SDSS data for low-z

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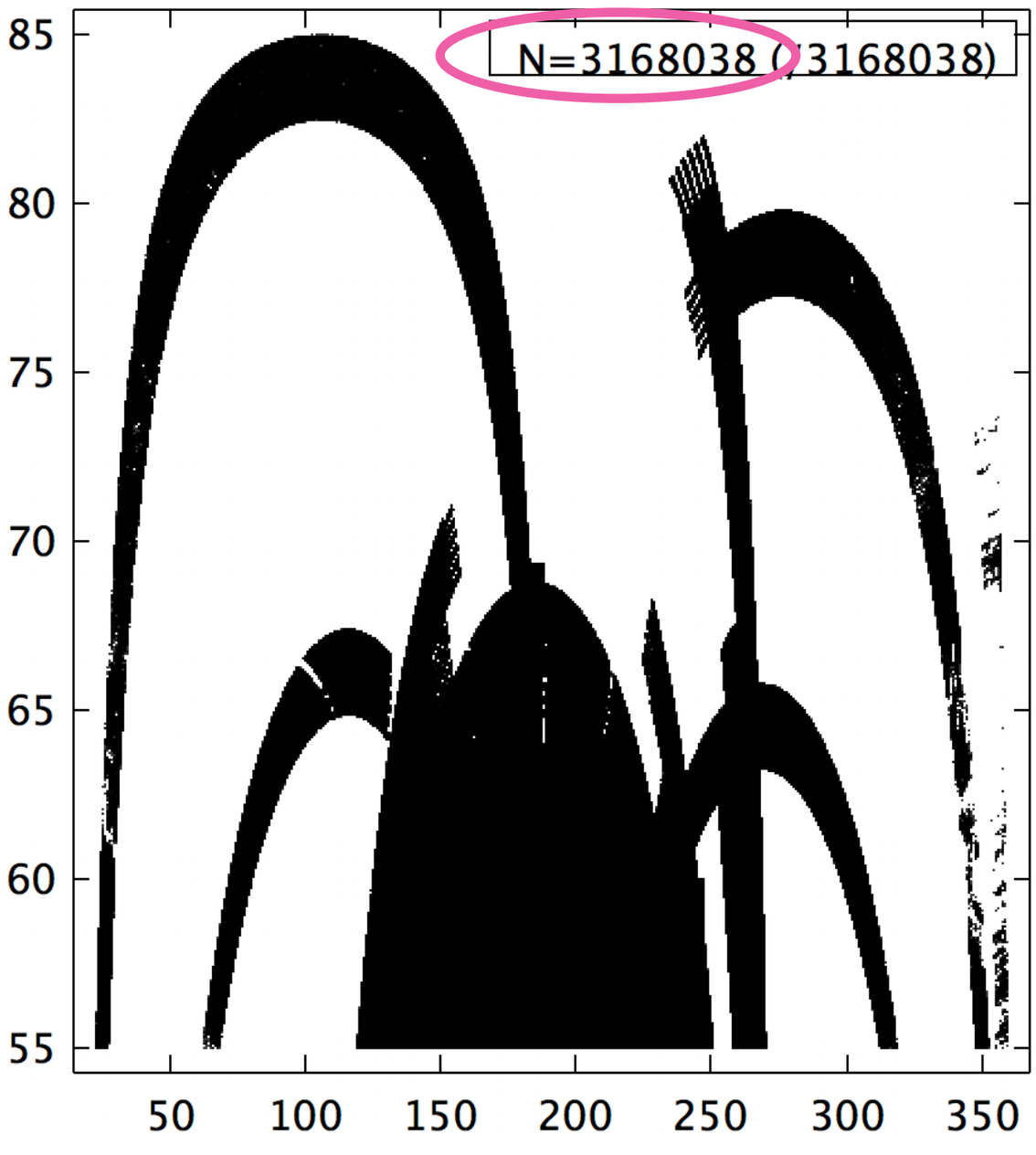
- Checking use / applicability of SDSS data for Tianlai NCP / and other latitude low z surveys forecast / and then analysis
- Data downloaded from SDSS data server, DR16
- Spectroscopic data (spectroscopic redshifts) : **PhotoObj** table joined to **SpecObj** table
- Photometric data with photo-z (photometric redshifts) : **Photoz** table
- All objects (galaxies) with $\delta > 55$ deg
- sky coverage (ra-dec distribution), redshift and magnitude distribution

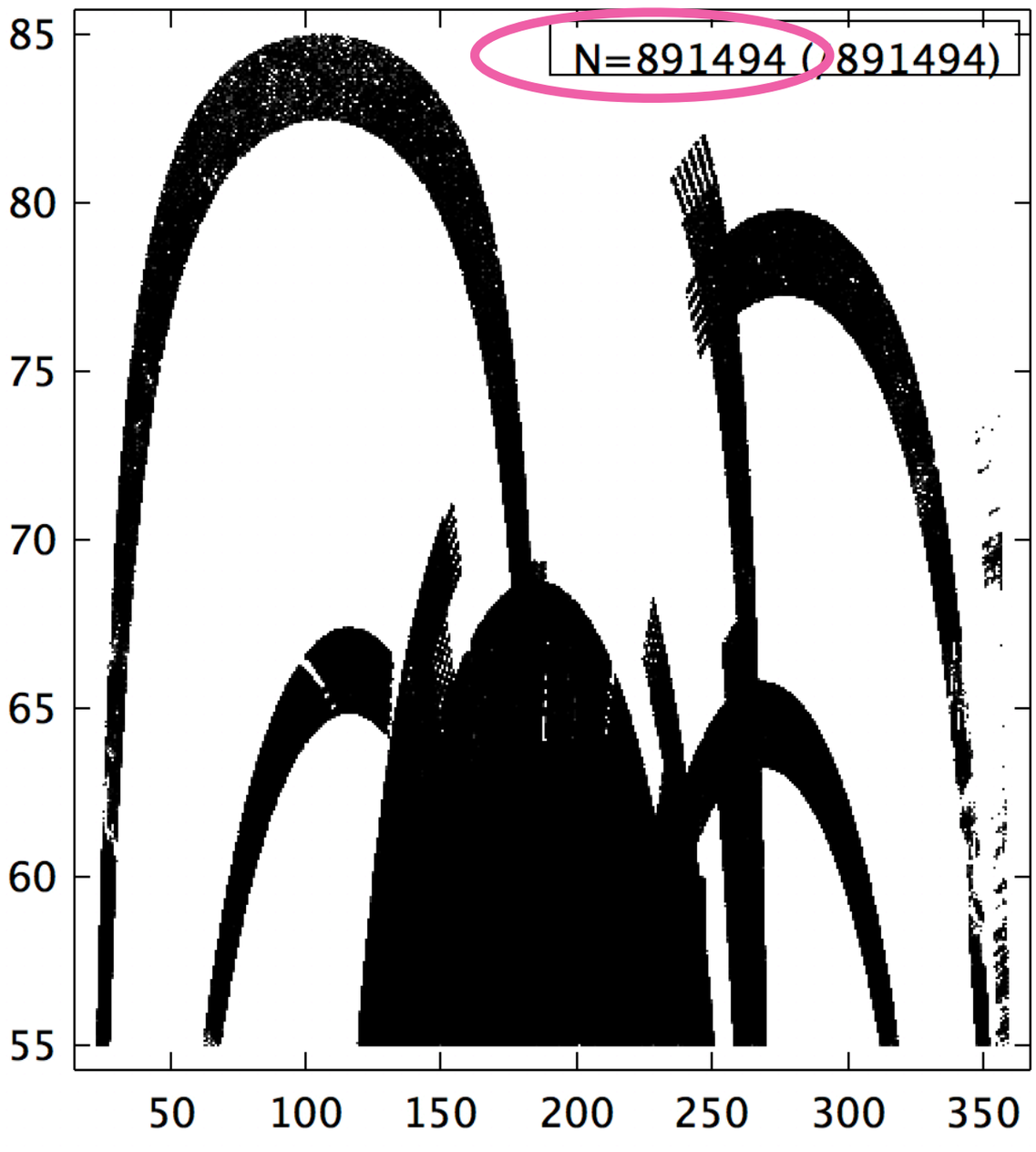
http://skyserver.sdss.org/dr16/

SDSS DR16 **photometric** high latitude coverage

~ all redshifts (z-phot<2)

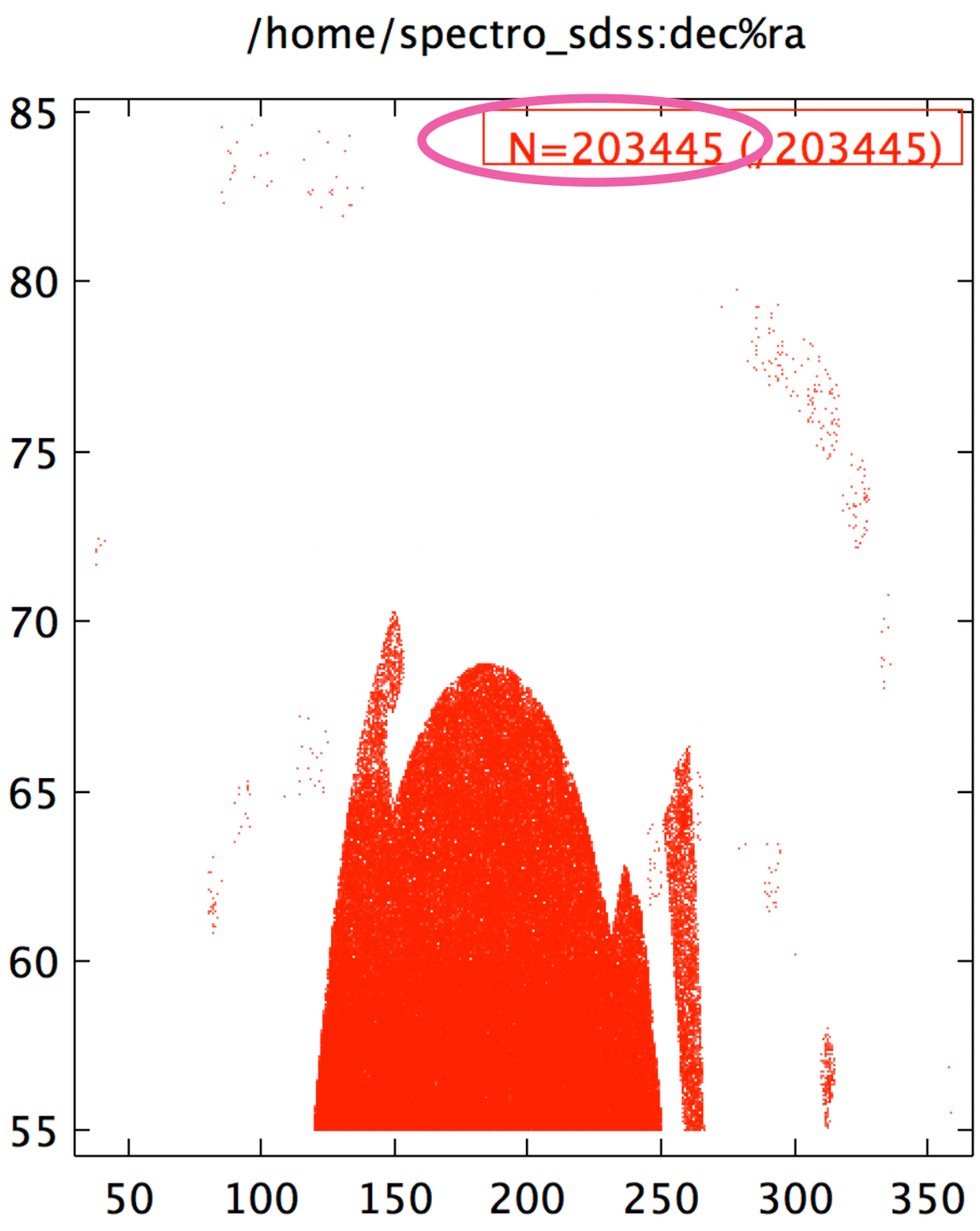


~ low redshifts (z-phot<0.25)

