BGS SV3 Selection

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on behalf of BGS working group

April 21, 2021 — SV/TS telecon

BGS SV3 target selection recap

star-galaxy separation

not in Gaia
in Gaia but $G - rr > 0.6$

https://desi.lbl.gov/trac/wiki/TargetSelectionWG/SV3#BrightGalaxySurveyBGS

BGS SV3 target selection recap

star-galaxy separation	*not in Gaia* *in Gaia but* $G - rr > 0.6$
spatial masks	*around BS and GC*

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BGS SV3 target selection recap

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spatial masks	*around BS and GC*
fiber-mag cut	$r_{\rm fiber} < 22.9 + (r - 17.8)$ for $r < 17.8$ $r_{\rm fiber} < 22.9$ for $17.8 < r < 20$

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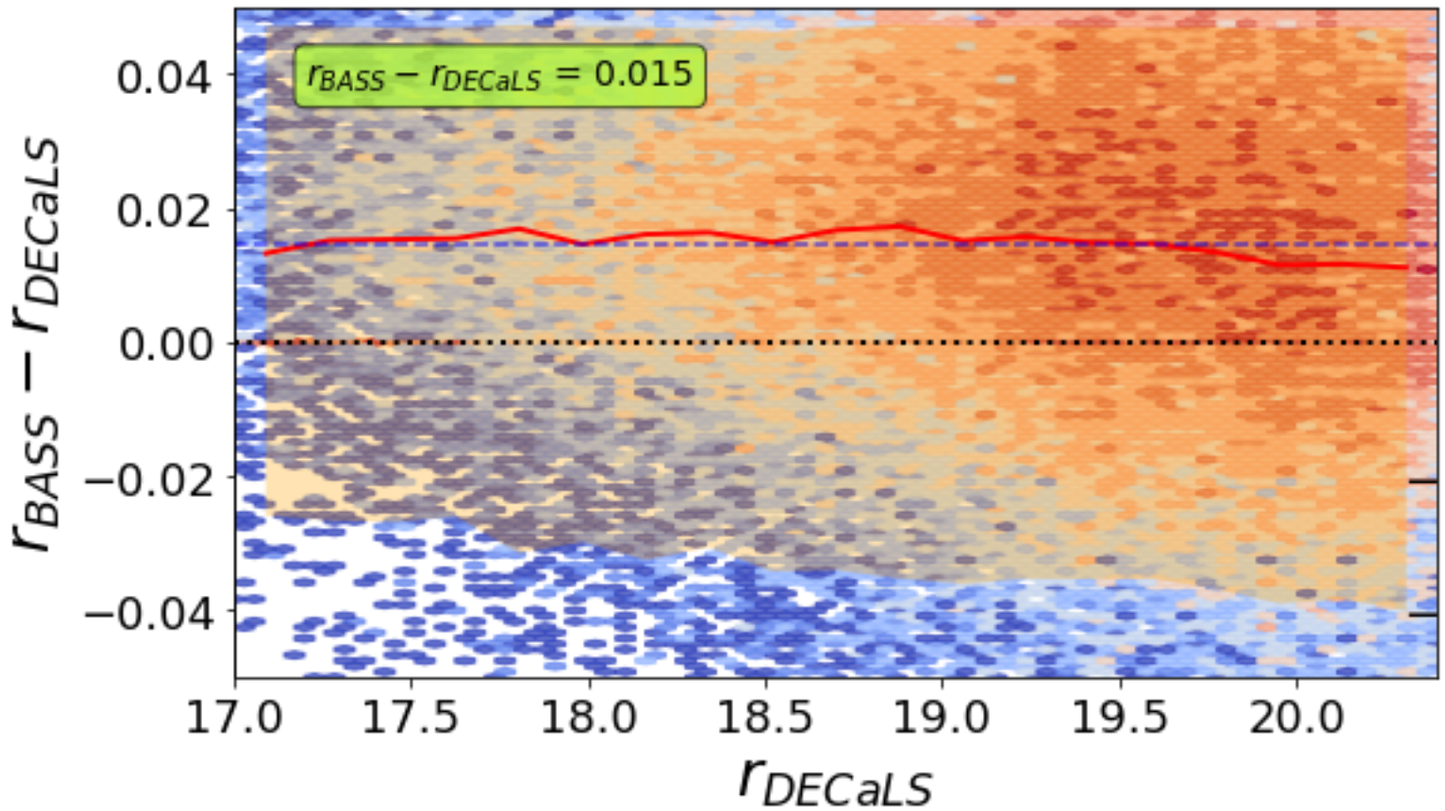
quality cuts	$\mathrm{nobs}_i > 0$ for $i = g, r, z$ $-1 < g - r < 4$, $-1 < r - z < 4$

