

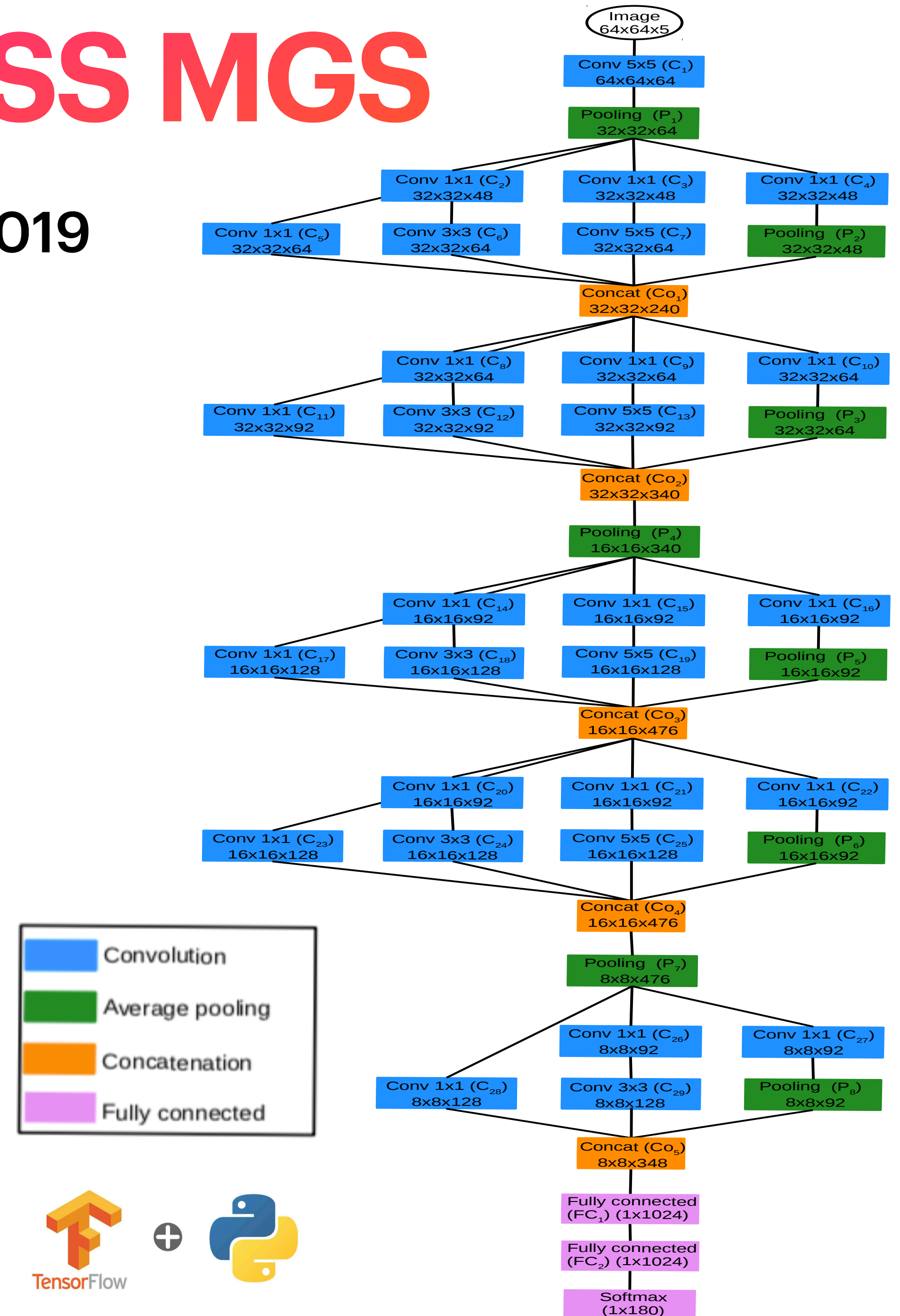
Prototype applied to SDSS MGS

Jo.Pasquet, Bertin, Treyer, Arnouts, Fouchez 2019

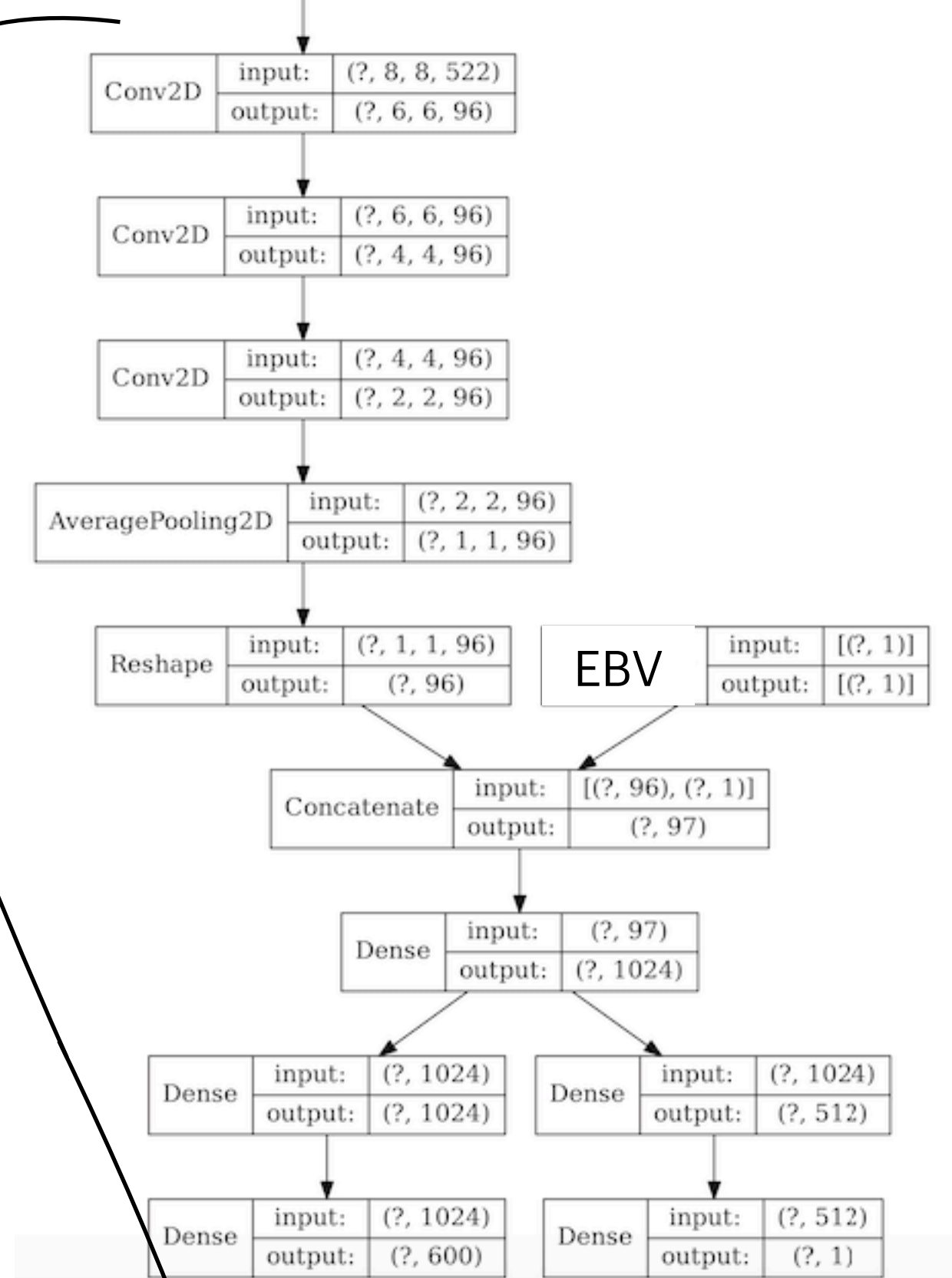
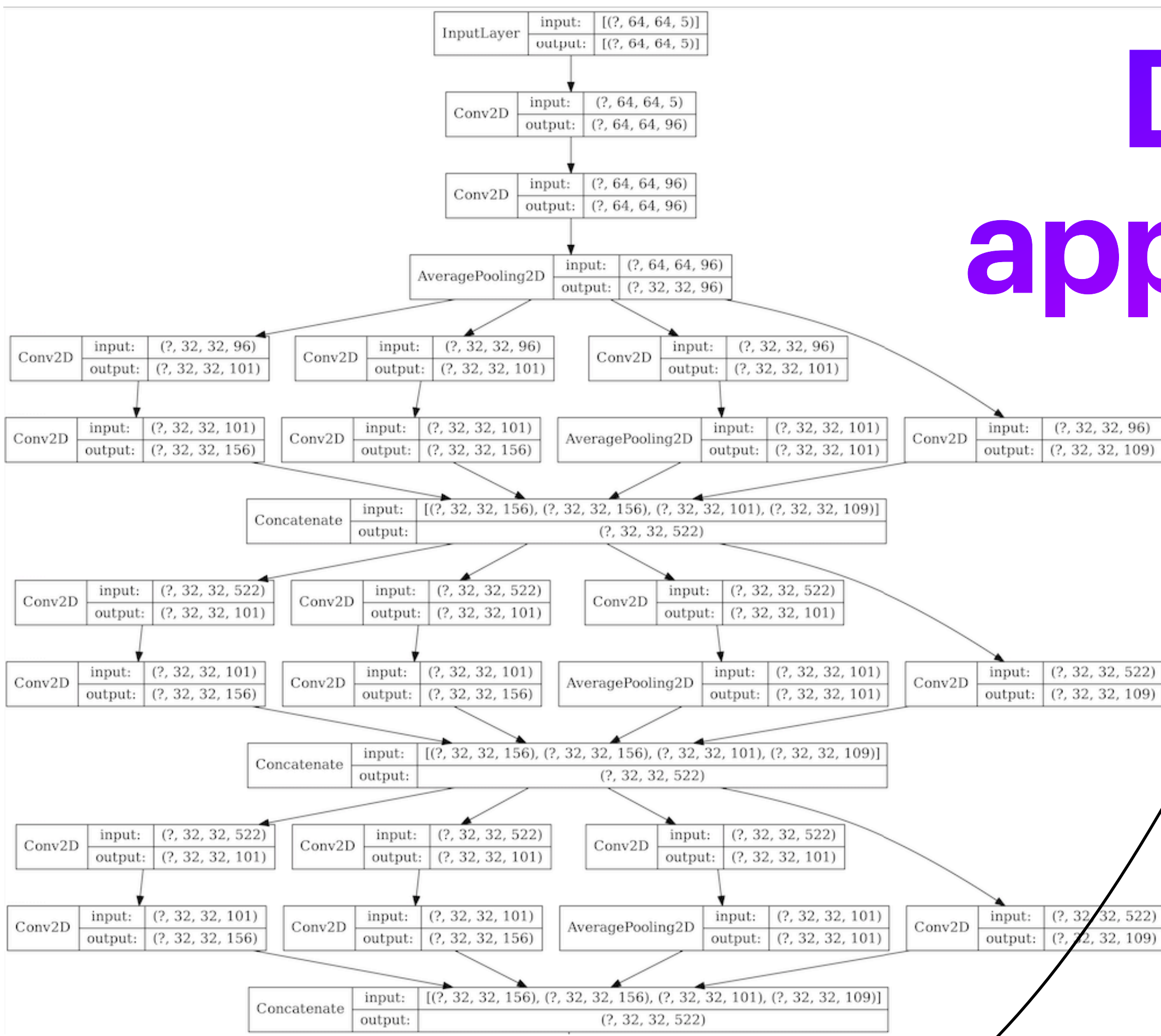
Input: *ugriz* images, 64x64 pixels*, unmodified (no color images, no photometric measurements) + EBV