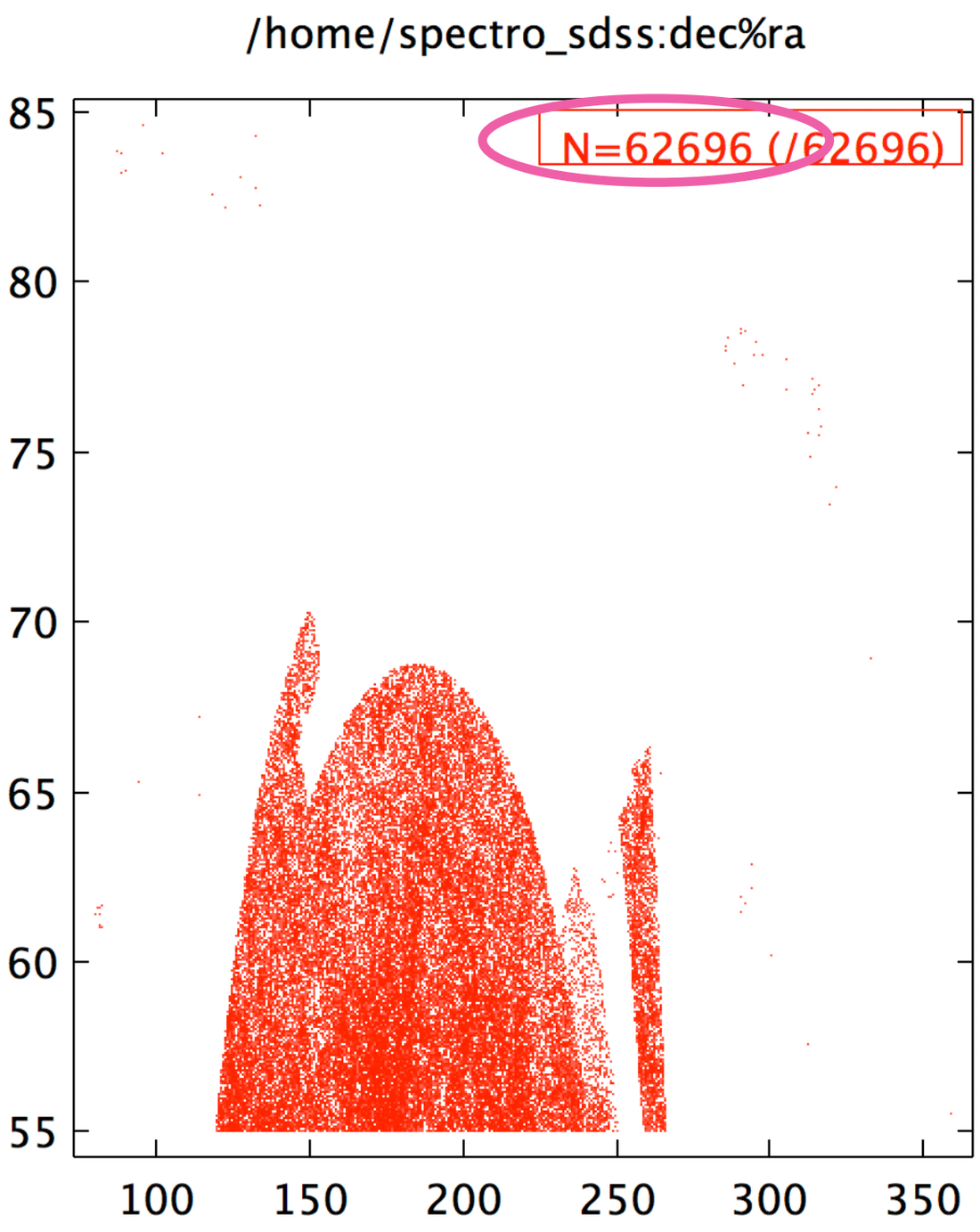


SDSS DR16 **spectroscopic** high latitude coverage

~ all redshifts (z-phot<2)



~ low redshifts (z-phot<0.25)



LSS in SDSS DR16 **spectroscopic** and **photo-z** catalogs

ra-z(redshift) plane - objects with 55 v< δ < 62

(cut on zErr<0.03)

Spectro

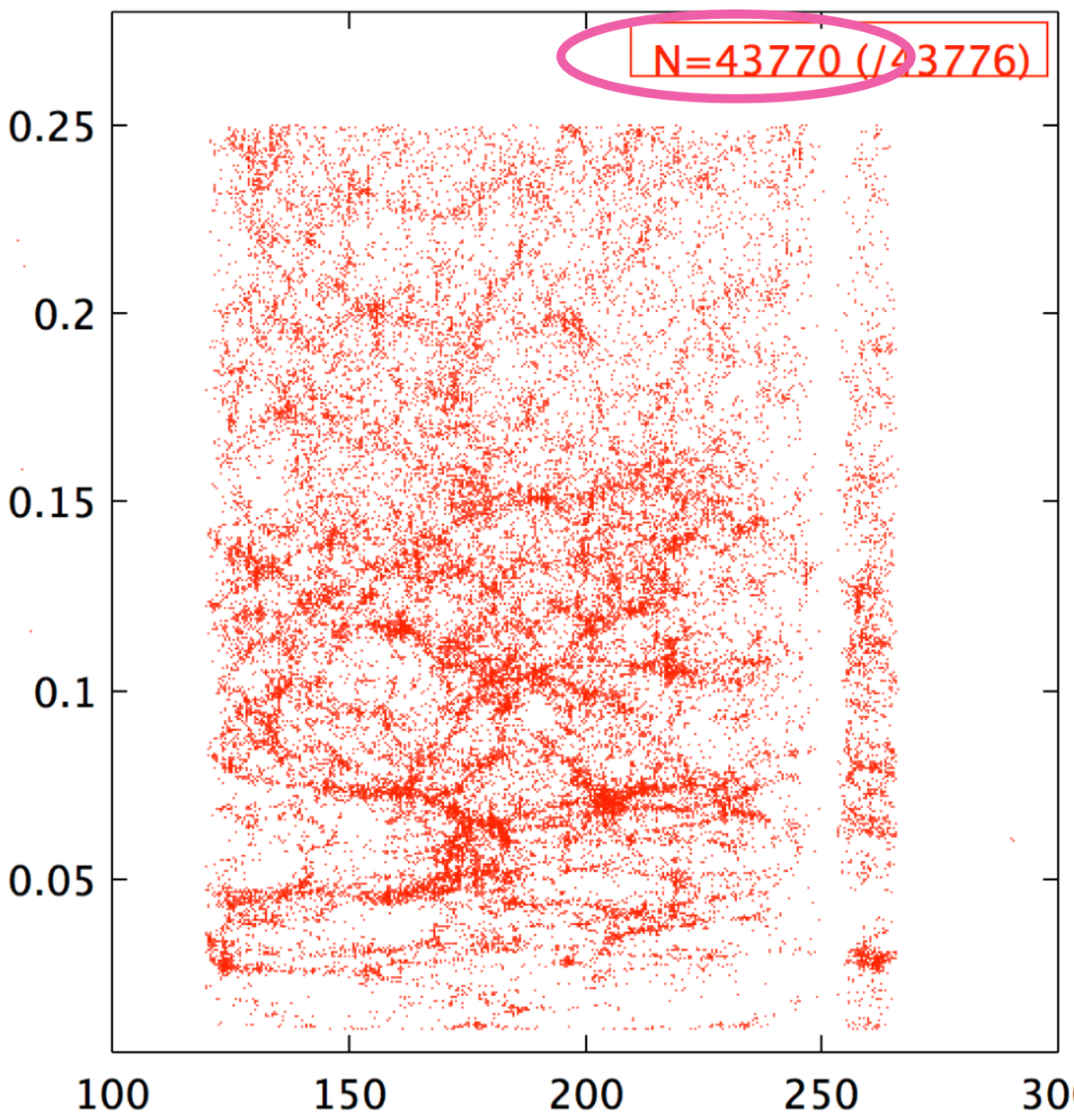
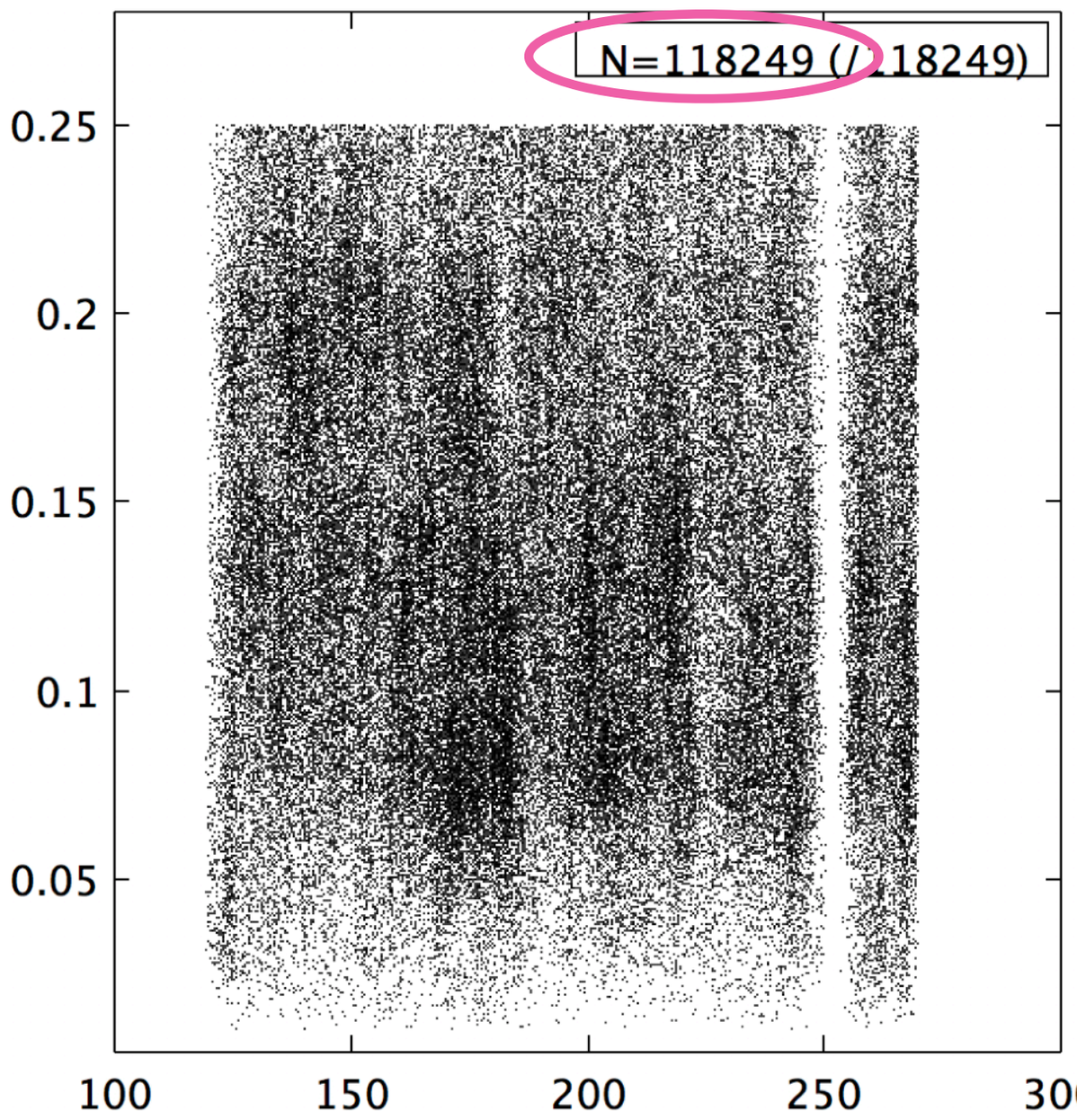


