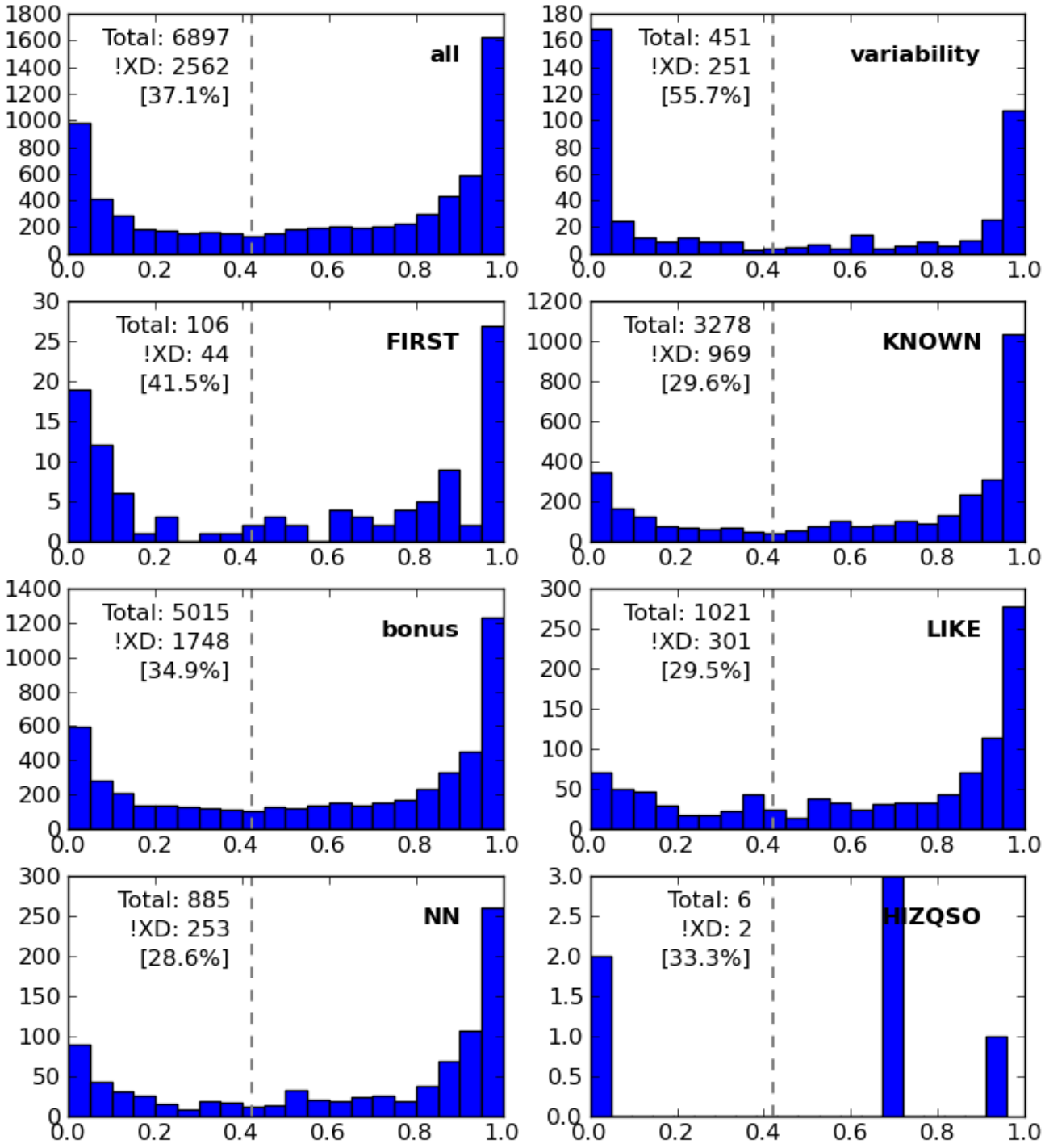
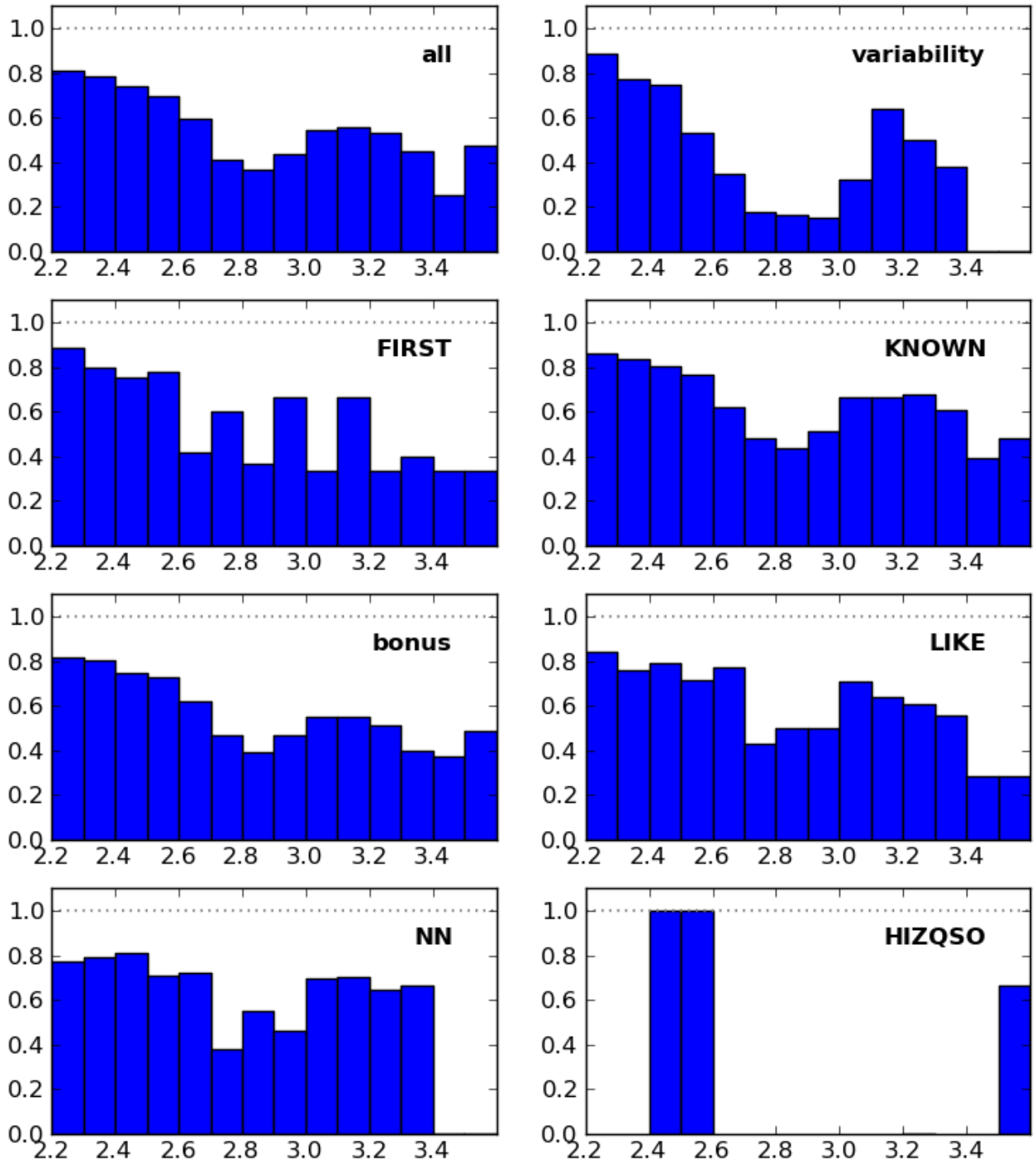
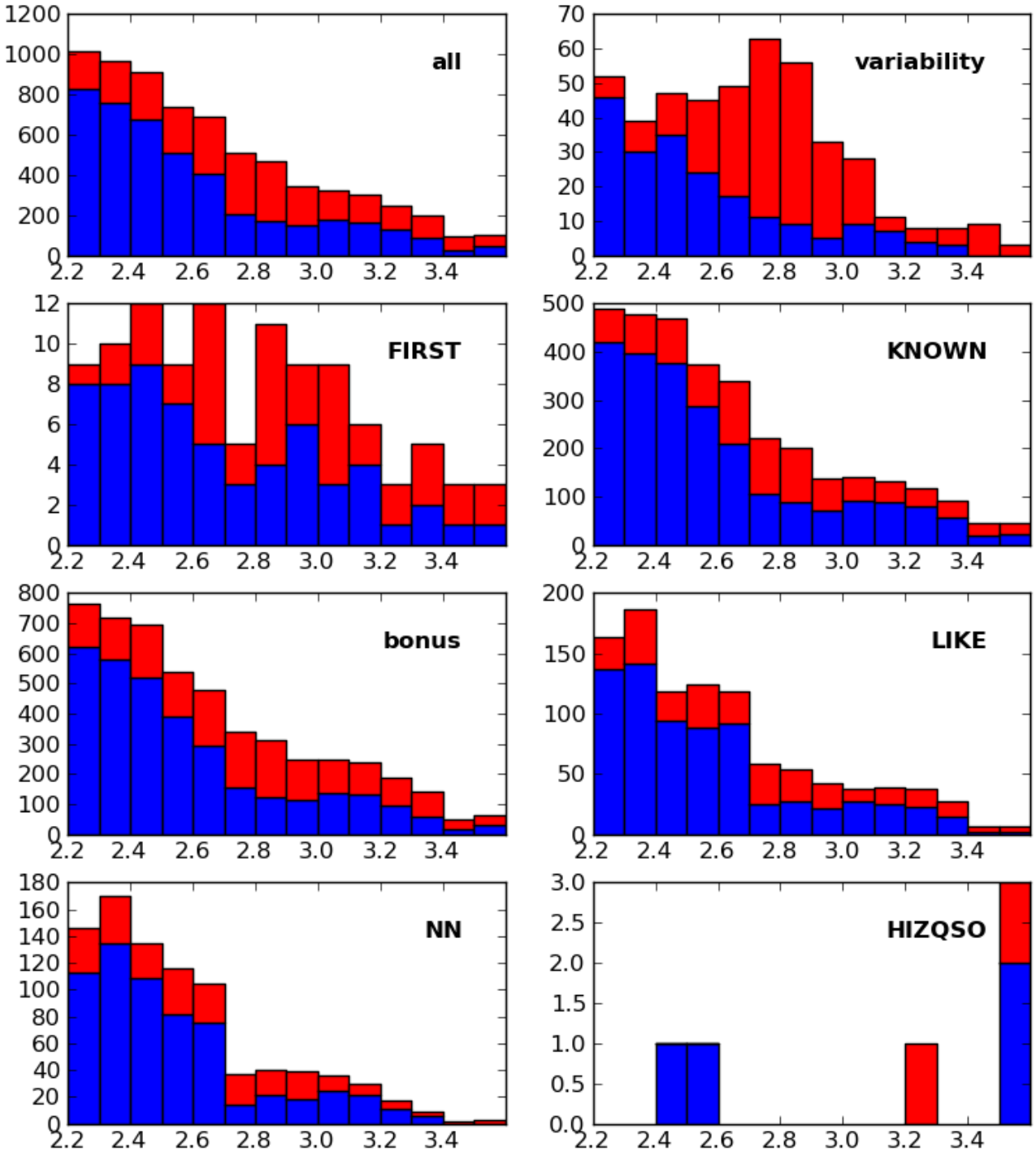
check XD probabilities for Stripe82 quasars with 2.2 < z < 3.6. Only 56% complete for variability selected objects! By number most are coming from KNOWN (or whatever bonus is here).