Output: redshift classification into 180 bins between 0 and 0.4 (PDF)

*using SWarp by E. Bertin: a software that resamples and co-adds FITS images using any arbitrary astrometric projection defined in the WCS standard (AstrOmatic.net)



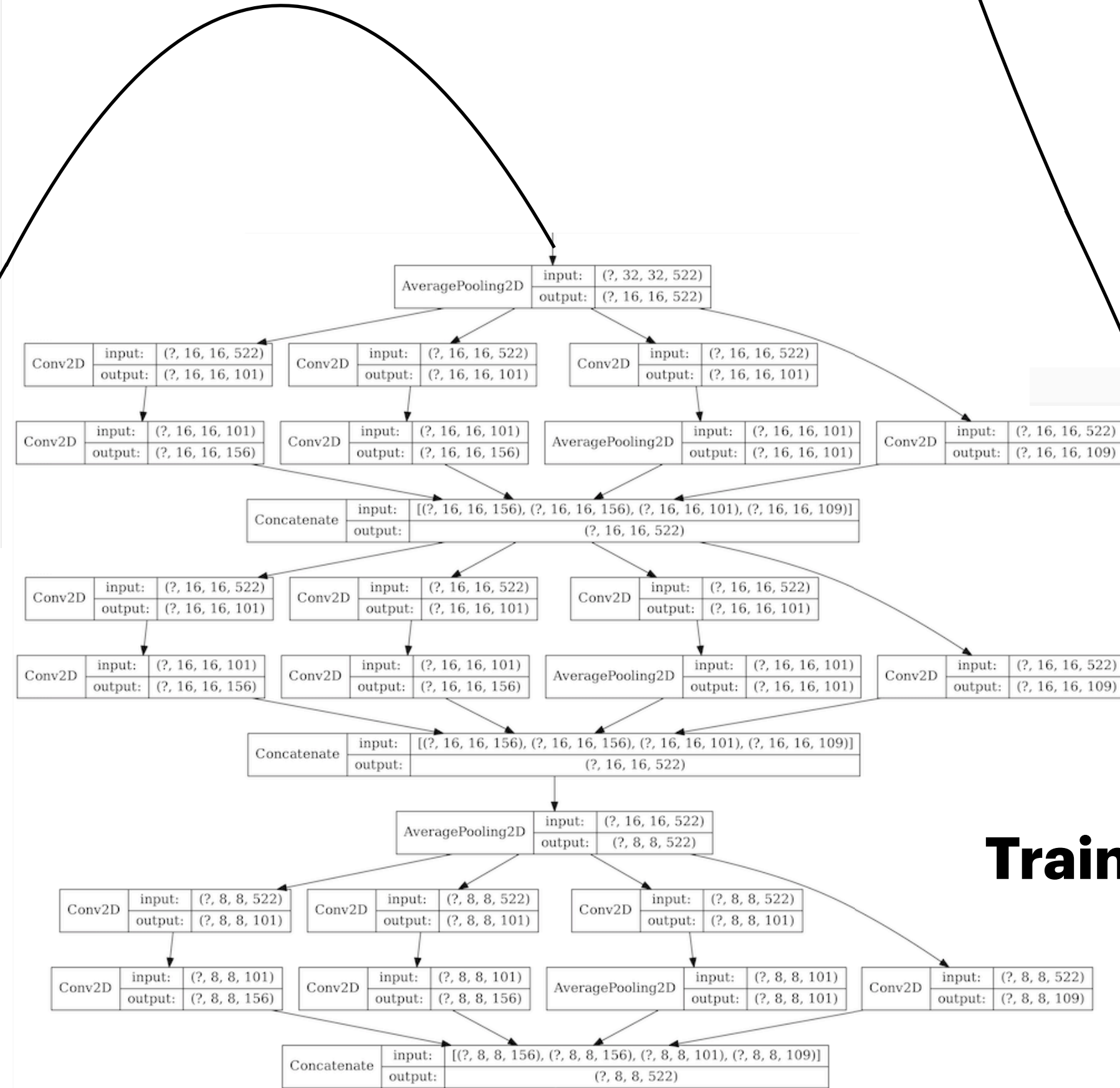
Deeper CNN applied to deeper surveys



Classification Regression

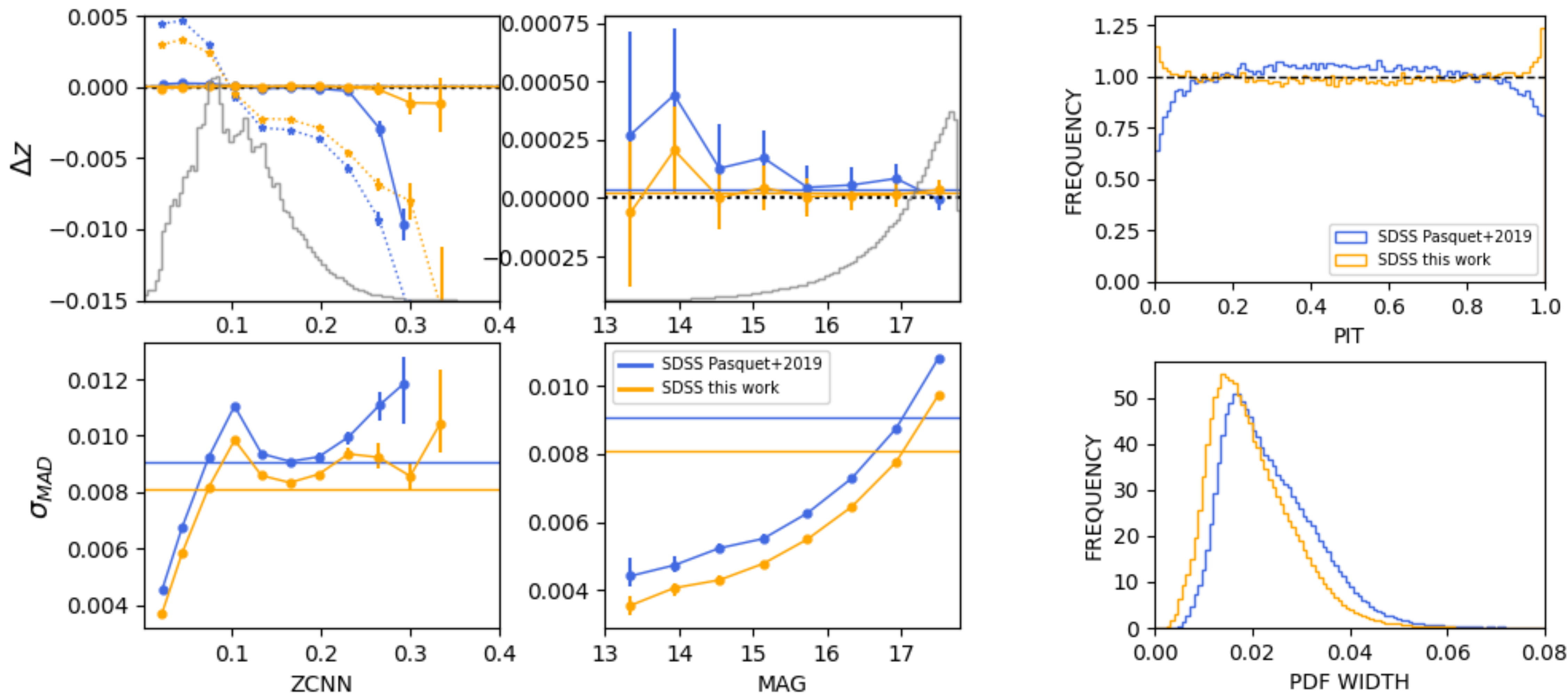
Adjustable input parameters:

learning rates, loss functions, activation functions, optimisation functions, number of epochs, redshift binning, etc.