photo-z



Magnitude-redshift distribution in SDSS DR16

spectroscopic and **photo-z** catalogs

g_mag-z(redshift) plane - objects with 55 v< δ < 62 and z<0.25

(cut on zErr<0.03)

Spectro

/home/spectro_sdss:z%magG

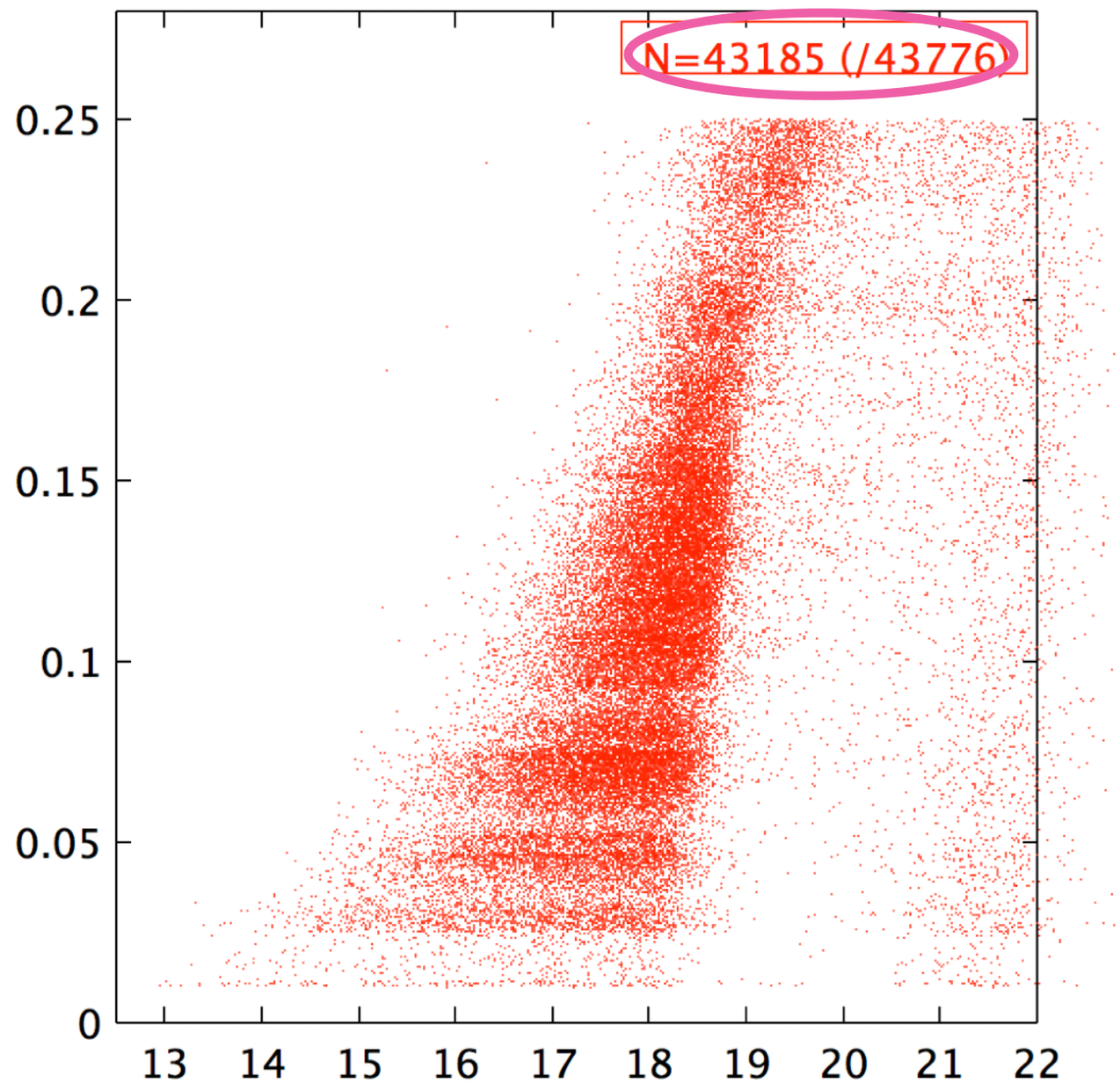
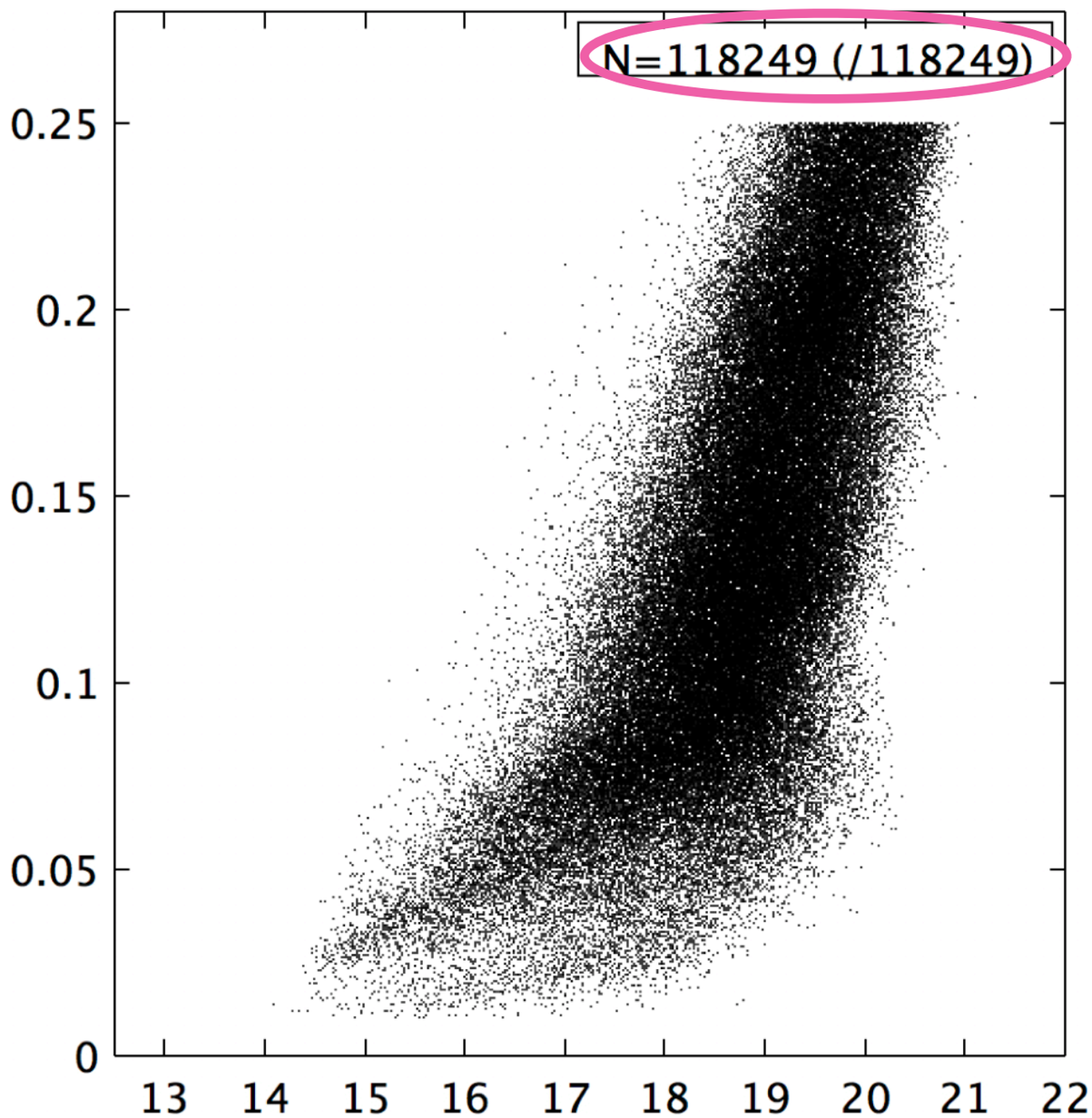


photo-z

/home/pz_sdss:z%magG



Redshift distribution in SDSS DR16 **spectroscopic** and **photo-z** catalogs

z(redshift) distribution - objects with 55 v< δ < 62

(cut on zErr<0.03)