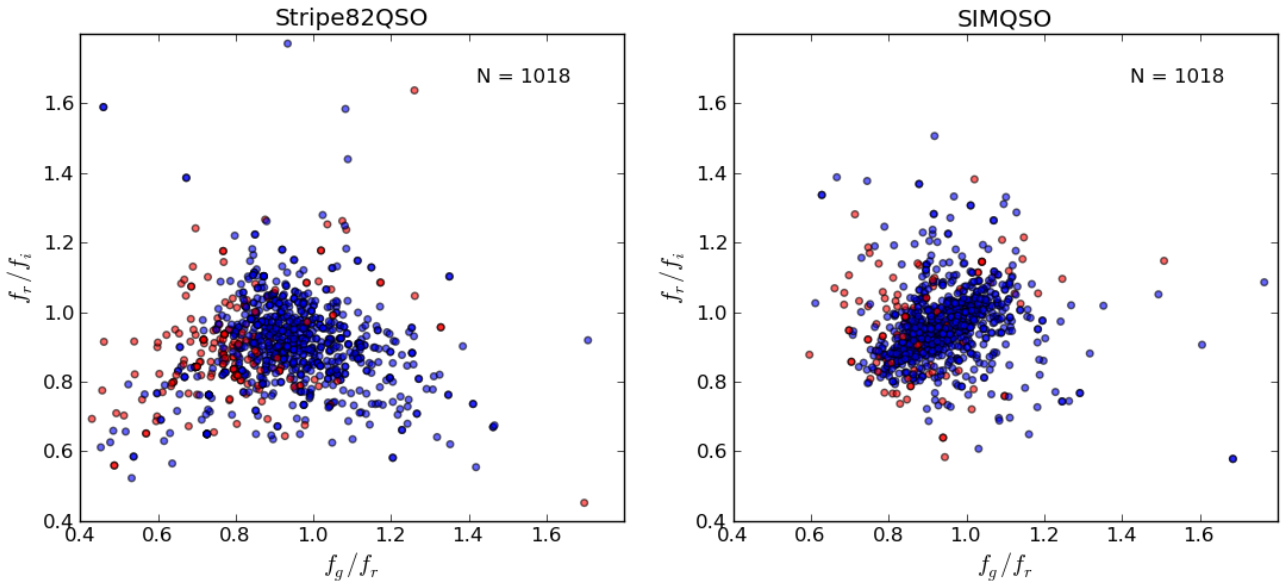
Completeness by redshift for each bit. variability exposes the hole at $2.7 < z < 3$.