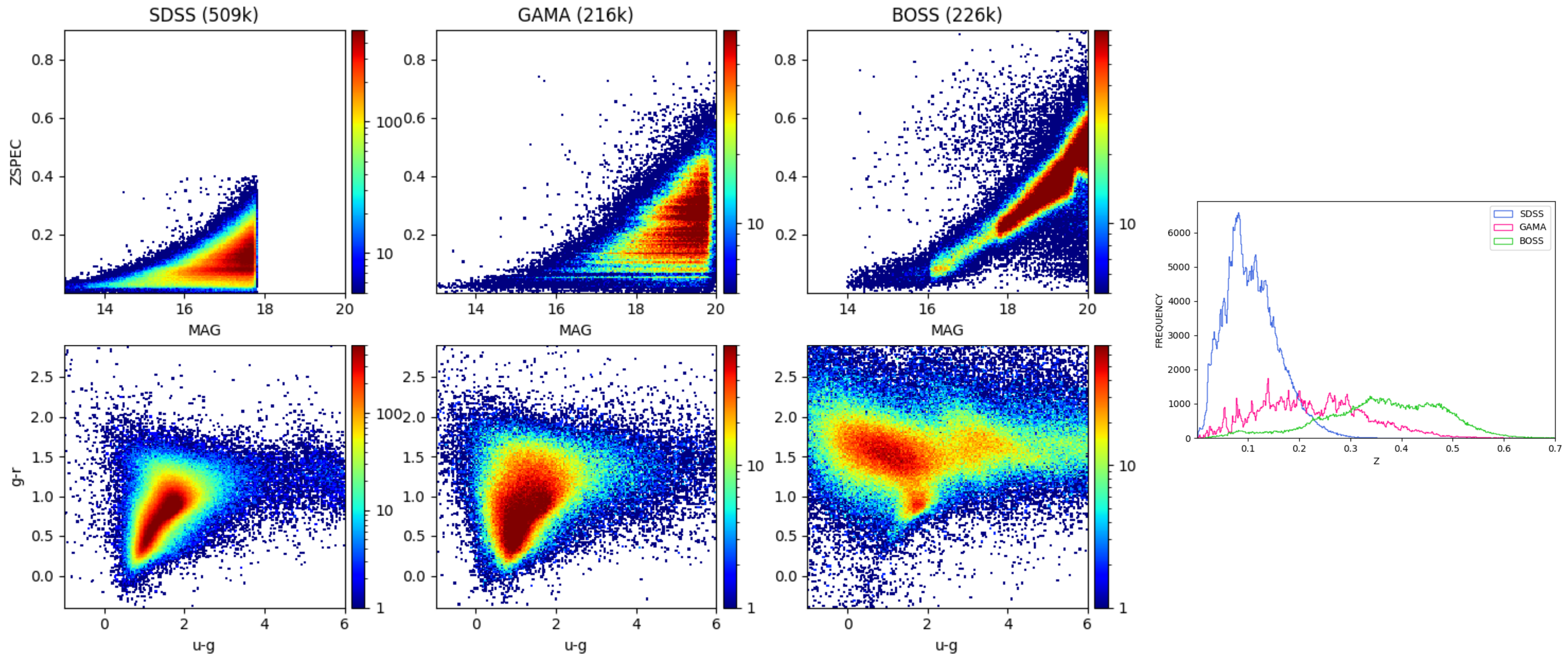
Trainable parameters: 7.6 M

Improved performance on SDSS



Low redshifts ($z < 1$)

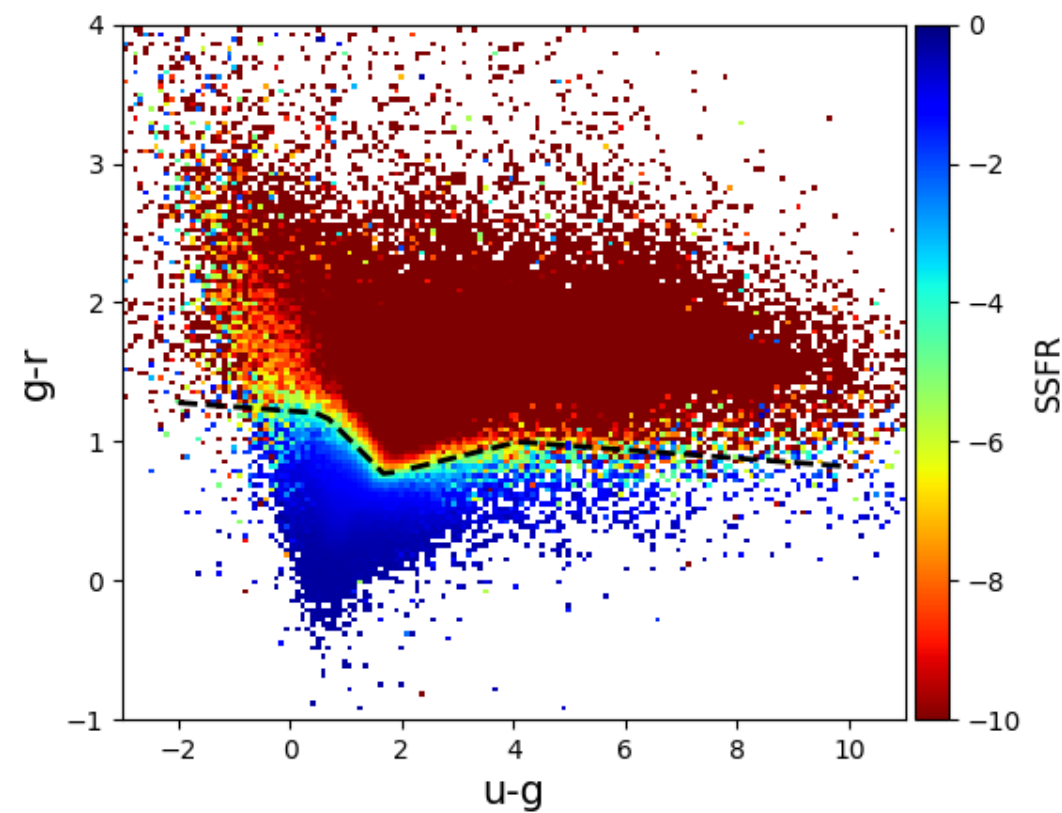
Goal: predict CNN redshifts for $\sim 16\text{M}$ galaxies at $r < 20$ in the SDSS footprint