Spectro

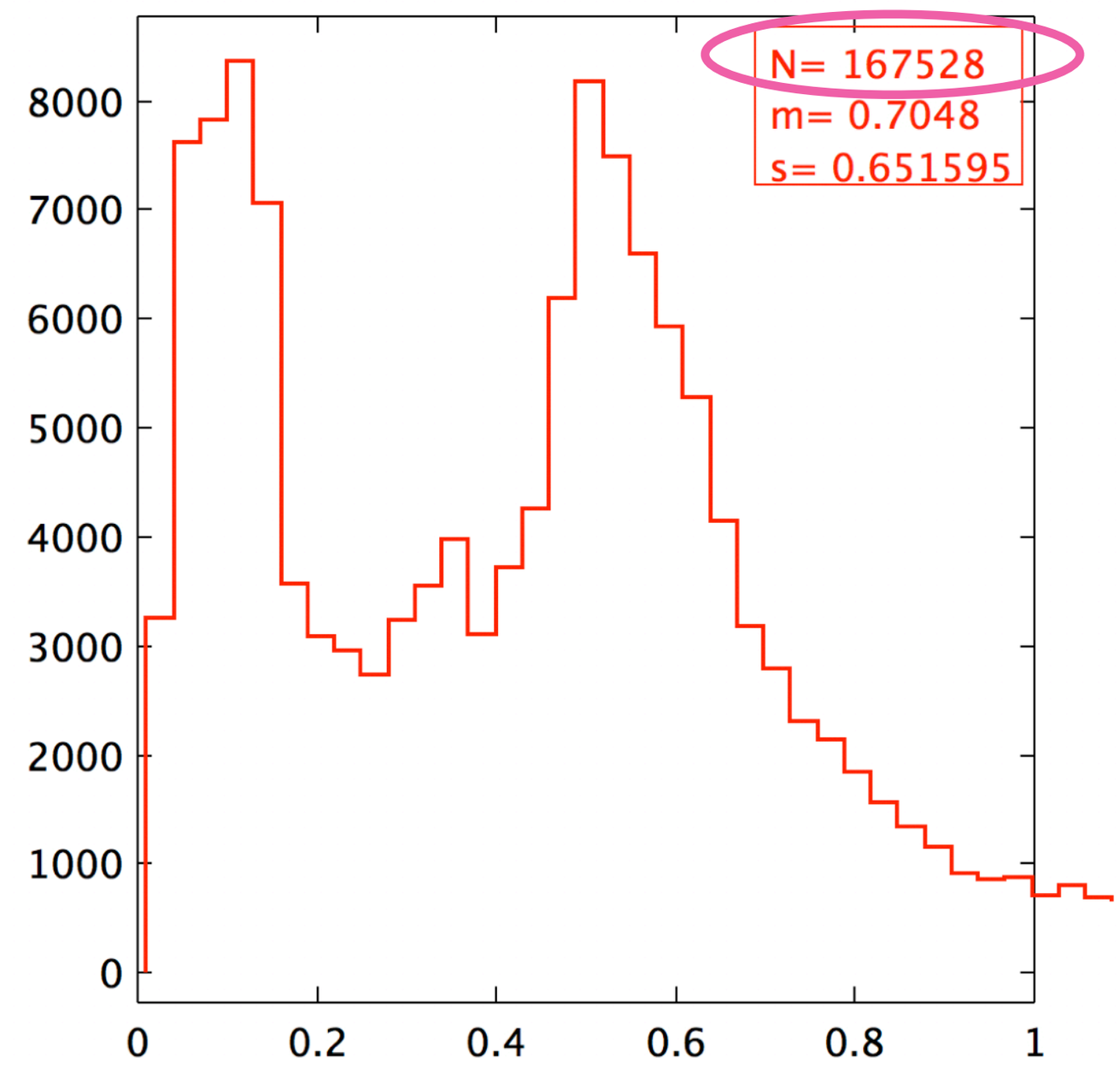
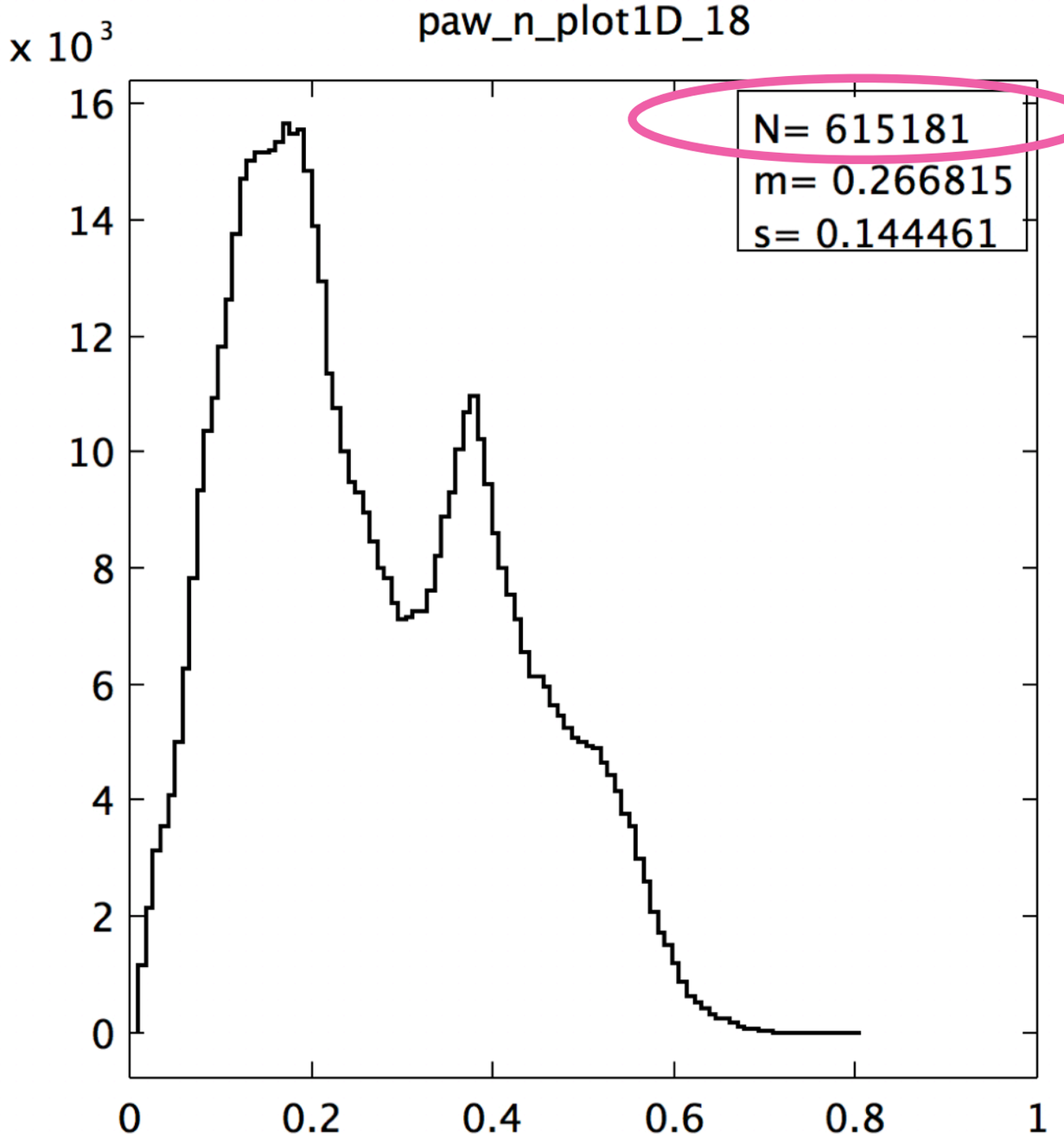


photo-z



Magnitude distribution in SDSS DR16 **spectroscopic** and **photo-z** catalogs

g-band magnitude distribution - objects with 55 v< δ < 62

(cut on zErr<0.03)