https://desi.lbl.gov/trac/wiki/TargetSelectionWG/SV3#BrightGalaxySurveyBGS

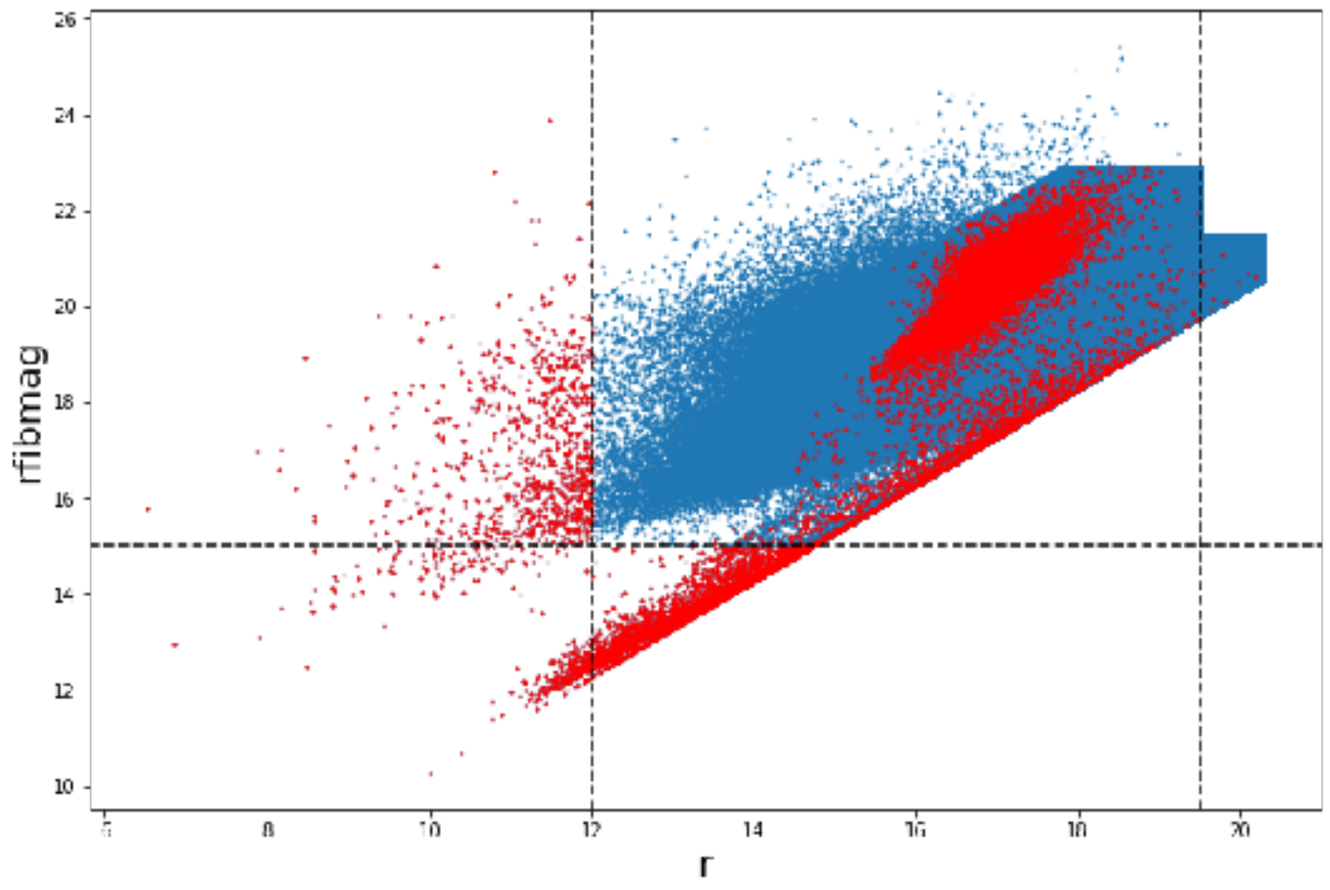
BGS SV3 target selection *what you might've missed —*
r discrepancy between DECaLS and BASS/MzLS