Training

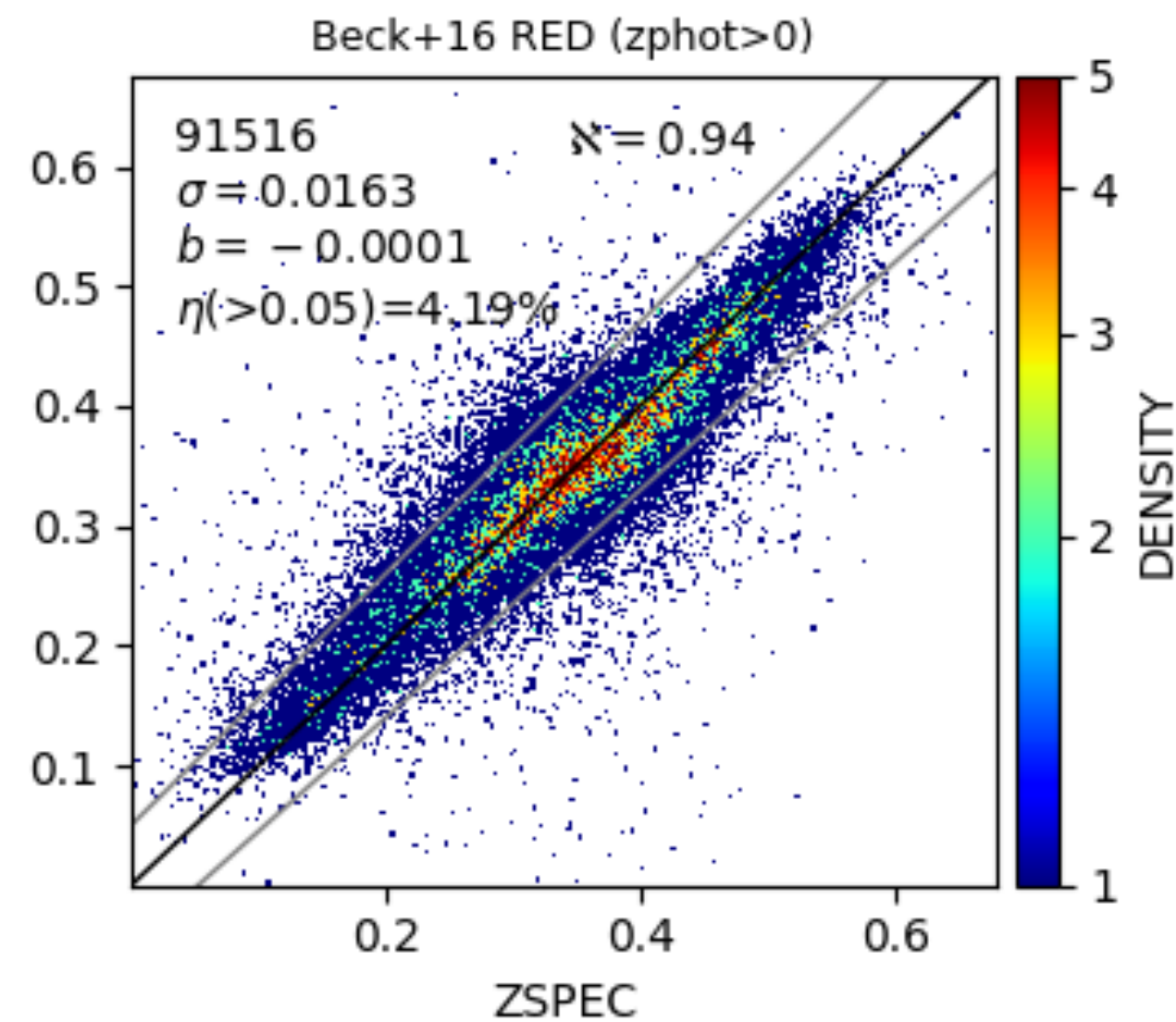
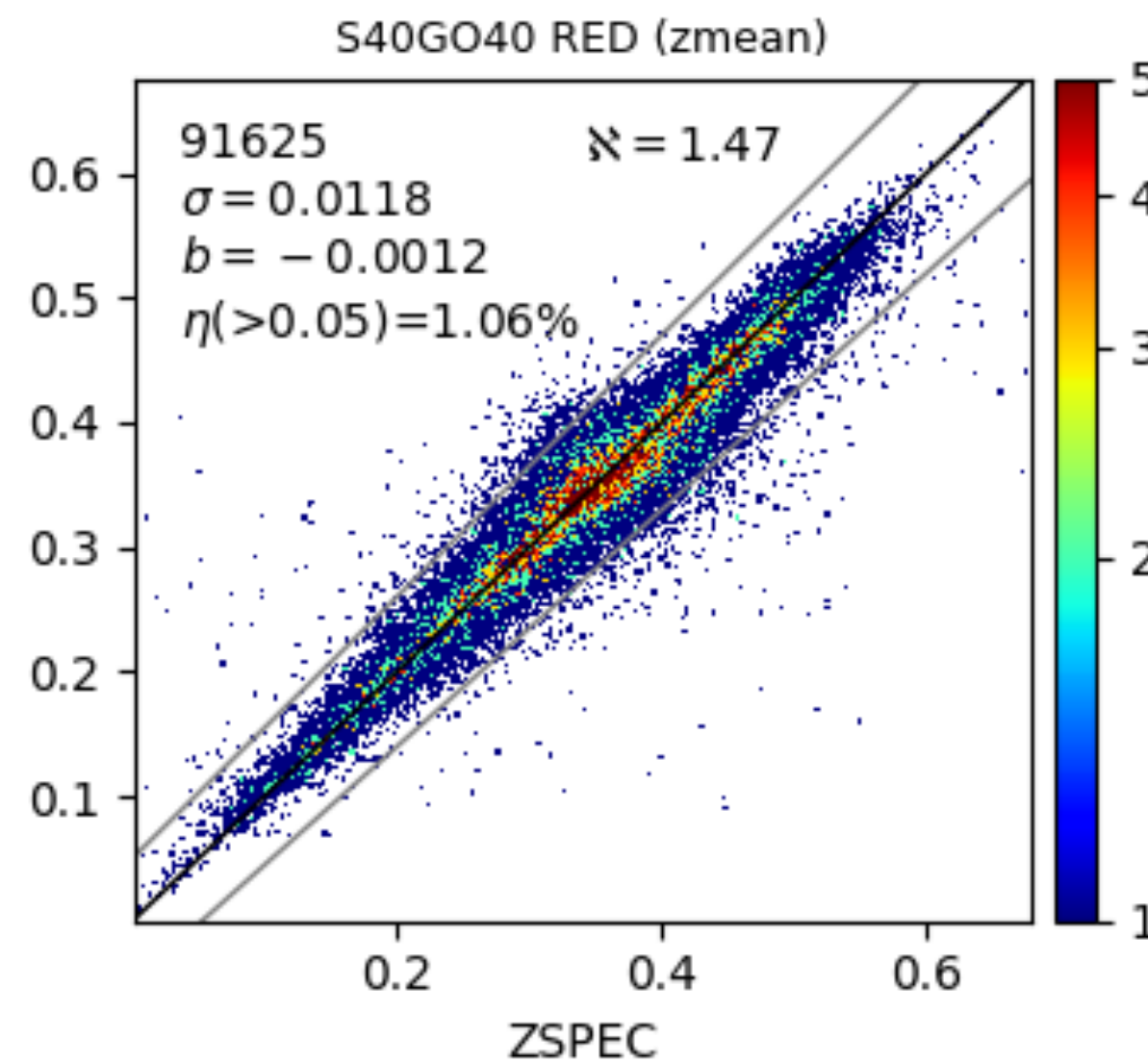
Testing