Spectro

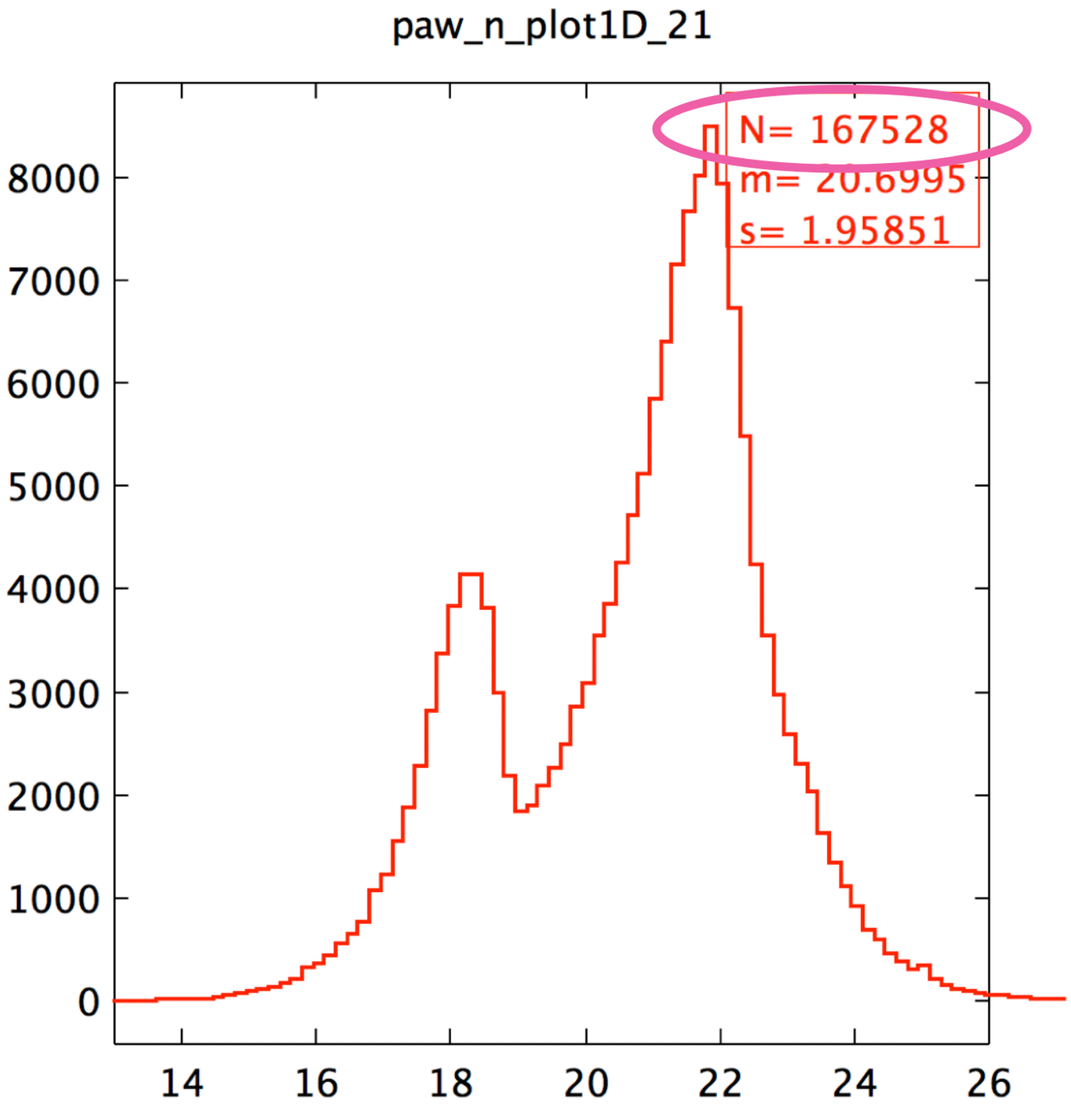
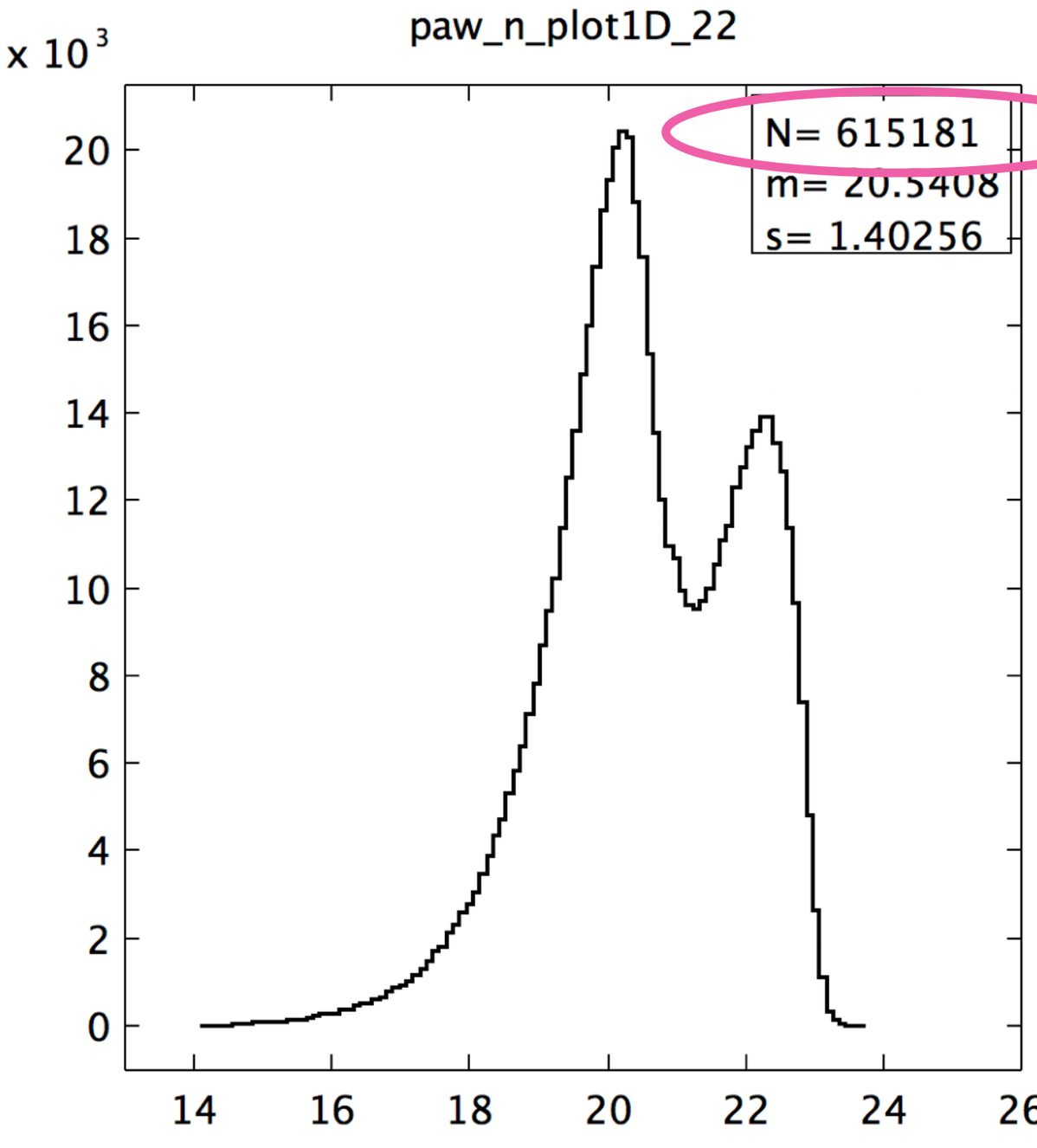


photo-z

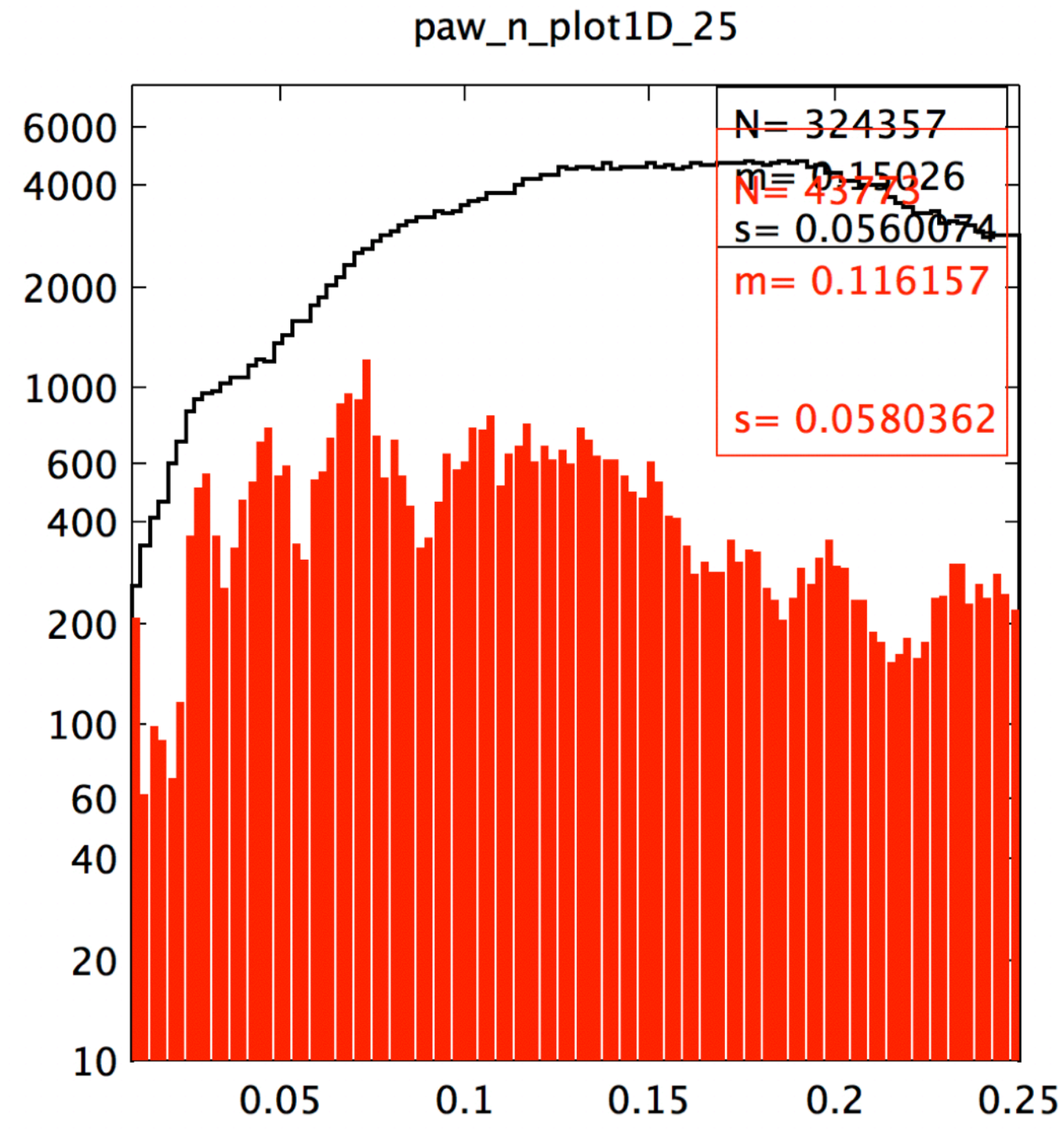


Comparison of magnitude, redshift distributions in SDSS DR16 **spectroscopic** and **photo-z** catalogs

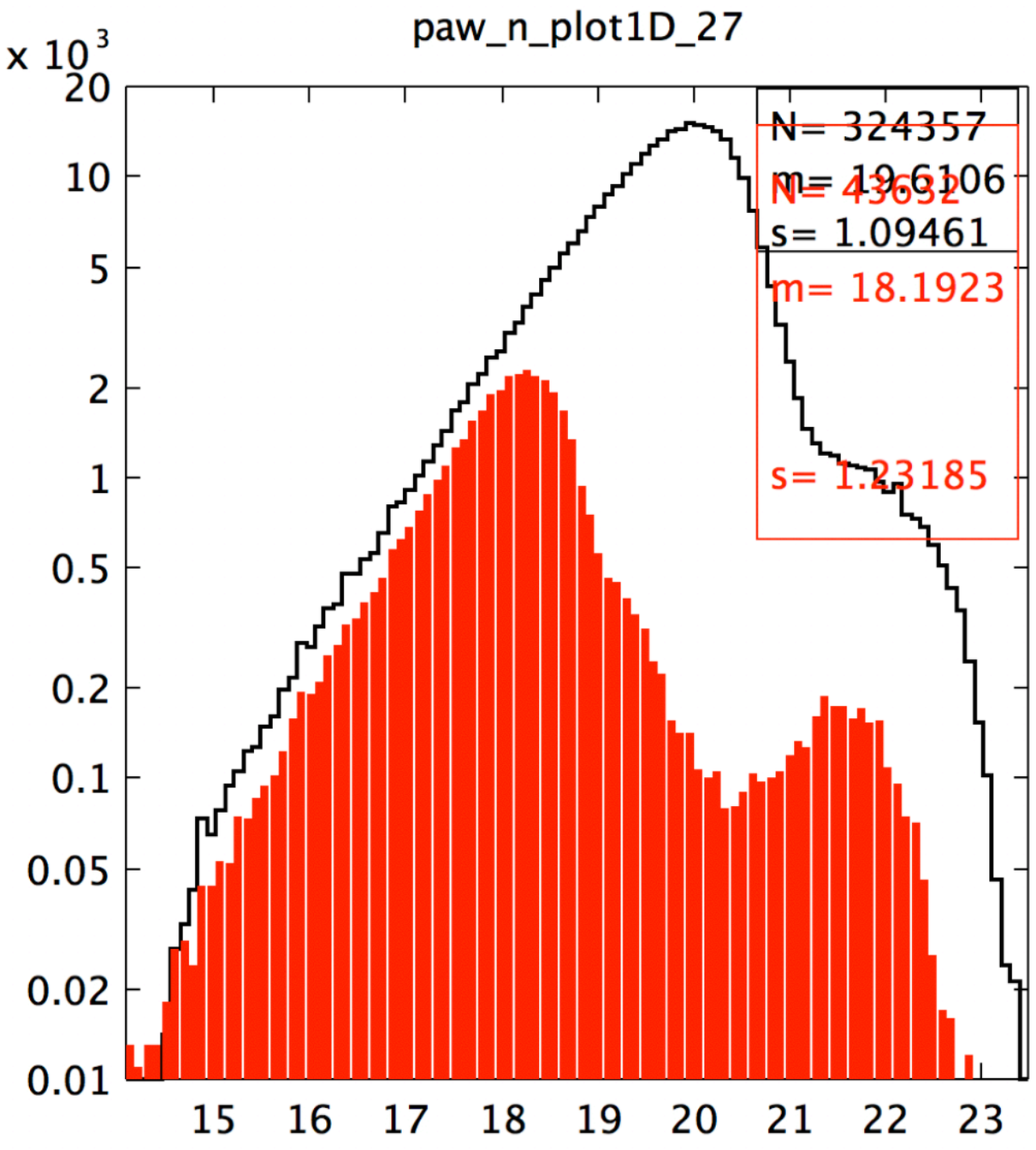
g-band magnitude distribution - objects with 55 v< δ < 62 , z<0.25

