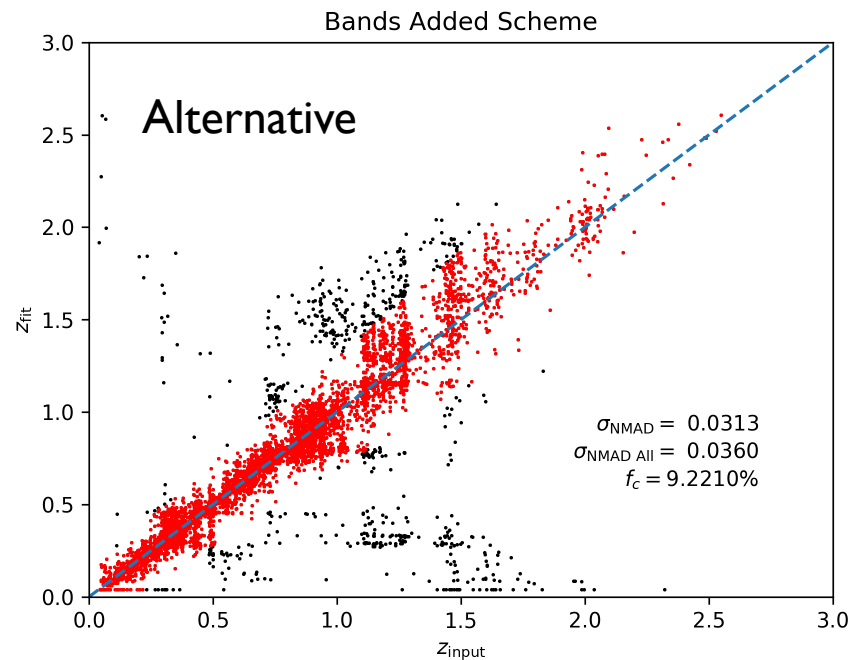
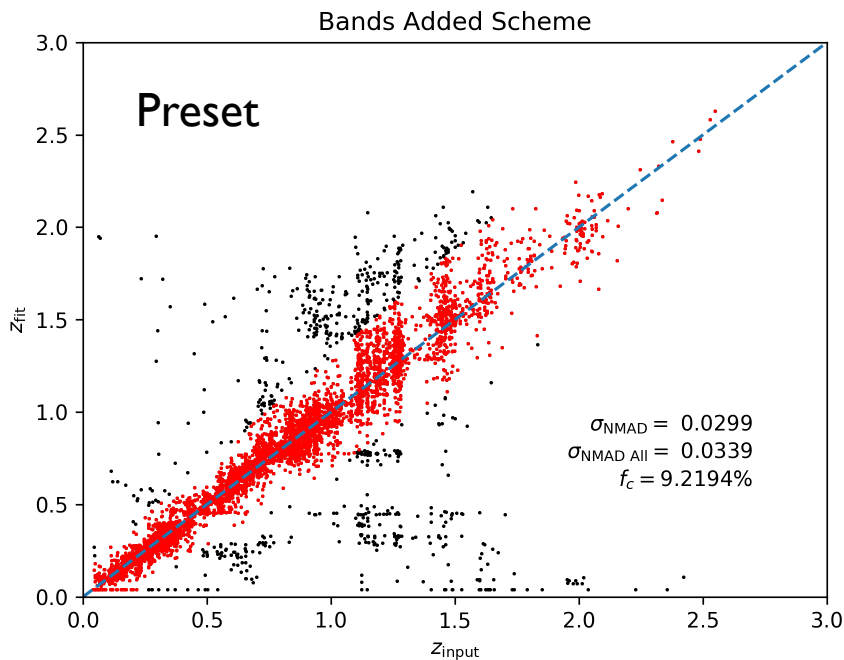