$17.8 < r < 20$

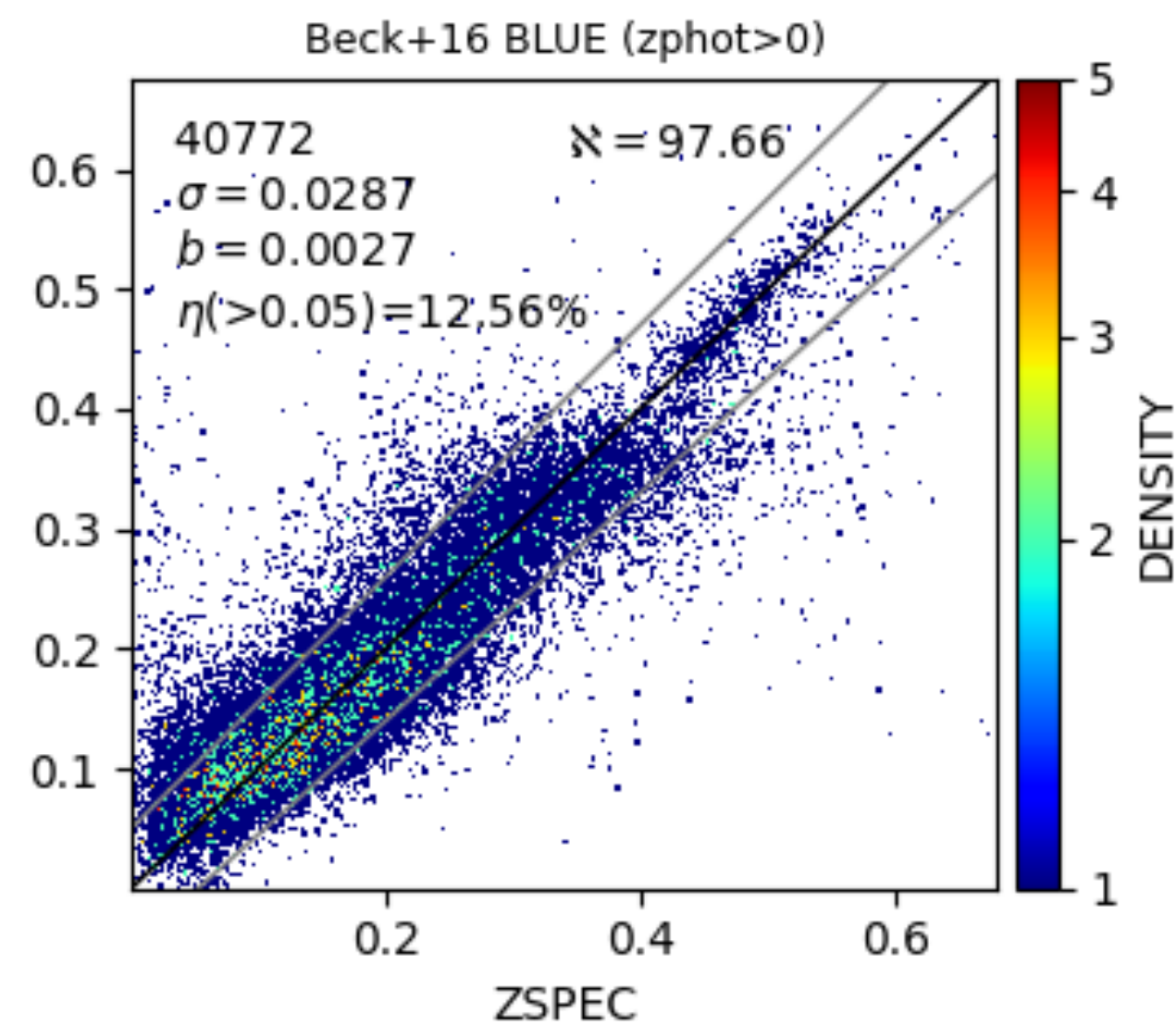
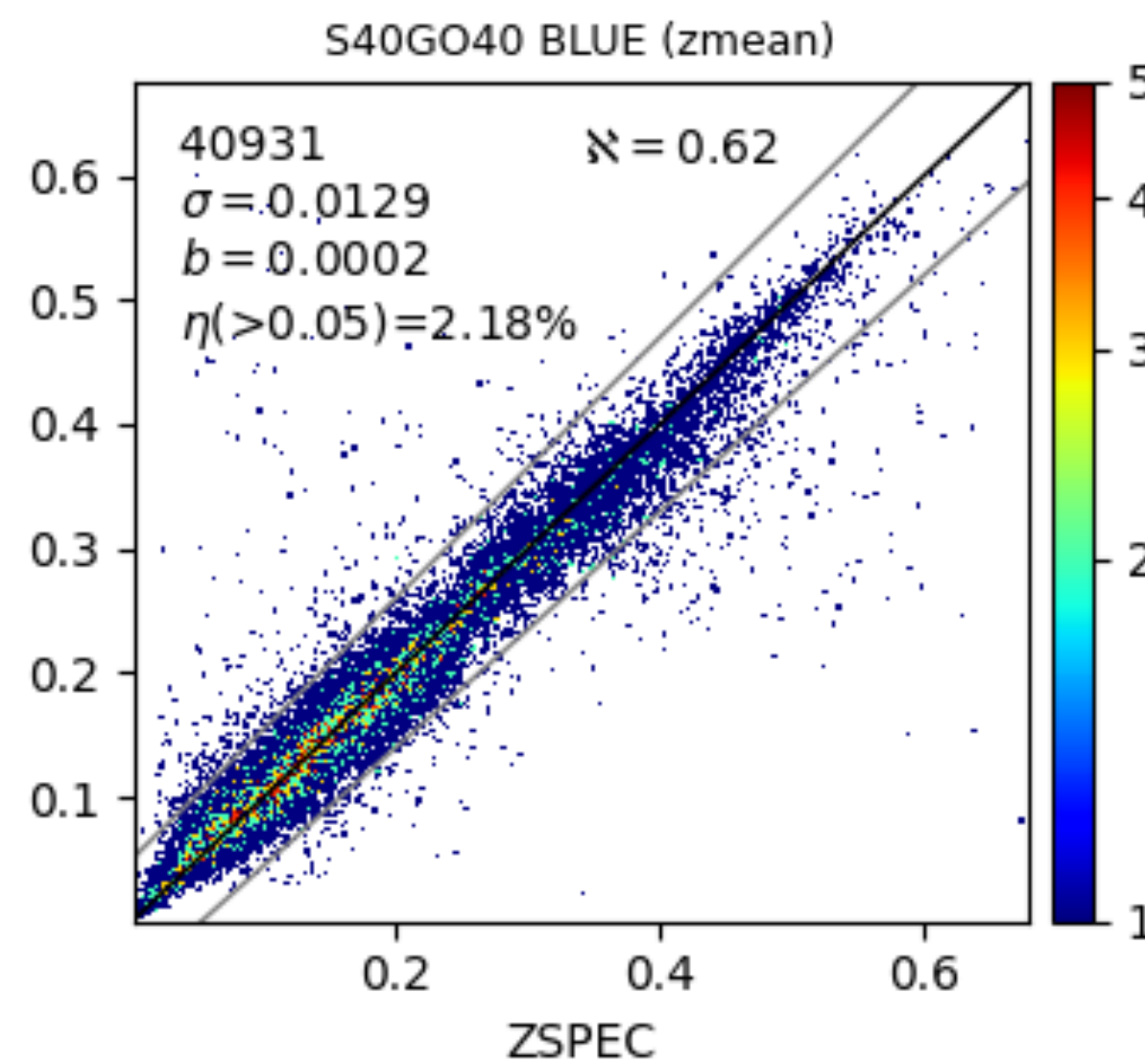