(cut on zErr<0.03)

redshift



magnitude



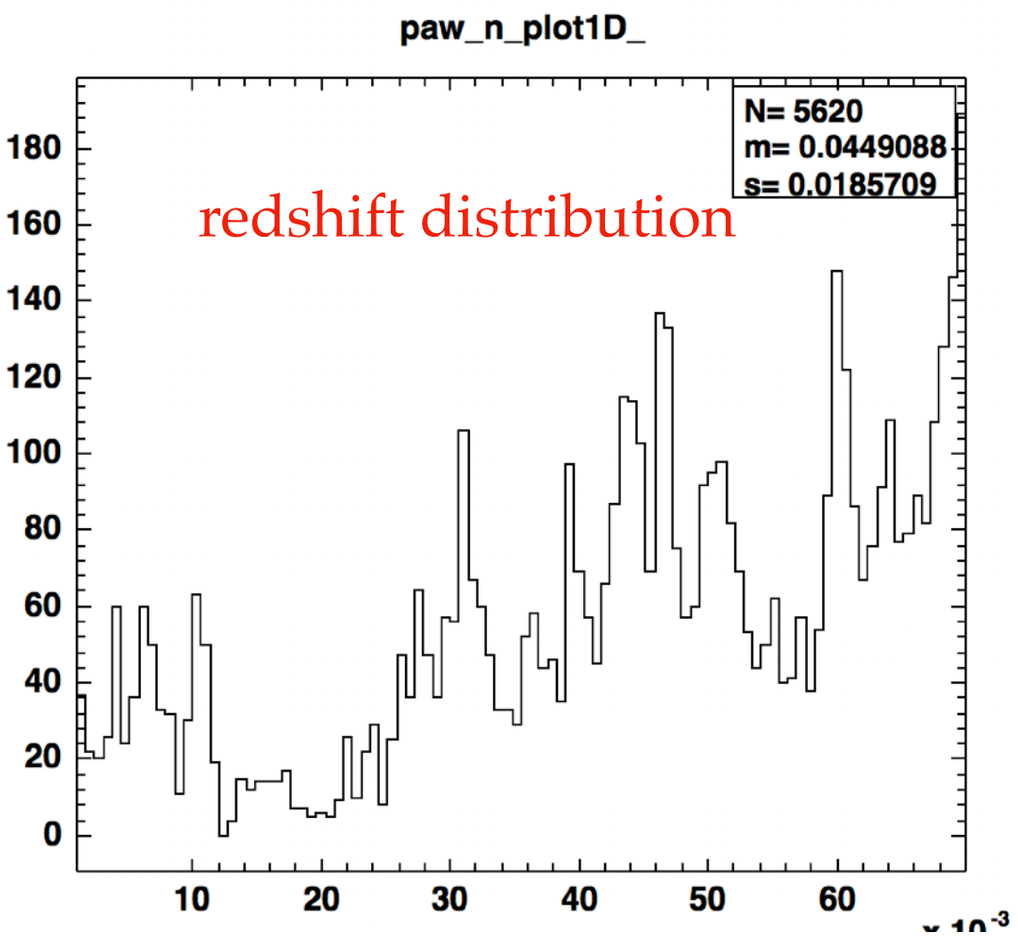
Some questions

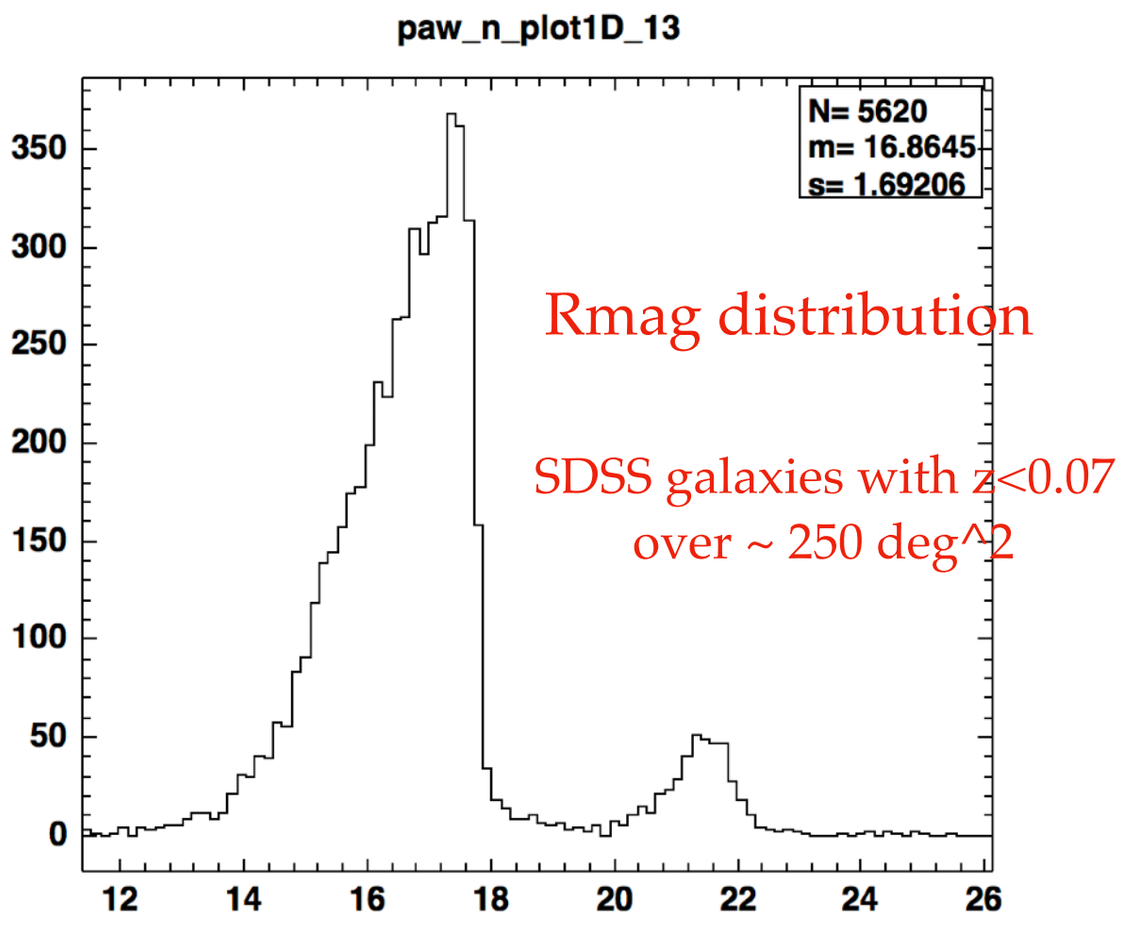
- some doubts about the robustness of the available photo-z's , can we have better ?
- very small set of spectroscopic redshifts at declinations above $\delta > 80$ deg
- Estimate the completness of the spectroscopic sample at low redshifts, assess what is missing (low magnitudes, and the corresponding HI distribution
- Start to do some simulation using the spectroscopic sample -
- Use the sample sample and put it around NCP ?

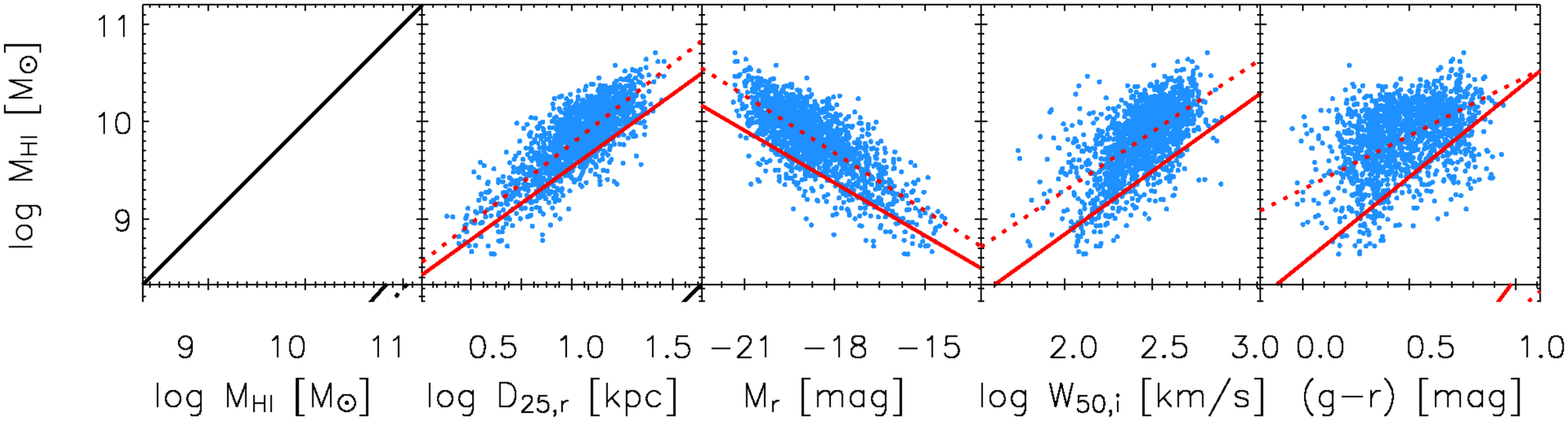
Preliminary cross-correlation sensitivity estimates

OpticX21 : preliminary estimates cross correlation sensitivity (Peter's questions for NSF proposal)