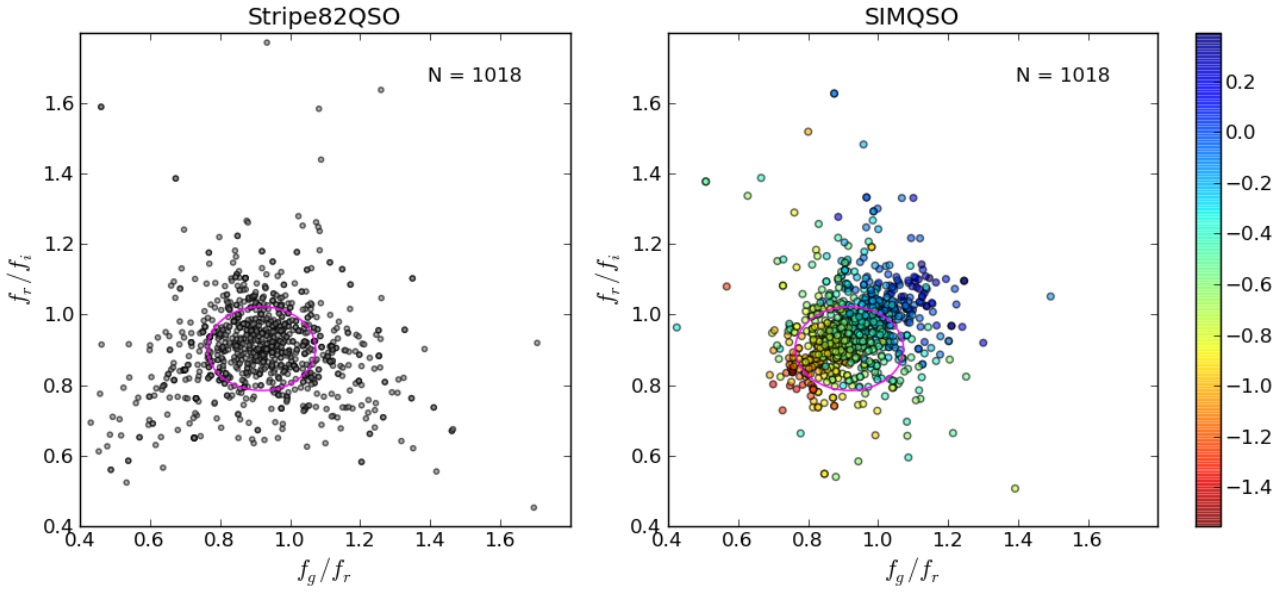
Same, just showing total number of objects. Blue: XD-selected, Red: XD-missed.