SDSS + GAMA + BOSS combo

ZCNN

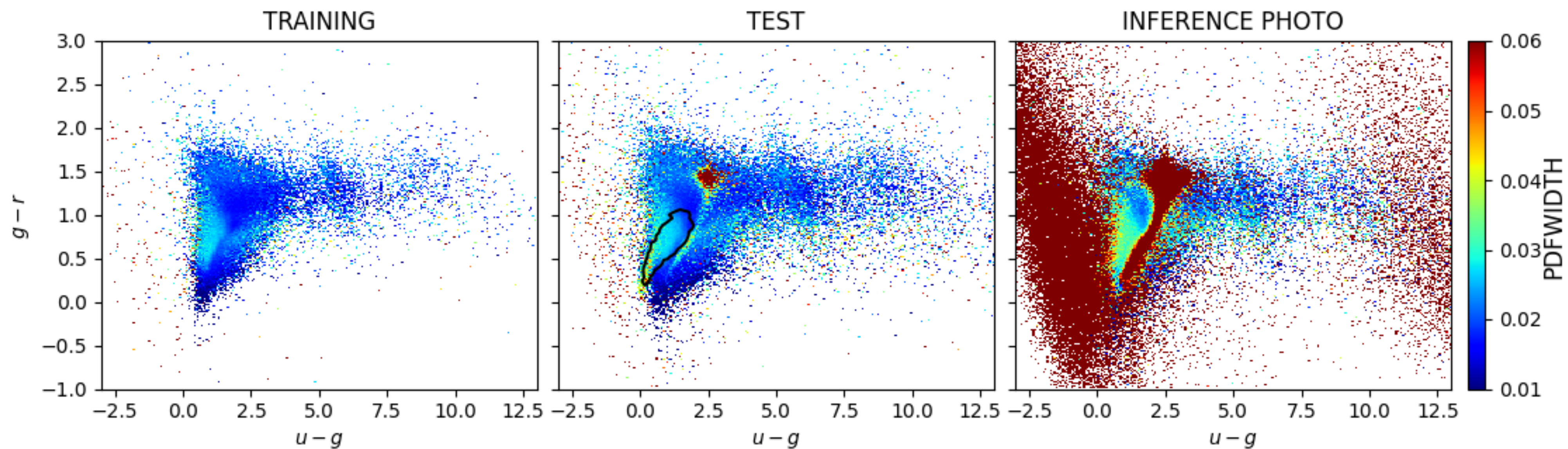


ZCNN

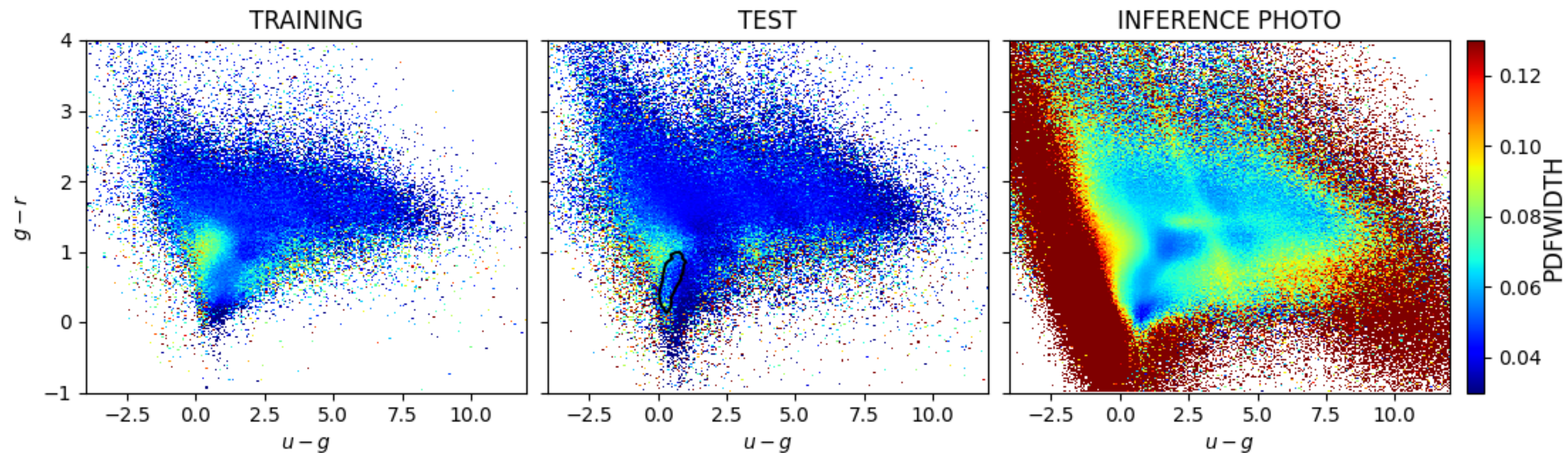


SDSS PHOTOMETRIC CATALOG

$r < 17.8$



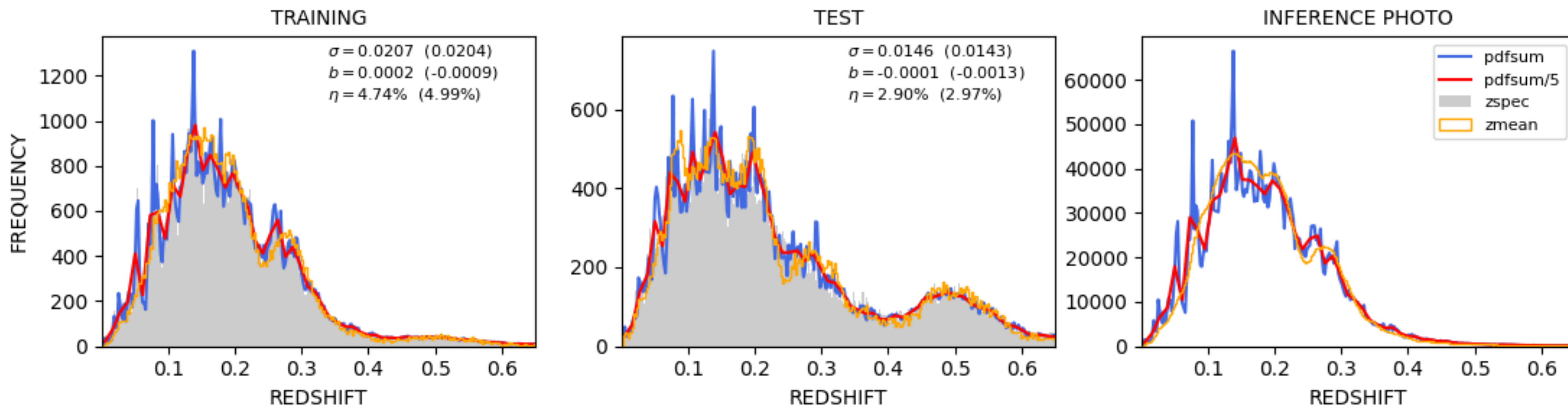
$17.8 < r < 20$



N(z) PREDICTIONS $17.8 < r < 20$

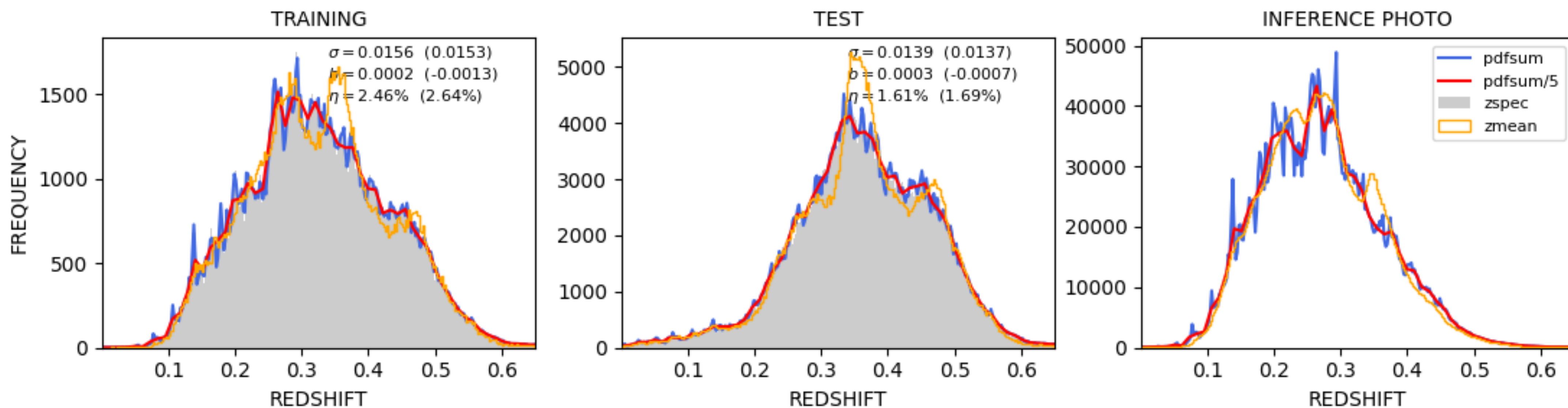
BLUE

$17.8 < r < 20$, PDFW < 0.08, BLUE



$17.8 < r < 20$, PDFW < 0.08, RED

RED



High redshifts ($z < 6$)

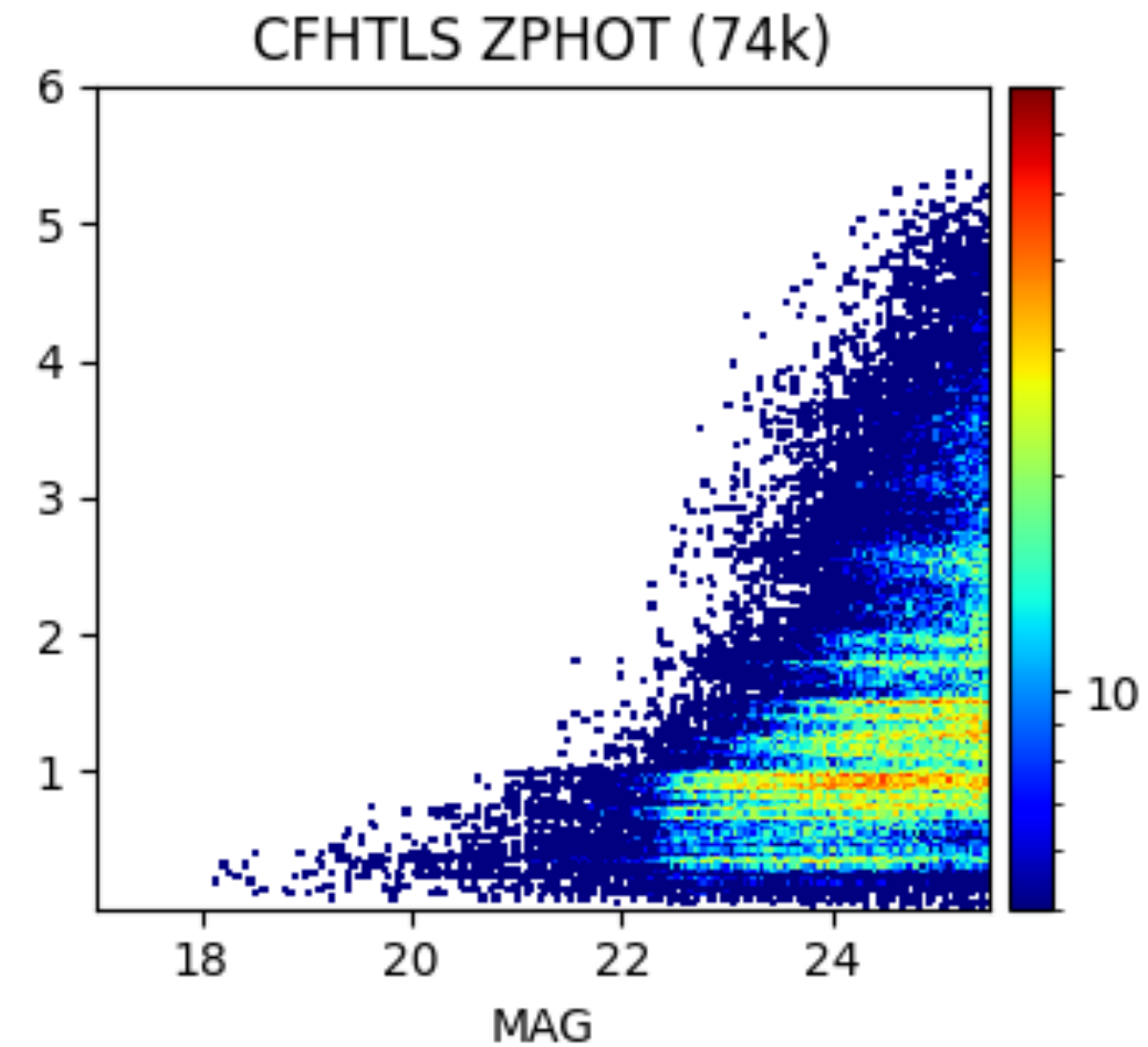
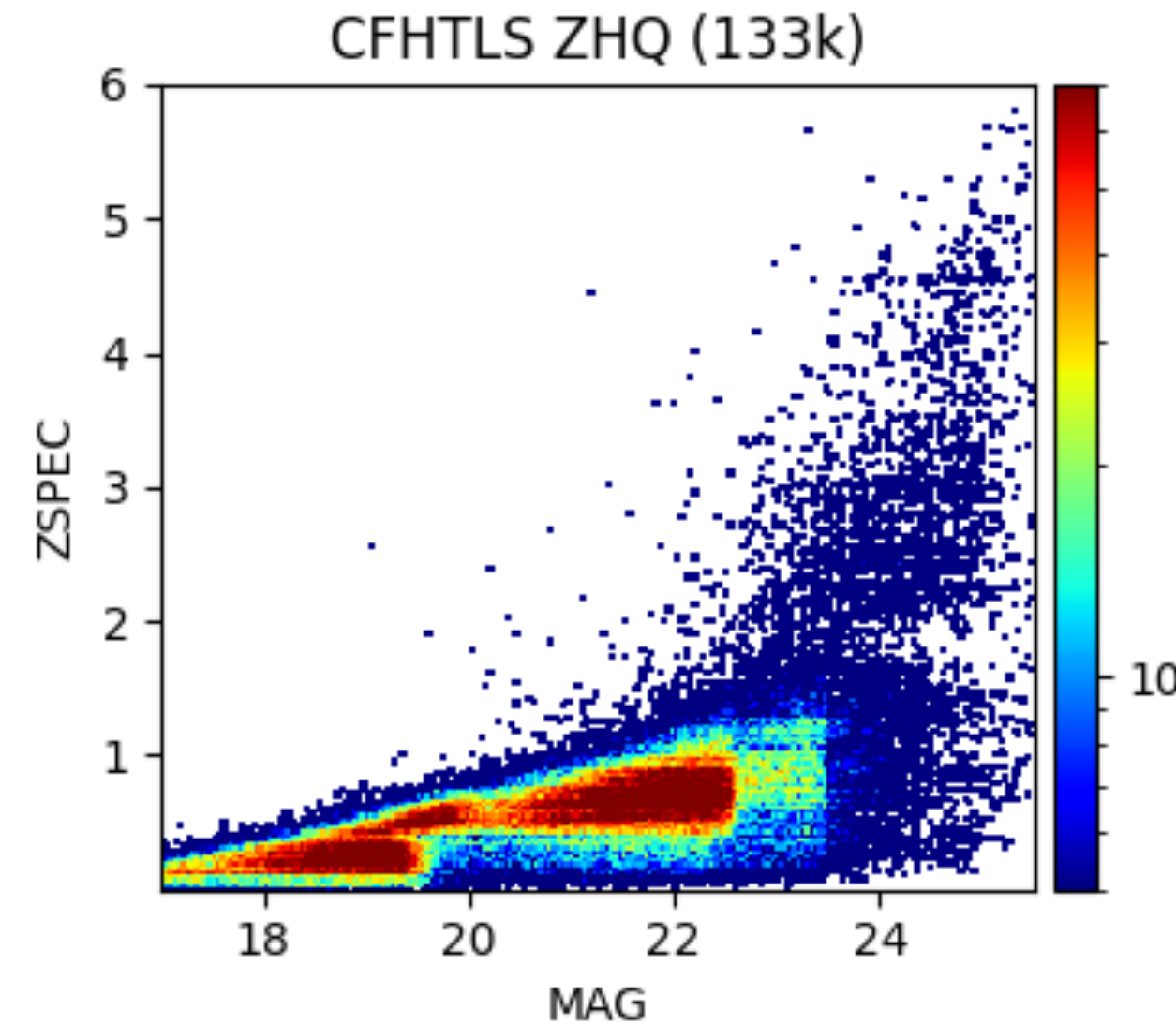
High quality zspec