$\Delta r_{\rm offset} = 0.04$ to BASS/MzLS r and $r_{\rm fiber}$ to match DECaLS target densities

credit: Omar Ruiz

BGS SV3 target selection *what you might've missed* —
Bright limit cut $(r > 12)$ & $(r\text{fibertot} < 15)$



removes $1.4\ \text{deg}^{-2}$; $r\text{fibertot}$ removes stars and saturated point sources

credit: Omar Ruiz

BGS SV3 target selection *what you might've missed —*
WISE-AGN selection

```
agnw2 = (z - w2 - (g - r) > -0.5) &   \
        (w2snr > 10) &\
        ((maskbits & 2**(9)) == 0) &  \
        (w2flux > 0)

quality = (rflux > 0) & (gflux > 0) & (zflux > 0) &                  \
          (gfluxivar > 0) & (rfluxivar > 0) & (zfluxivar > 0) &      \
          (gnobs >= 1) & (rnobs >= 1) & (znobs >= 1) &                \
          (imaging_mask(maskbits, bgsmask=True)) &                   \
          ((gaiagmag == 0) | ((gaiagmag != 0) & (gaiagmag > 16))) &  \
          (r < 20.3) & (r > 16) &                                    \
          (rfib < 22) & (rfibtot > 15) &                             \
          (((rfib < 21.5) & (r > 19.5)) | (r < 19.5)) &              \
          (((_psflike(objtype)) & (r < 17.5)) | (~_psflike(objtype)))

stars = ((gaiagmag != 0) & (Grr < 0.6)) | ((gaiagmag == 0) & (_psflike(objtype)))

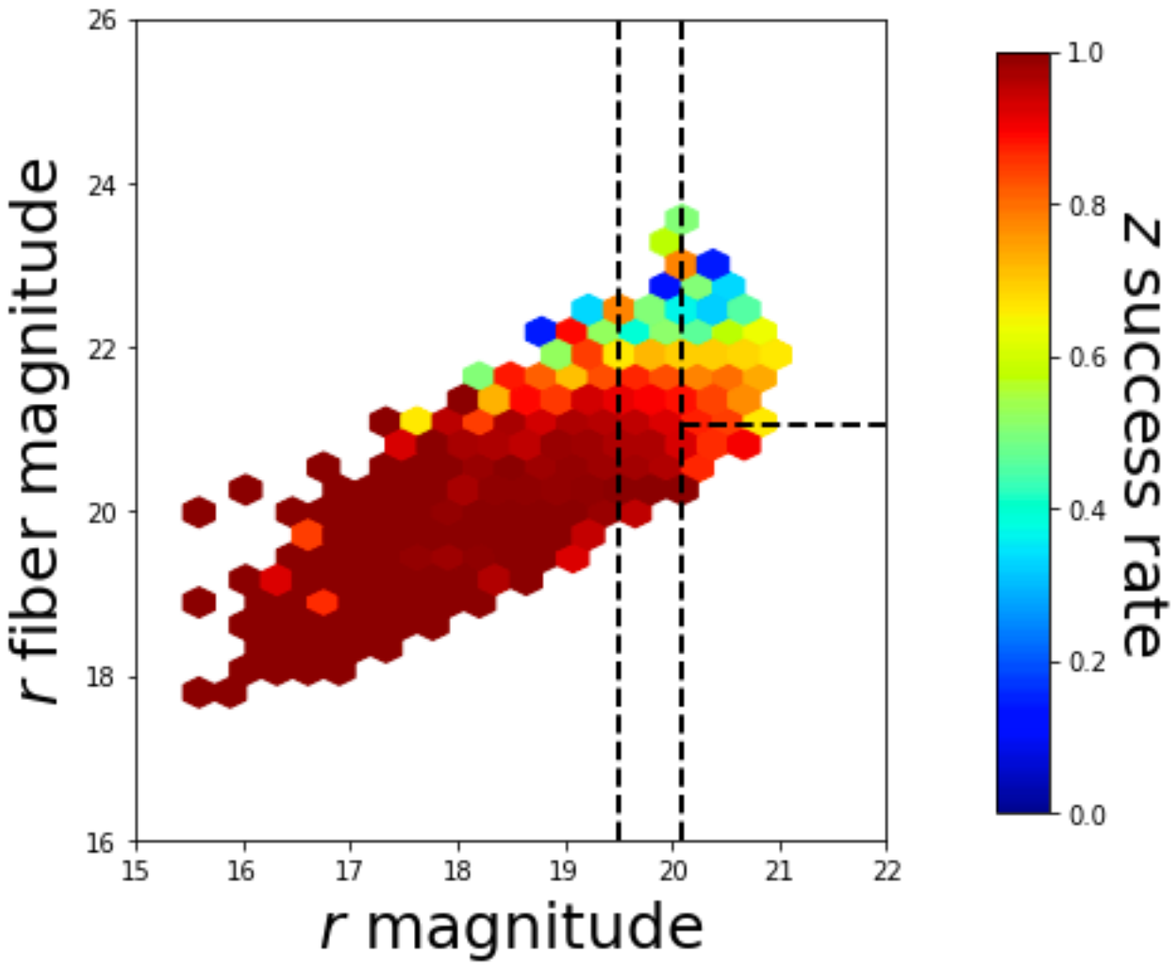
additional = ((w1 - w2) > -0.2) &          \
             (z - w1 - (g - r) > -0.7) &   \
             (w1snr > 10)

AGN = (agn_ext) & (quality) & ~((stars) & (~agn_ext)) & (Grr < 0.6) & (gaiagmag != 0)
```