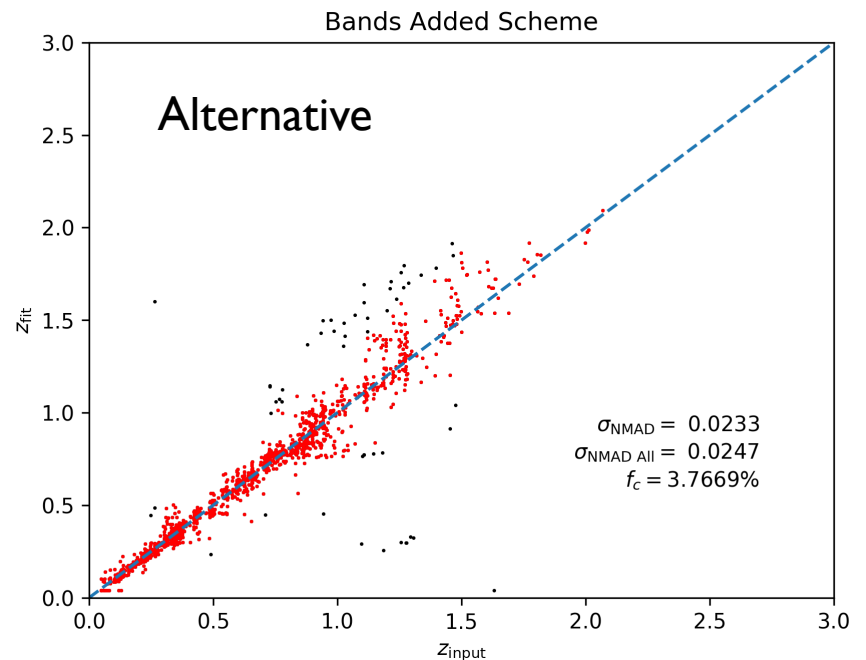
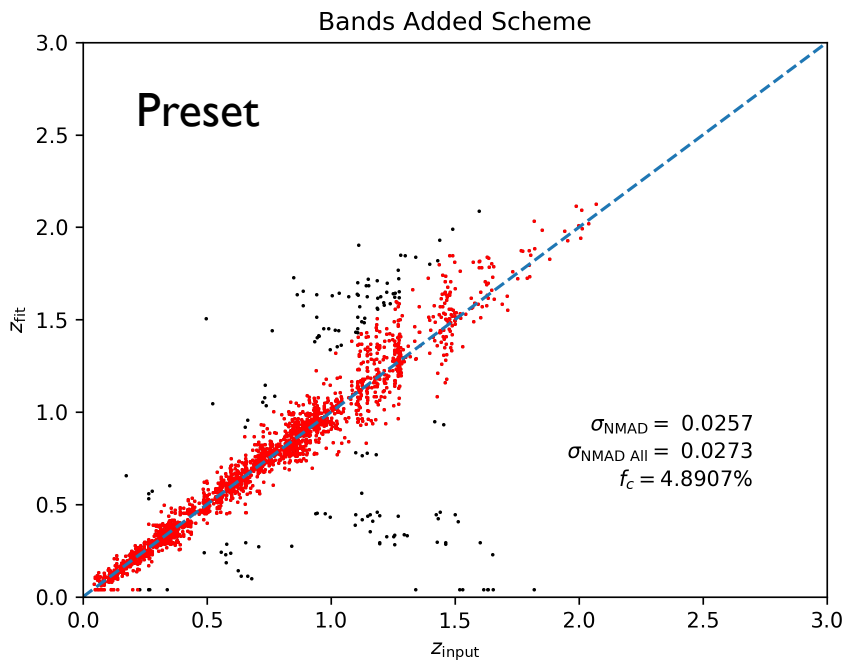