- Number of SDSS galaxies with spectroscopic redshifts with z < 0.07 , galaxy density
- Naive estimate of cross correlation (Ox21) coefficient bewteen SDSS spectroscopic galaxies and HI signal - for ~275 degree overlap, around dec 60 deg , or 12 degree, around NCP - Noise of 10 mK and 50 mK for dec 60 deg, 1 mK and 10 mK for NCP
- SDSS galaxies with z-spectro, 130<ra<230 57<dec<62 and 0.001<z<0.07 (zErr<0.002)
- Area = 130 x 5 x cos(59) = 257 deg^2 , about 5600 galaxies => **~ 22 galaxies / deg^2**
- **SDSS galaxies with z-spectro, 130<ra<230 57<dec<62 and 0.001<z<0.07 (zErr<0.002)**
- Naive estimates using 1deg^2 x 2 MHz pixels (50 pixels along frequency / redshift , **12500** pixels for dec=60 deg survey (5 degree wide) , or **600** pixels (12 deg^2) around NCP
- magR = 17.5 at z=0.05 , D_L = 230 Mpc -> ~ 10^10 Msol HI , ~ 5 mK signal (3 mK +/- 0.75 in the naive Ox21 computation
- HI signal correlated with galaxy count - Galaxies generated with Poisson distribution in each pixel with mean ~ 0.5 galaxy / pixel (slightly optimistic - instead of 0.44 for 22 galaxies / deg^2 , spread over 50 pixels in frequency)



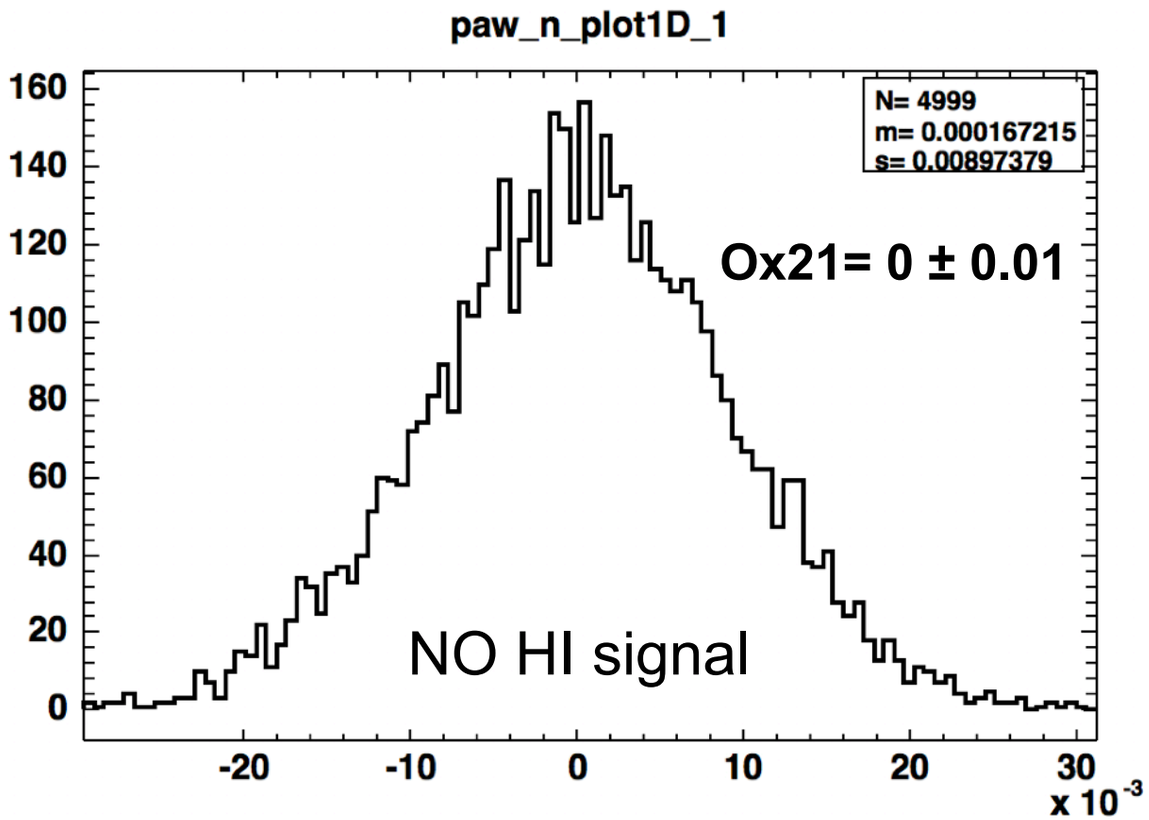


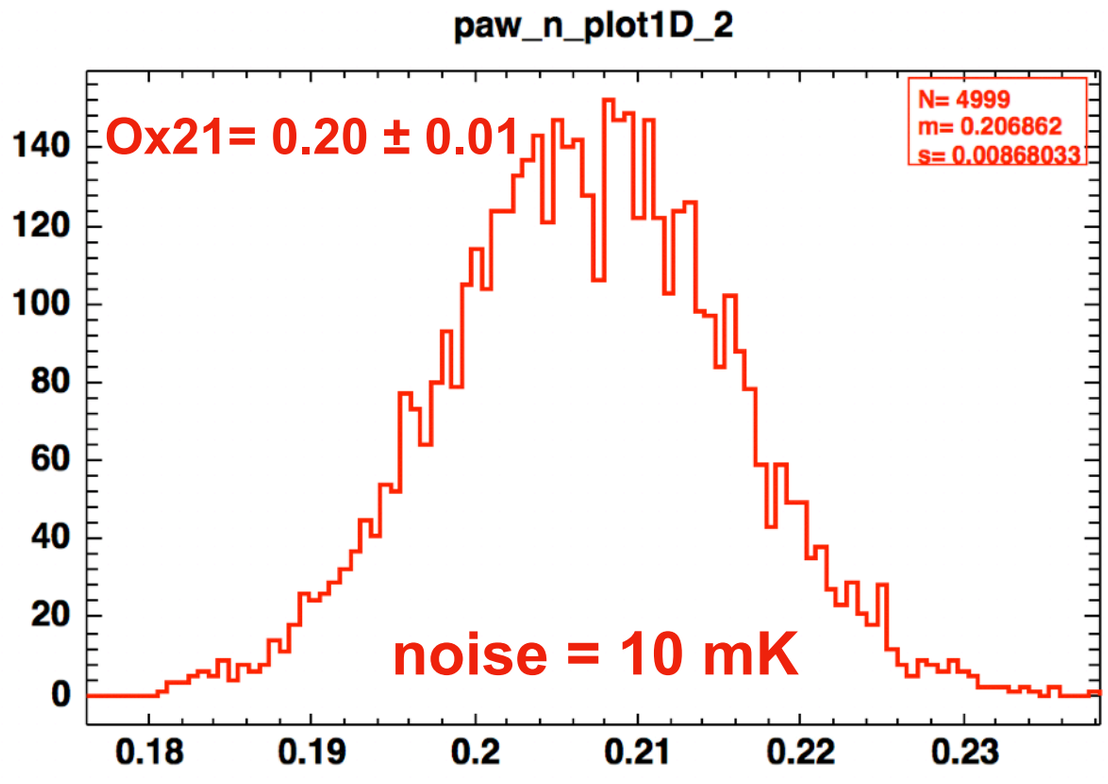


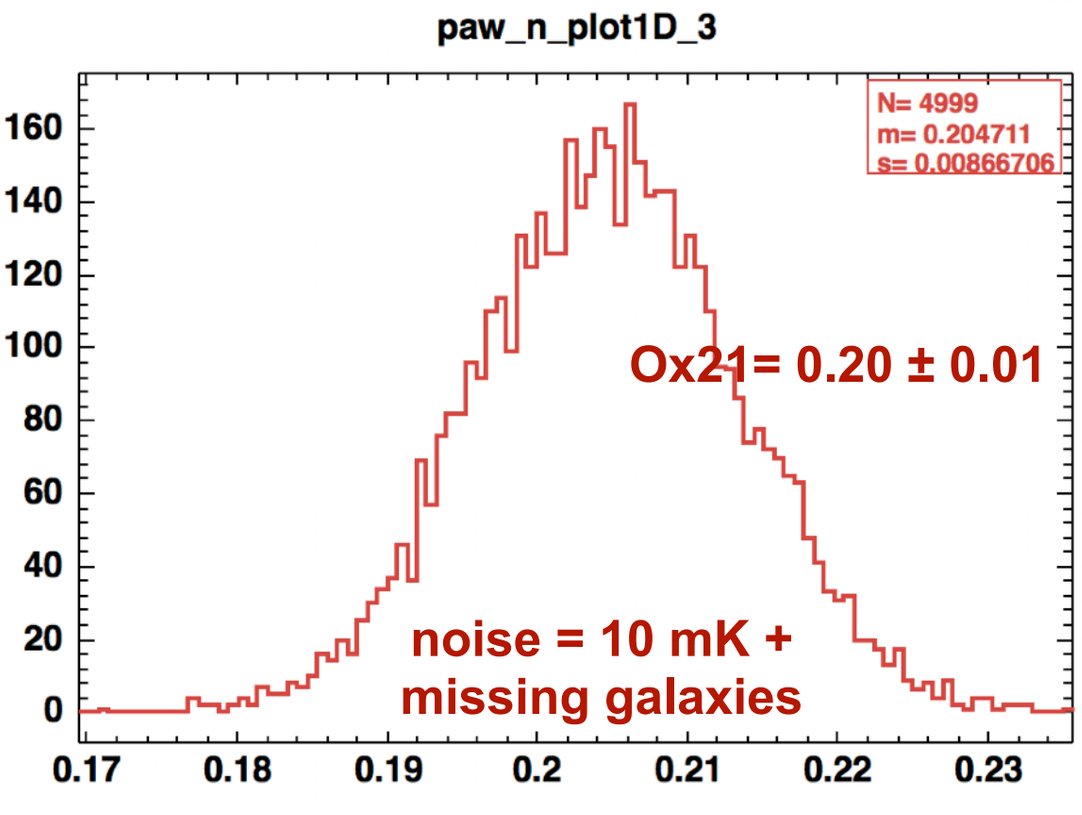
NEED an updated reference on this HI-mass - magnitude relation