Color/color: the simulated quasars have too much spread (they have been resampled to match the number of actual quasars). Blue: XD-selected, red: XD-missed. Redder objects are missed in real life and bluer objects are overrepresented in simulations. For $2.2 < z < 2.3$.

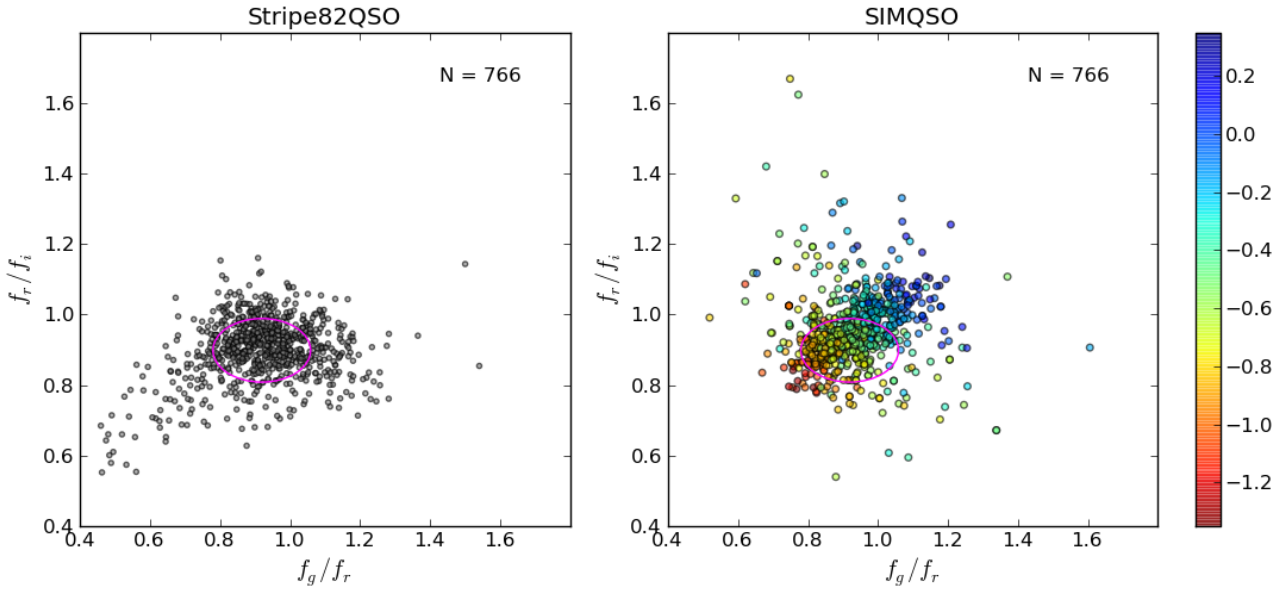


same, showing distribution of intrinsic slopes for the simulated quasars. Too many blue:

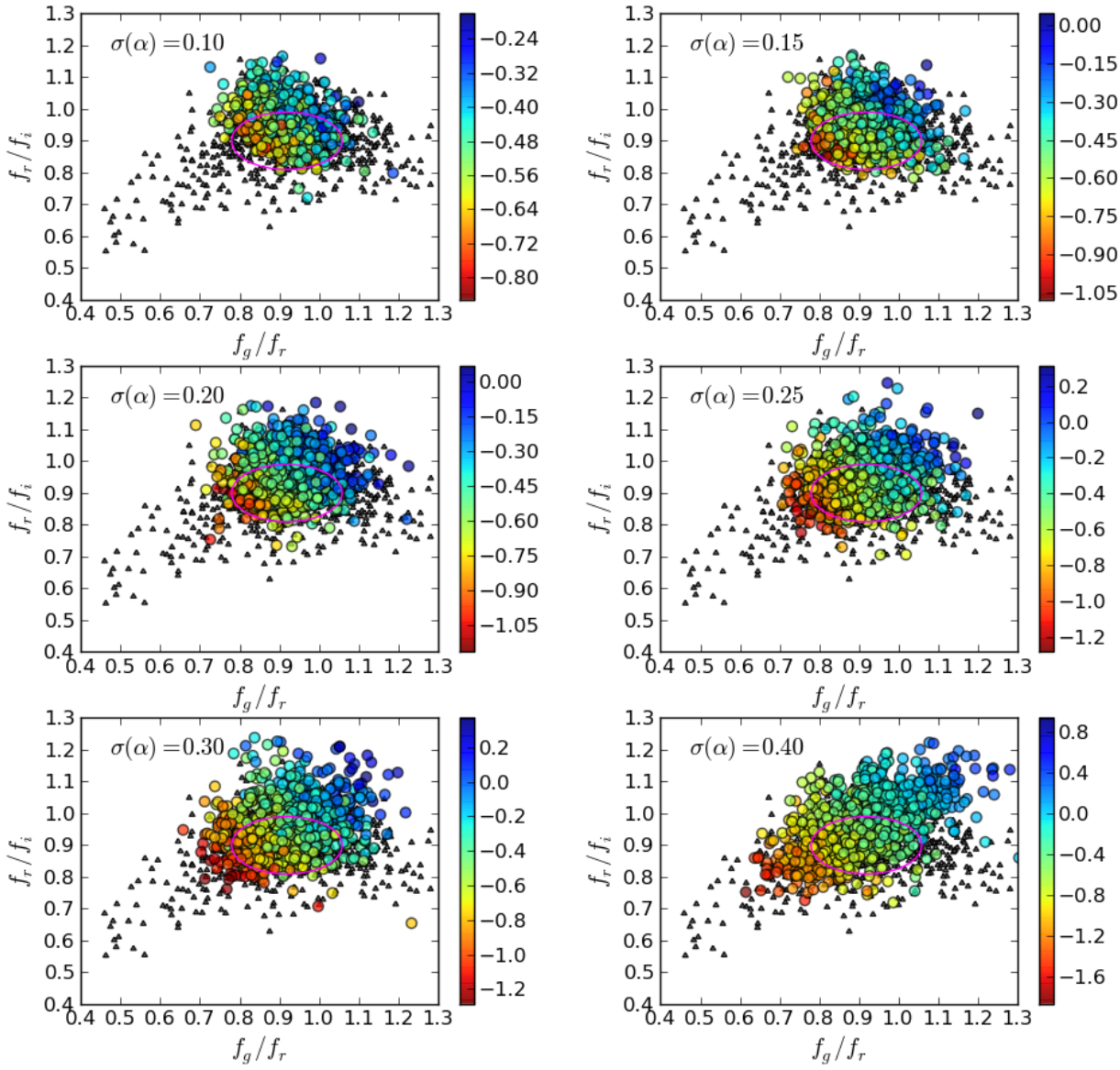


Some of the *additional* spread in the real quasars is photometric uncertainties, which are underrepresented in the simulated quasars since they were derived from a uniform grid in absolute magnitude (with a gaussian slope distribution), rather than from a luminosity function. But the spread due to continuum slope clearly exceeds the true spread, this was with -0.5 +/- 0.3.

same plot, filtered to remove duplicates, and using photometry from the varcats, which improves the S/N by about ~1.5-2:



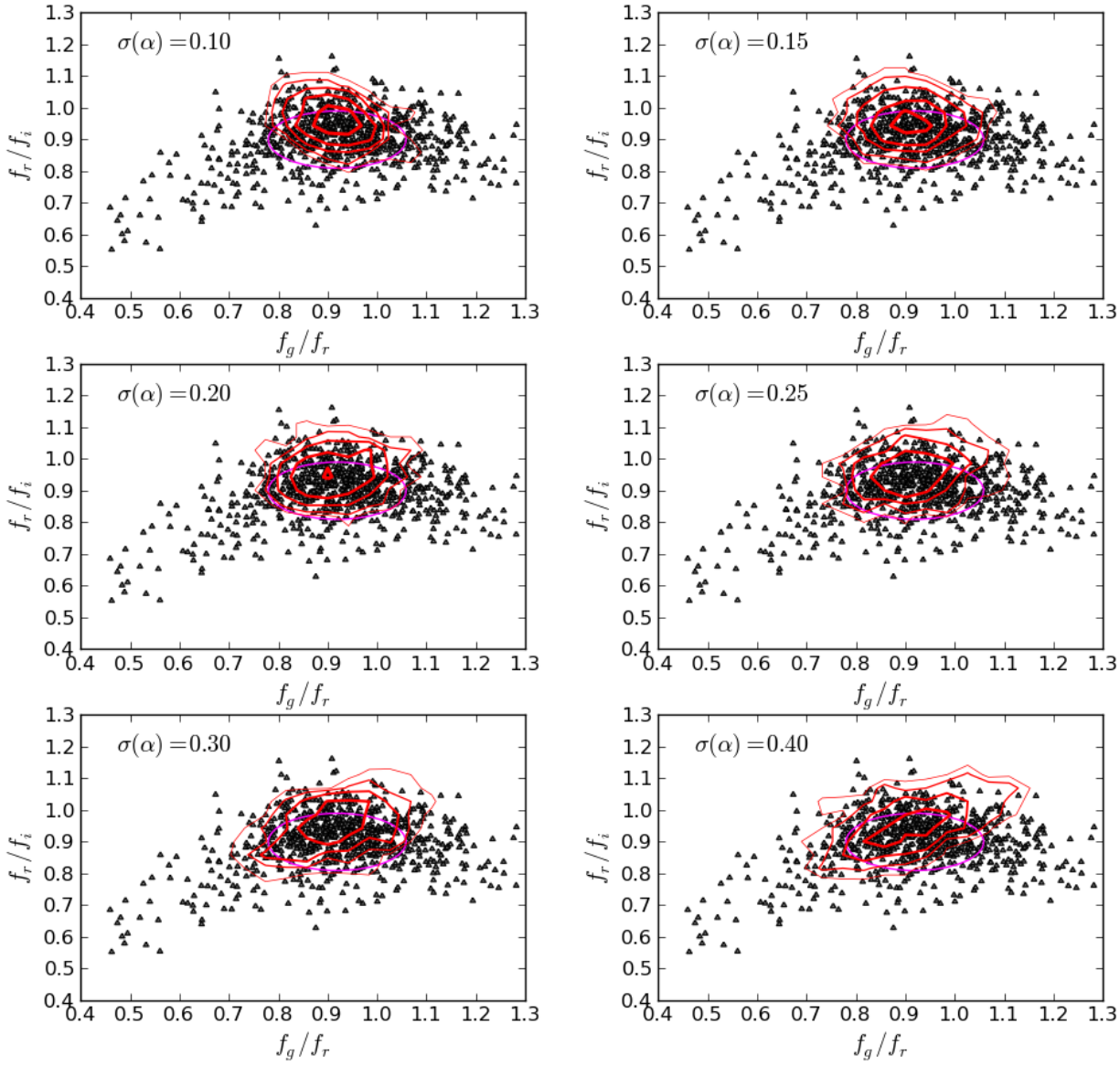
Now try varying the scatter in the slope by running simulations (1000 quasars, compared to >700 in varcat) with different slope scatters, using WP10 forest and VdB em lines and matching the photometric uncertainties in the varcat (color coding is slope):