$\sim 3\ \mathrm{deg}^{-2}$ ***AGN in BGS***

credit: Omar Ruiz, Daniel Eisenstein

BGS SV3 target selection *what you might've missed* —
updated BGS FAINT selection based on r_{fiber} – color cut



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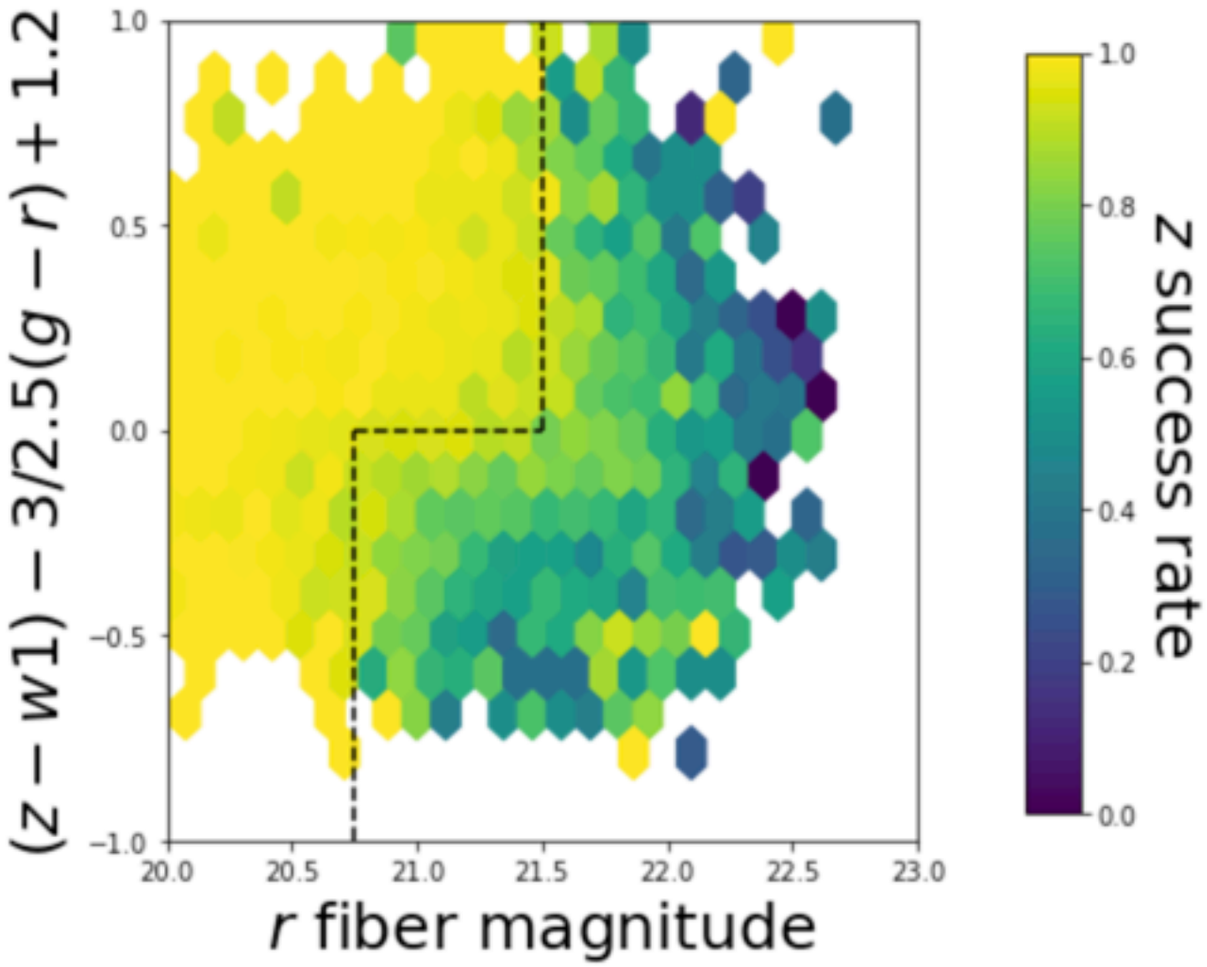

BGS SV3 target selection *what you might've missed —*
updated BGS FAINT selection based on $r_{\rm fiber}$ – color cut

BGS BRIGHT: $(r < 19.5)$ & (all other cuts)

BGS FAINT: $(19.5 < r < 20.3)$ & ($r_{\rm fiber}$ – color cut) & (all other cuts)

BGS SV3 target selection *what you might've missed —*
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BGS BRIGHT: $(r < 19.5)$ & (all other cuts)

$$860 \text{ deg}^{-2}$$

BGS FAINT: $(19.5 < r < 20.3)$ & ($r_{\rm fiber}$ – color cut) & (all other cuts)

$$630 \text{ deg}^{-2}$$

BGS SV3 target selection *what you might've missed —*
target density will be matched to $1{,}400\ \mathrm{deg}^{-2}$ for the main survey

BGS BRIGHT: $(r < 19.5)$ & (all other cuts)

$860\ \mathrm{deg}^{-2}$

20.175

BGS FAINT: $(19.5 < r <$ ~~20.3~~$)$ & $(r_{\mathrm{fiber}}$ – color cut) & (all other cuts)

~~630~~ deg^{-2}

540

BGS SV3 z **success** estimated from redrock outputs of SV3 exposures with 160 < BGS_EFFTIME_BRIGHT < 180