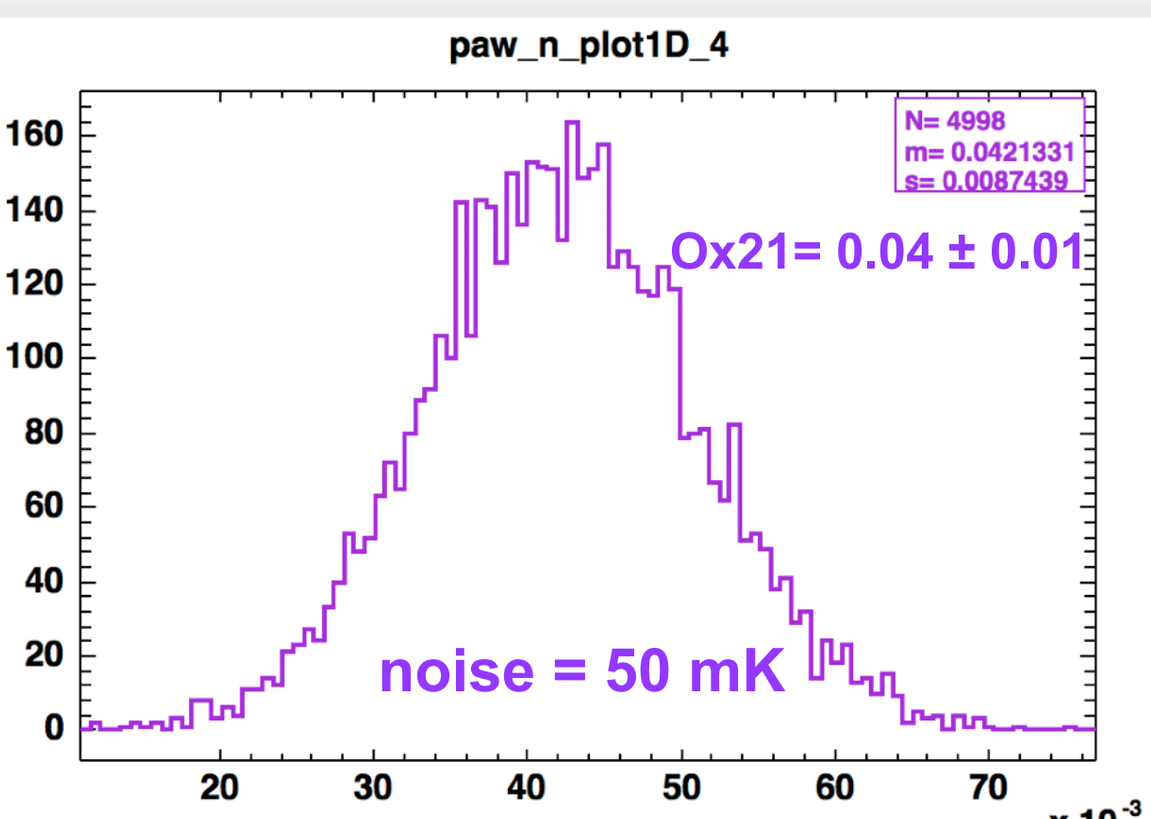
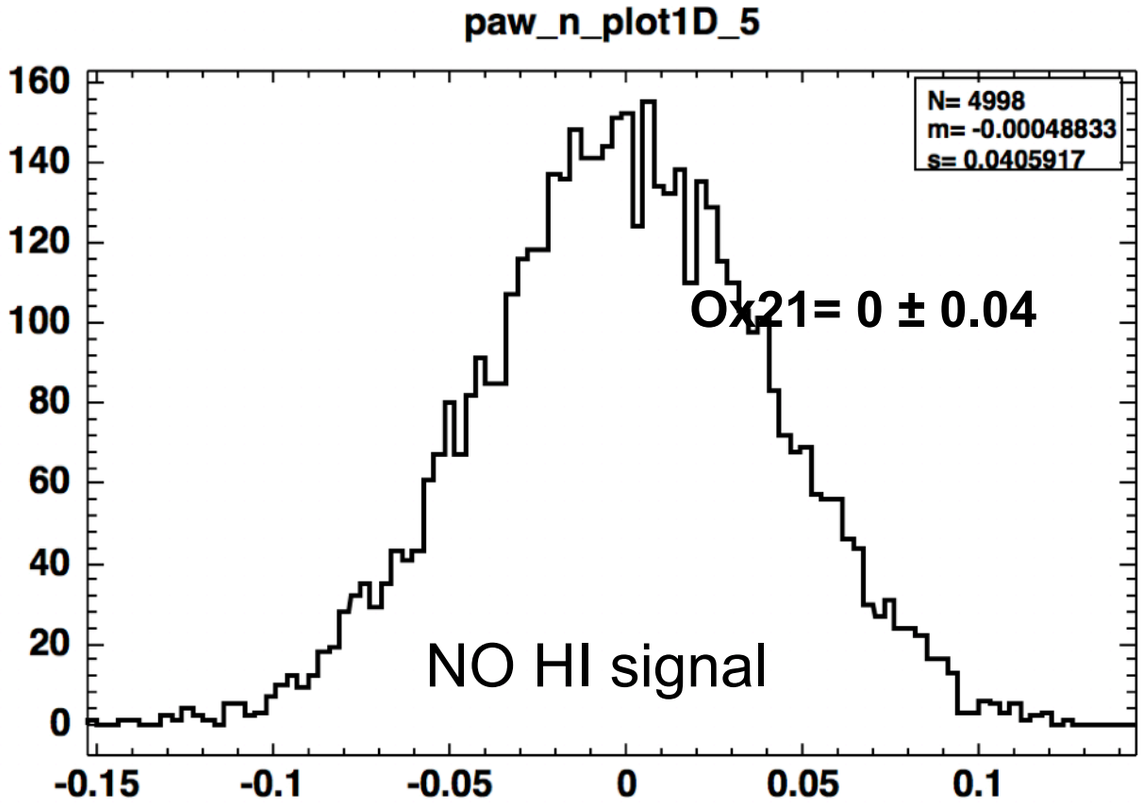
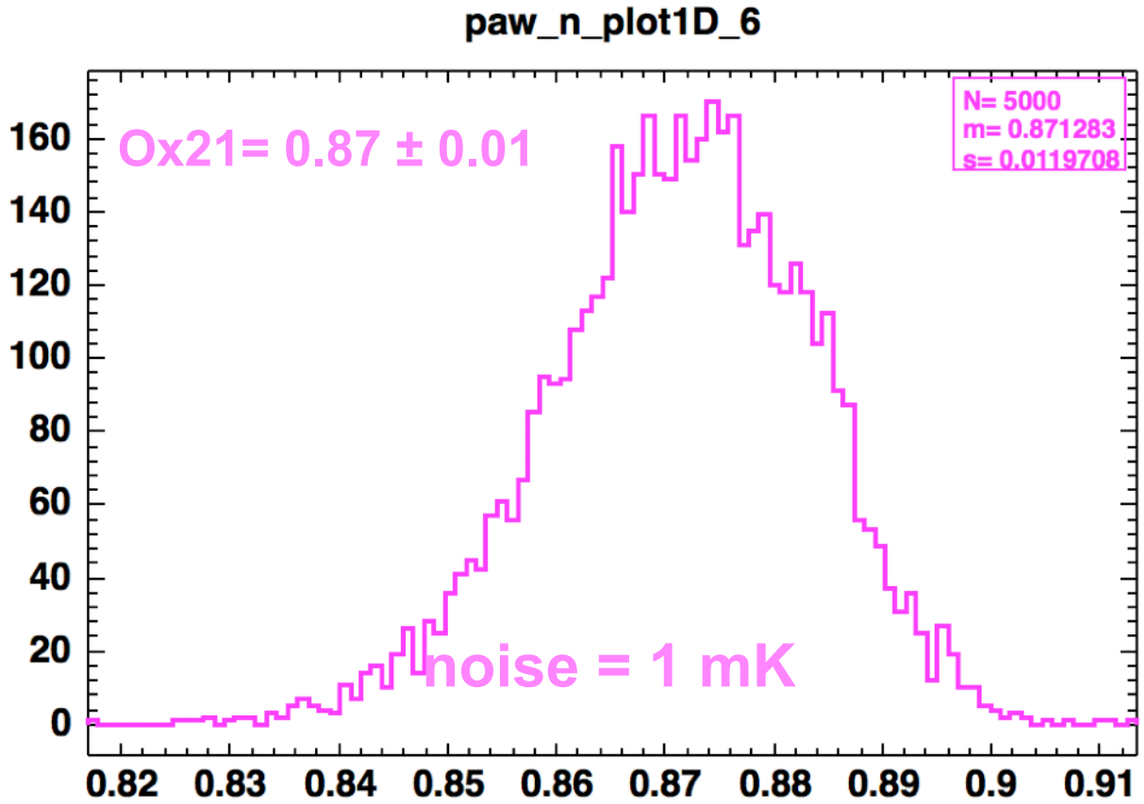
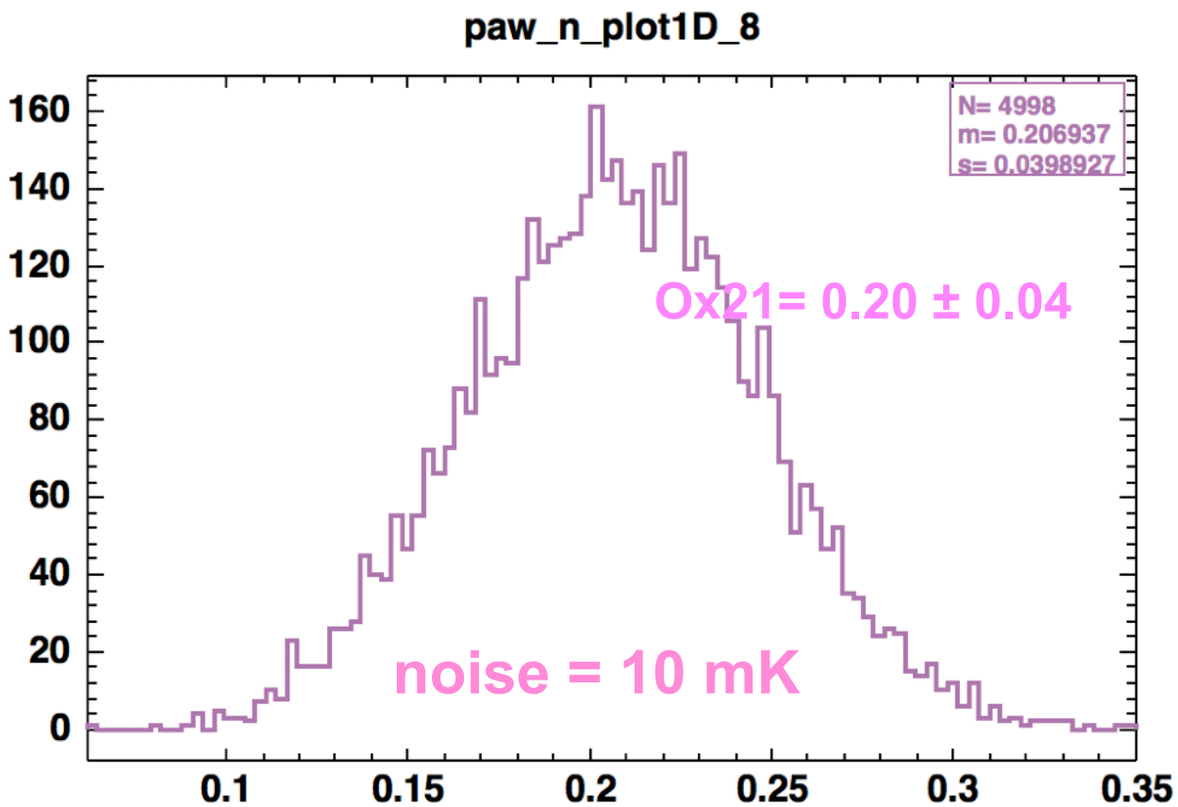
https://arxiv.org/pdf/1103.0990.pdf

Ox21 - cross correlation - 250 deg^2 (δ ~ 60 deg) - 12500 pixels









Ox21 - cross correlation signal - 12 deg^2 (NCP) : 600 pixels