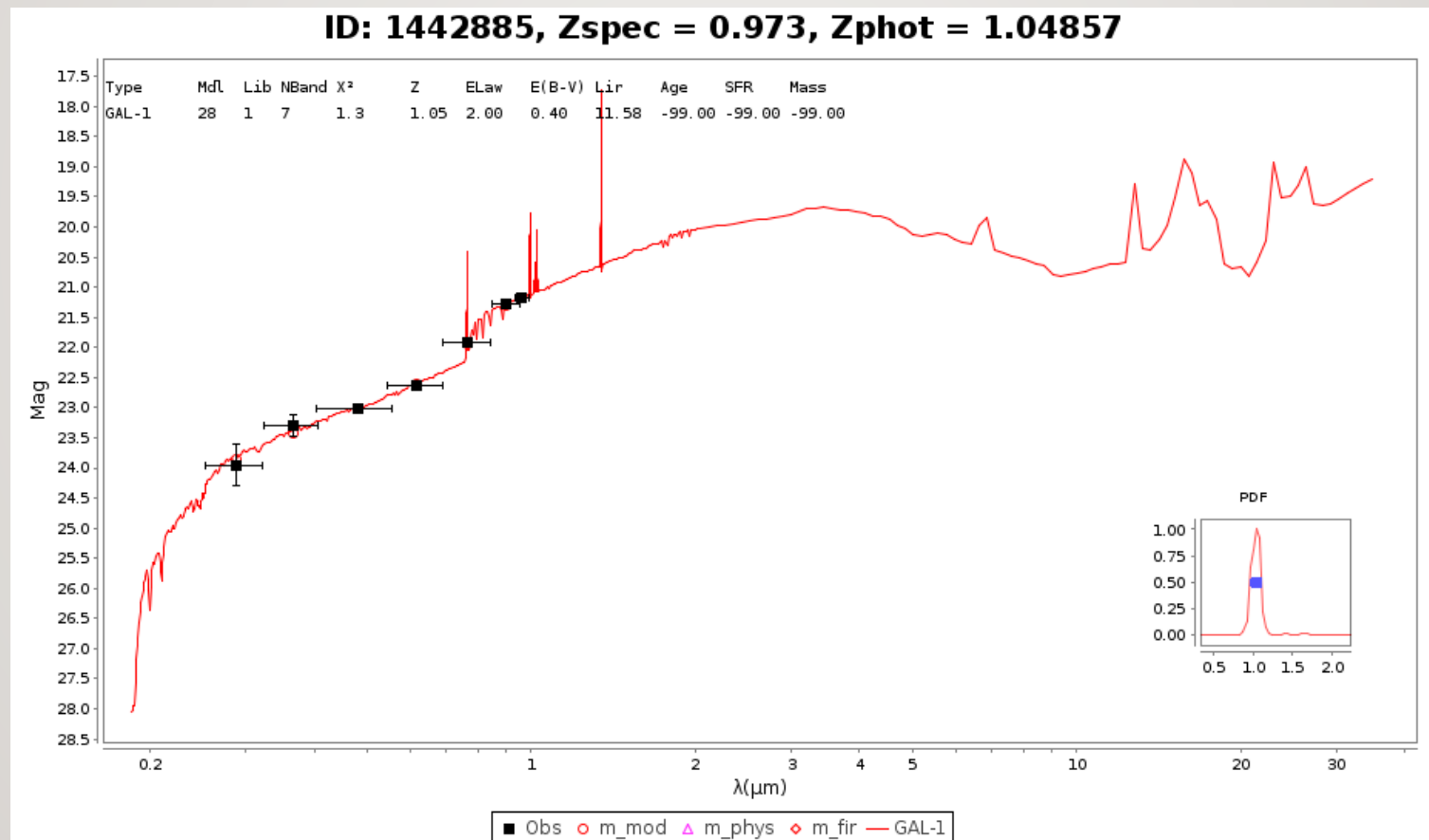
PHOTO-Z COMPARISON

- all detection sample
 - Detection: 1.2σ threshold and minimal 10 pixel connected (implies $> 3\sigma$)
 - ~2700 galaxies have all Preset bands detection
 - ~1500 galaxies have all Alternative bands detection