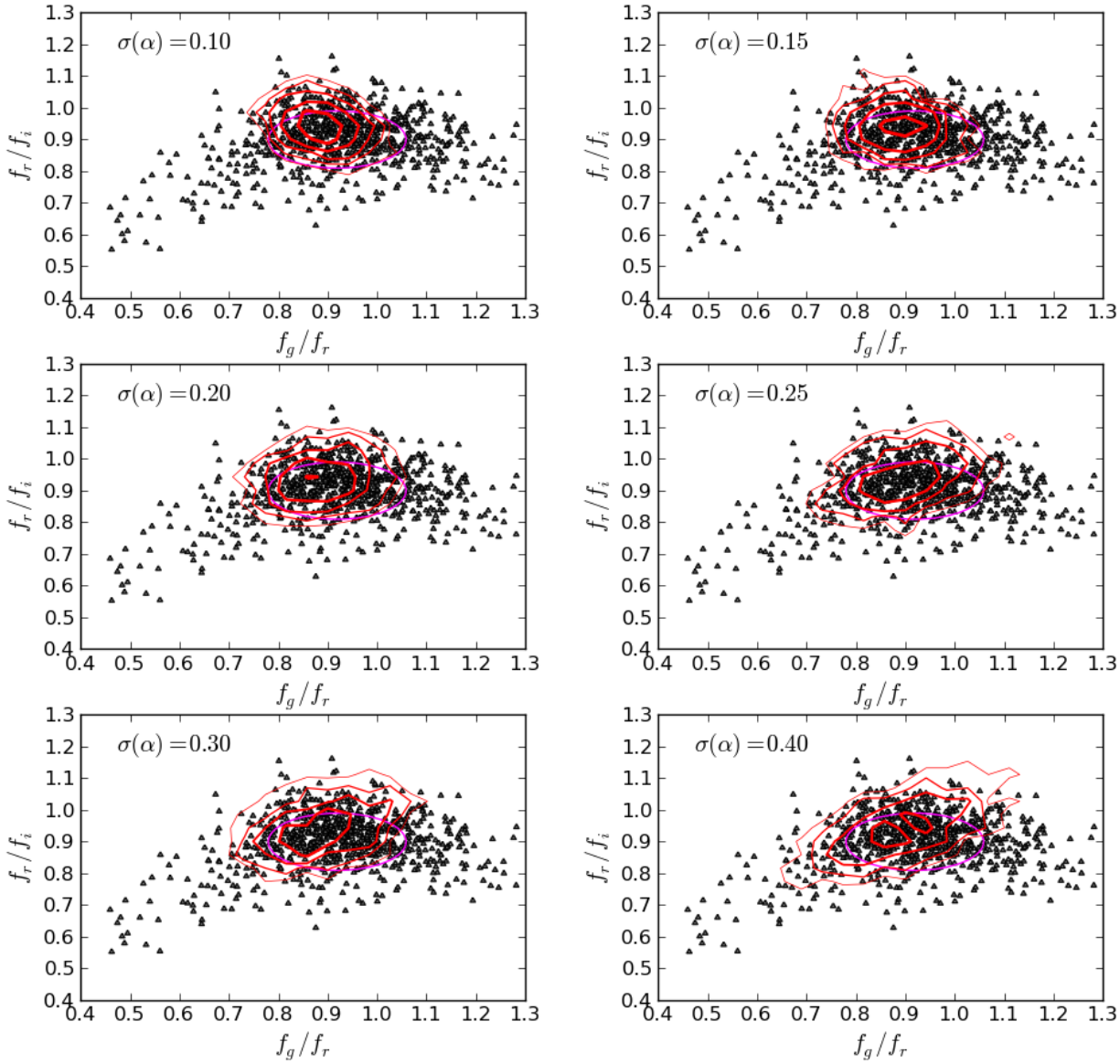
Once the scatter is above ~0.25 there are too many blue quasars, and these have high selection efficiency (~90%, see below) so they would be picked up. Seems to imply scatter is too large.

```
In [74]: ii = where(arr_between(qsos['z'],(2.2,2.3)) & (qsos['slope_cont'] > -0.2) &
arr_between(qsos['mag'][:,3],(17.8,22.2)))[0]
In [75]: len(ii),sum(xdprob.PQSO[ii] > 0.4214)
Out[75]: (711, 637)
```

different view of same thing, representing the distribution of simulated colors by contours:

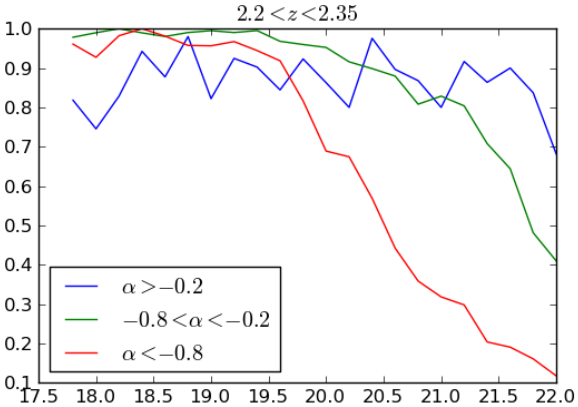


try changing the mean from -0.5 to -0.6, since r-i is a bit blue:

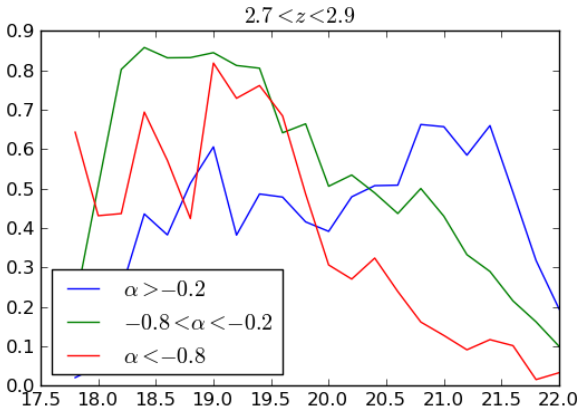


but it just moves down and to the left. OTOH, perhaps g-r is too blue here because Lya/CIV are overestimated?

selection efficiency by spectral index (i mag along x-axis):

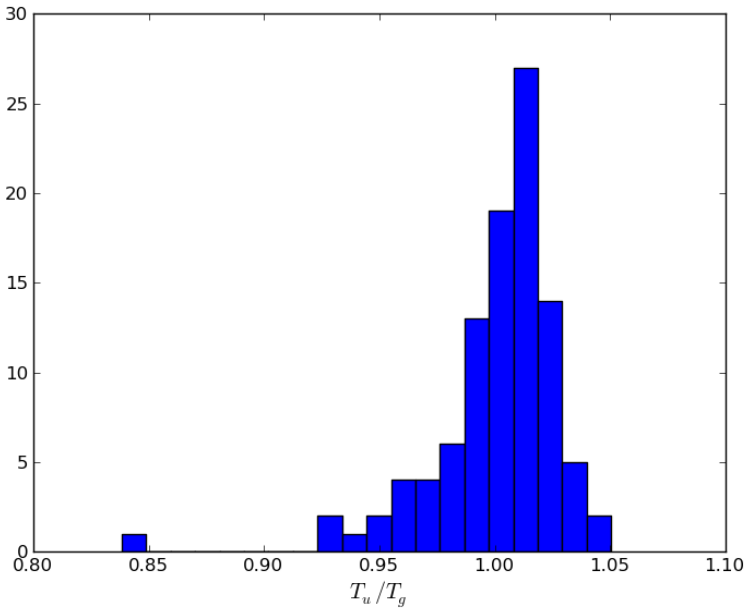


In the bad redshift range:

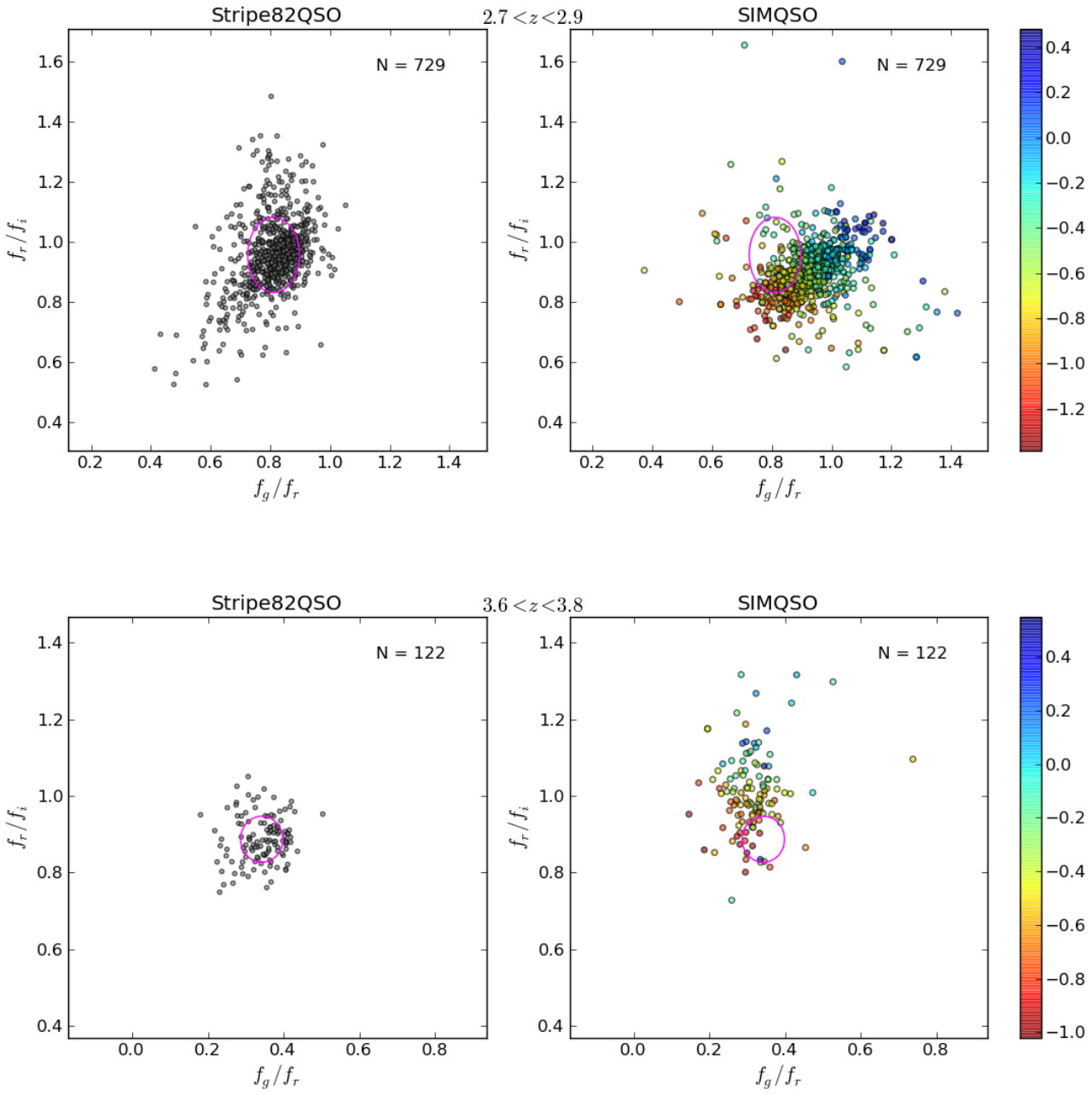


85% seems like a big overestimate given that variability shows more like 20% in this redshift range, and it doesn't push that faint (i.e., not just that most of the incompleteness is coming at i>21).

Forest contributes < 5% scatter at z=2.2 in u/g (std=2.8%):



sigh, colors really don't seem right...



CIV is important at these redshifts, maybe it is underestimated? Check against Gordon's paper shows that the composite mean is very close to the peak of the distribution for single object measurements. A quick experiment shows CIV EW would have to be nearly doubled to get the right r-i distribution.