High quality zphot

COSMOS2020:
30 bands photo-z
U + HSC+IB+
Ultra-VISTA+IRAC

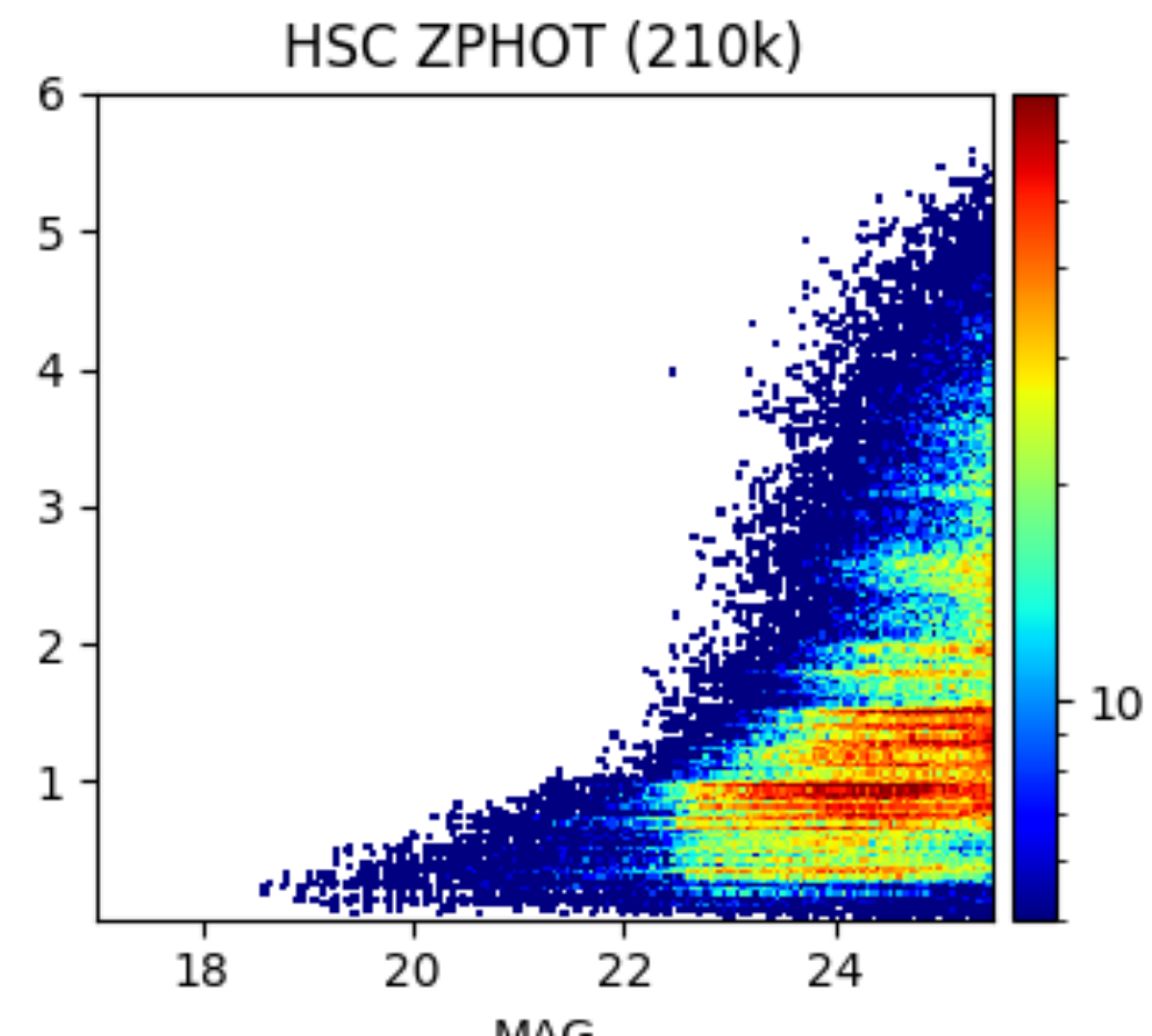
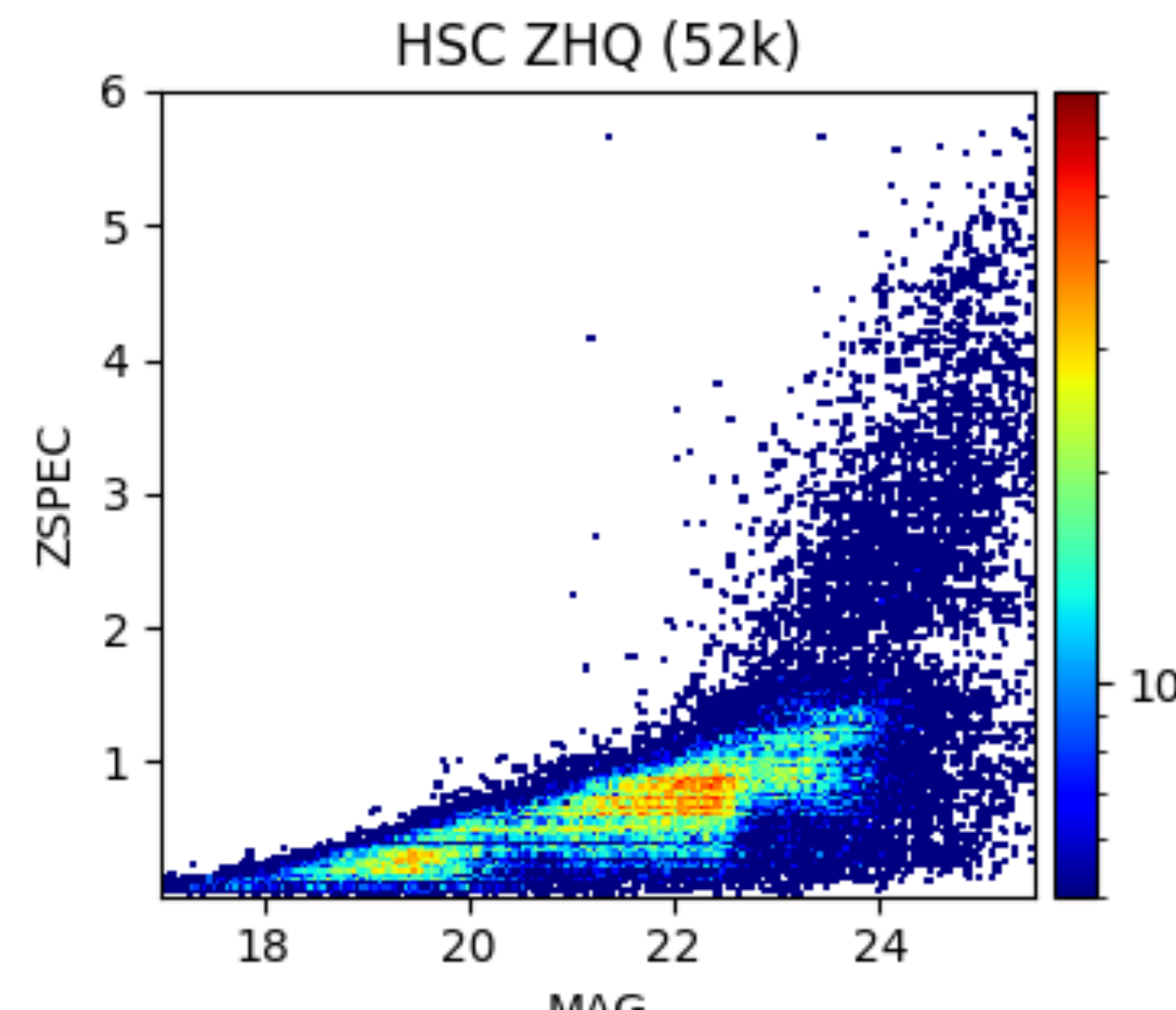
**CFHTLS
WIDE+DEEP**