ZWARN = 0

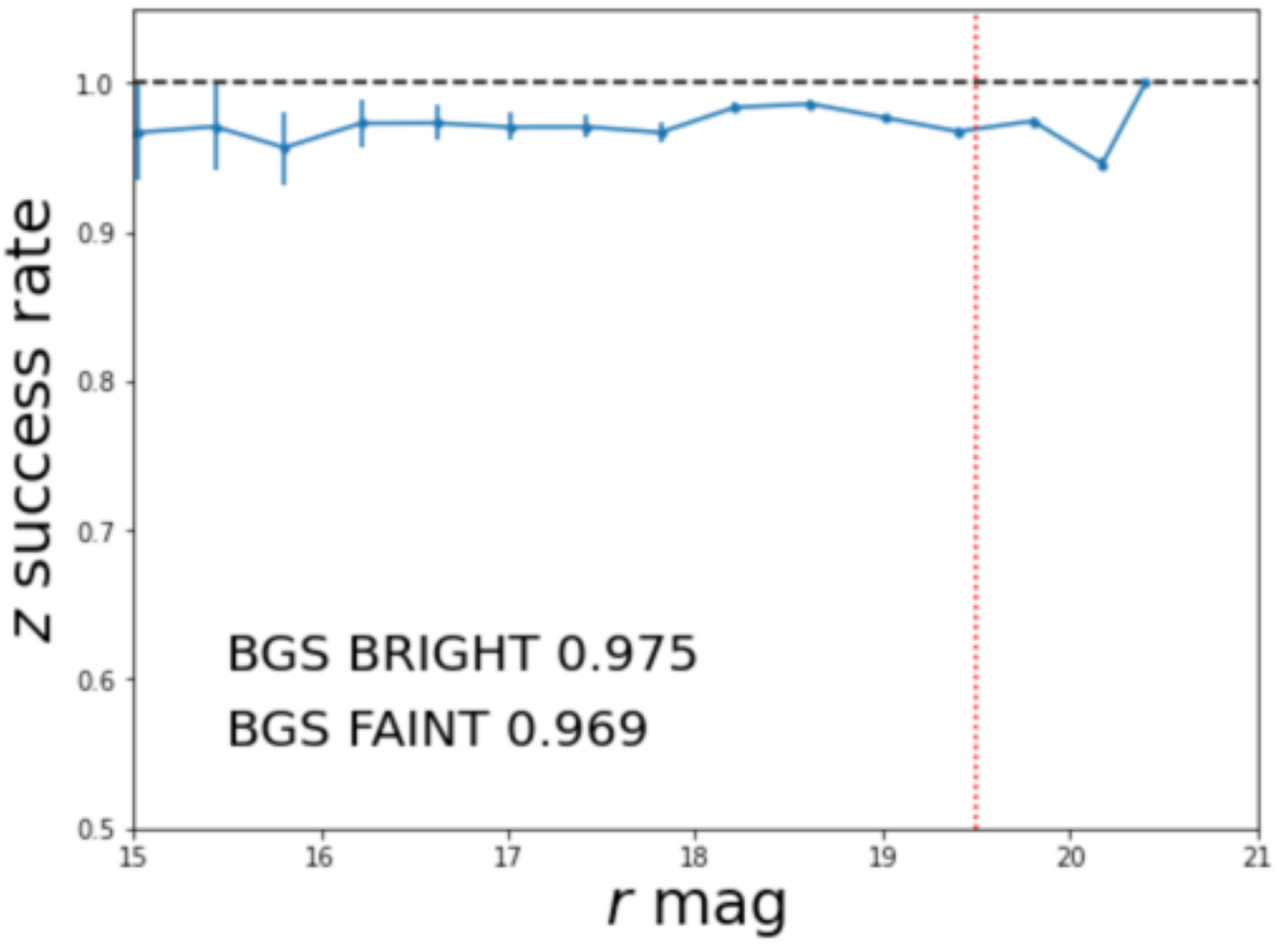
DELTACHI2 > 40

SPECTYPE != ‘STAR’

0.0 < Z < 0.6

ZERR < 0.0005 (1 + Z)