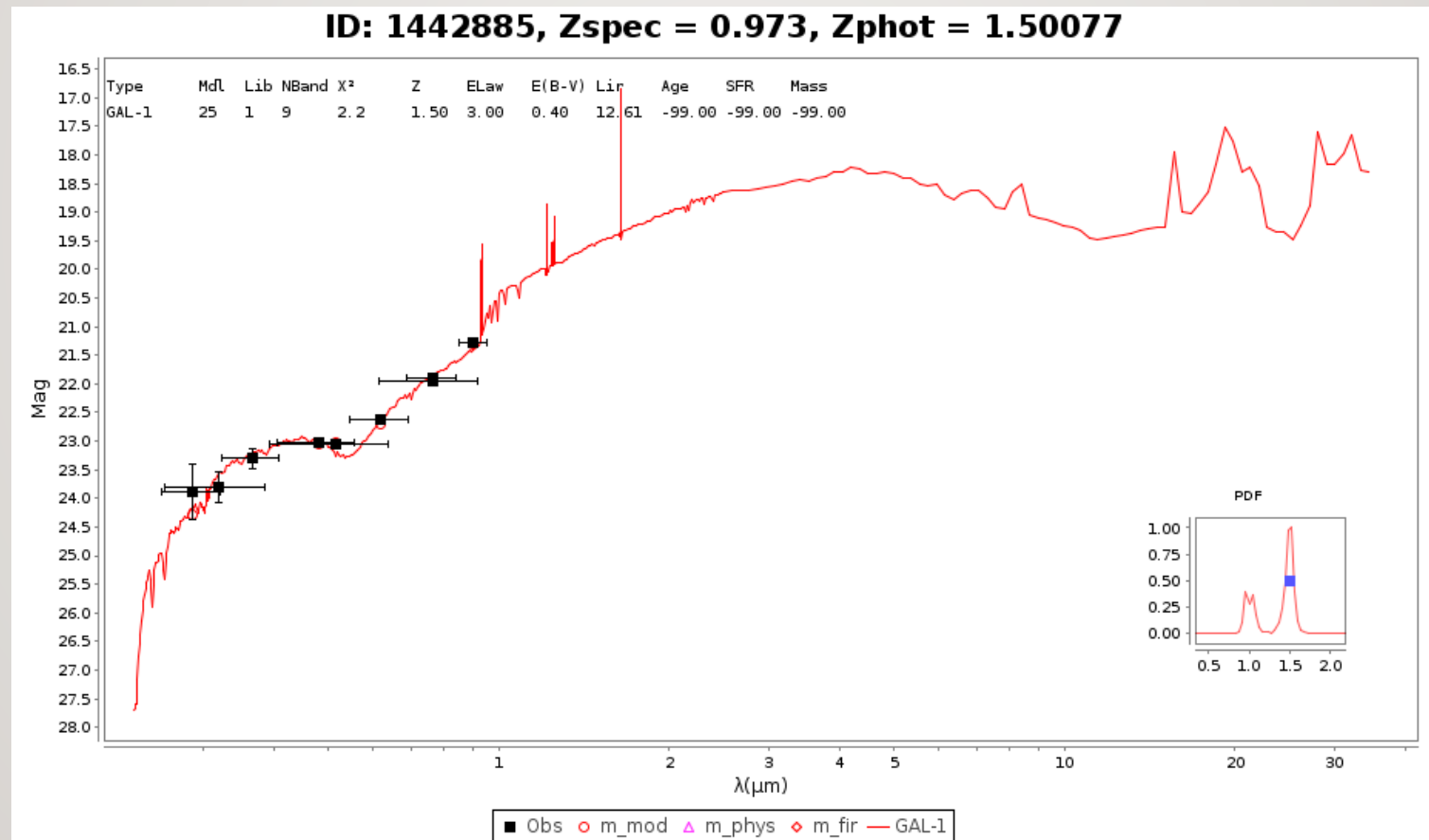
EXAMPLE FITTING

- Preset, example fitting



EXAMPLE FITTING

- Alternative, same object, catastrophic case



NEXT TO DO

- Include no detection bands data in photo-z calculation
- Improve the simulation and Reconsider the sample
- Include Euclid Y, J, H band data for photo-z improving

THANKS FOR YOUR ATTENTION