ugriz $i < 25.5$



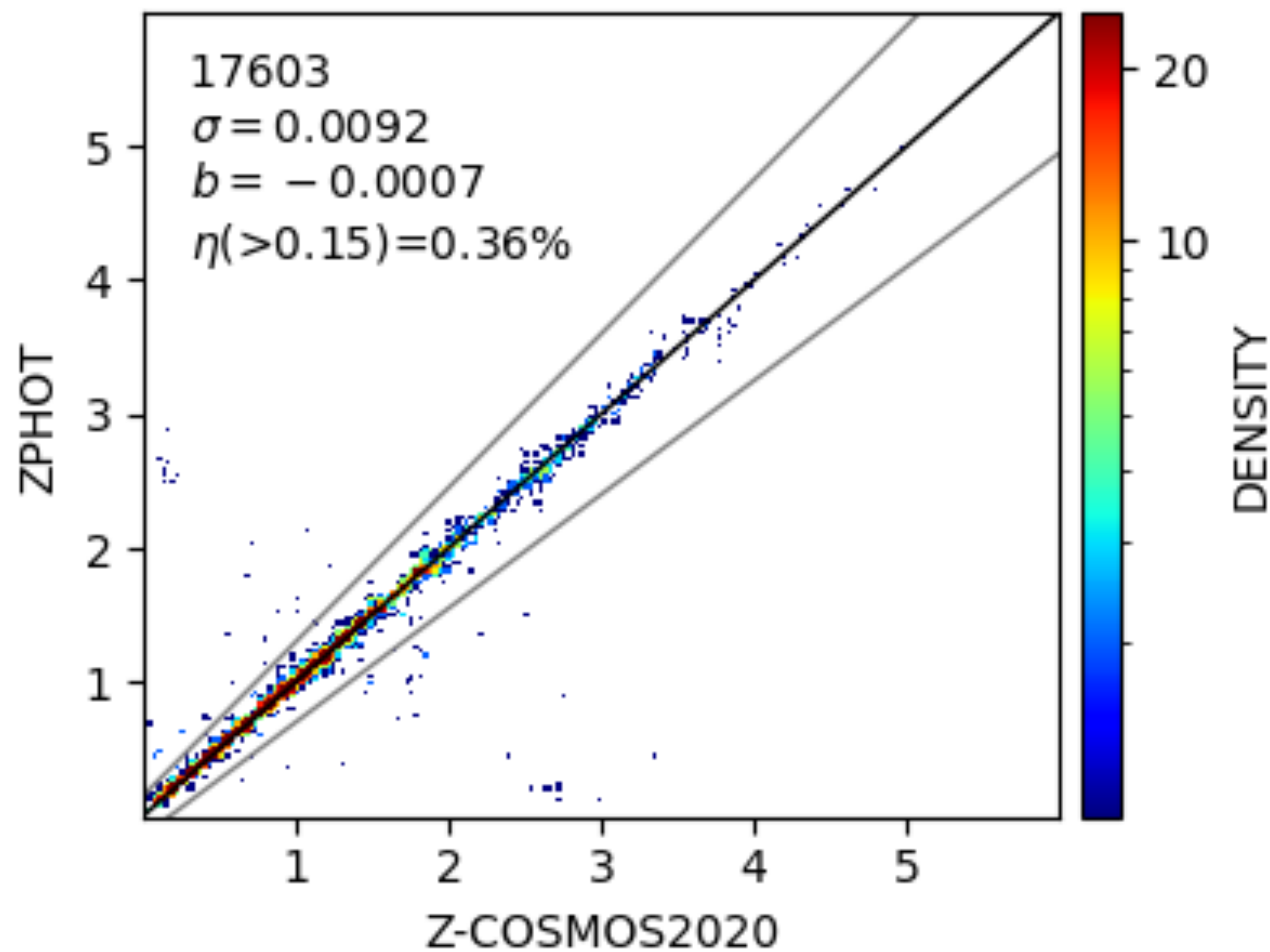
HSC-CLAUDS

ugrizy $i < 26.5$

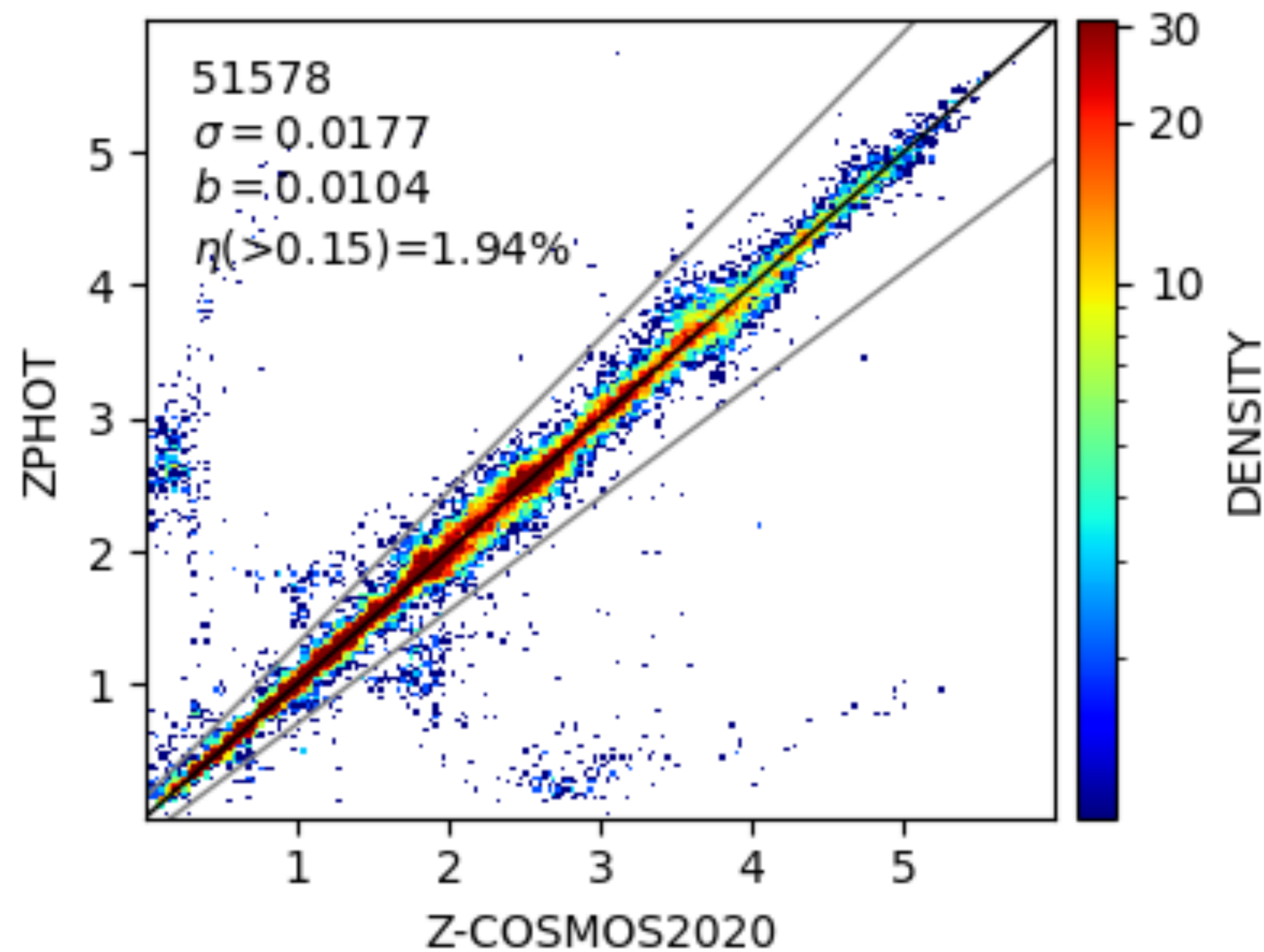


ZCNN (6 bands) vs SED fitting (30 bands) HSC-CLAUDS

$19 < i < 24$



$24 < i < 26$



Performance summary