BGS SV3 z **success** estimated from redrock outputs of SV3 exposures with 160 < BGS_EFFTIME_BRIGHT < 180



$> 95\,\%$ **for both BGS BRIGHT and BGS FAINT**

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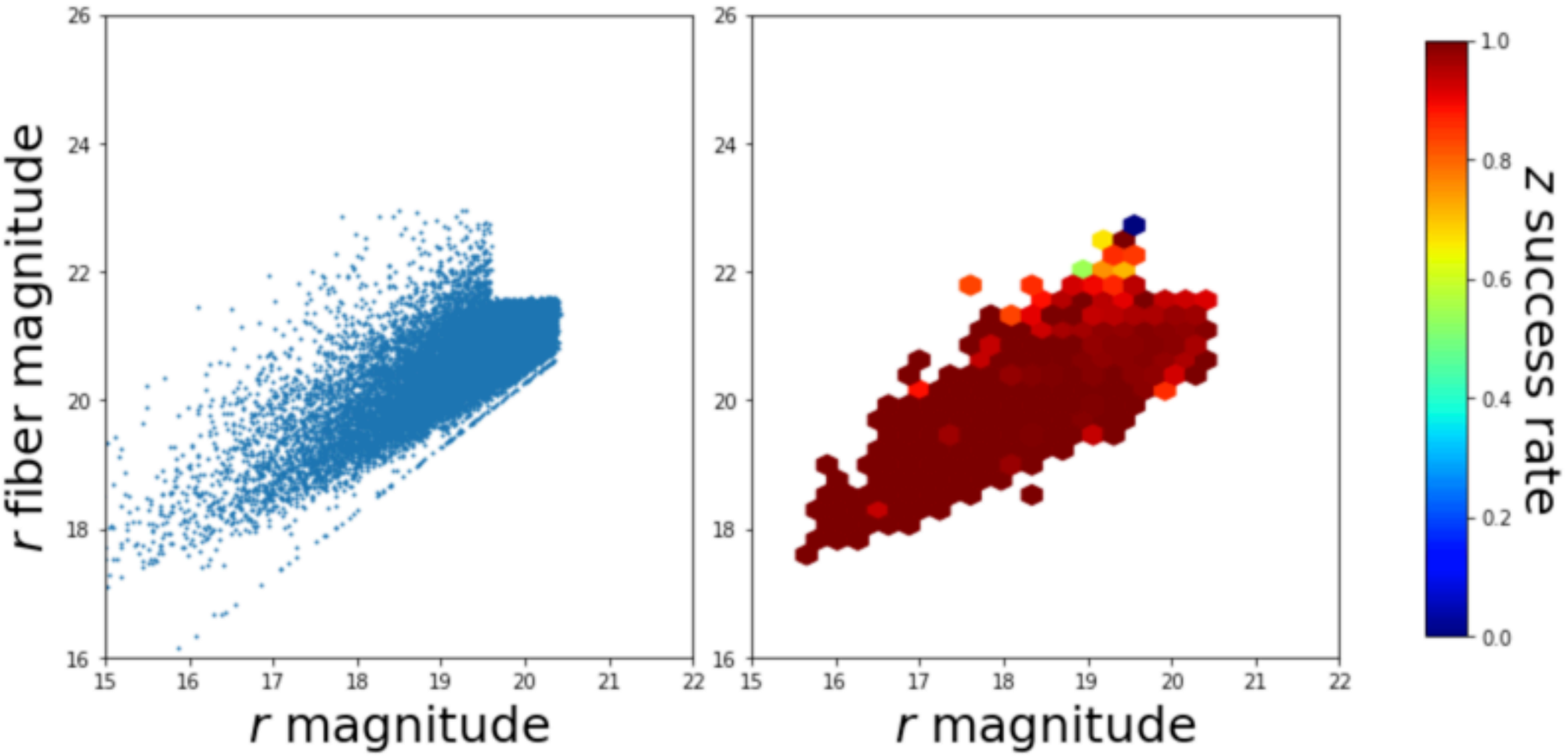

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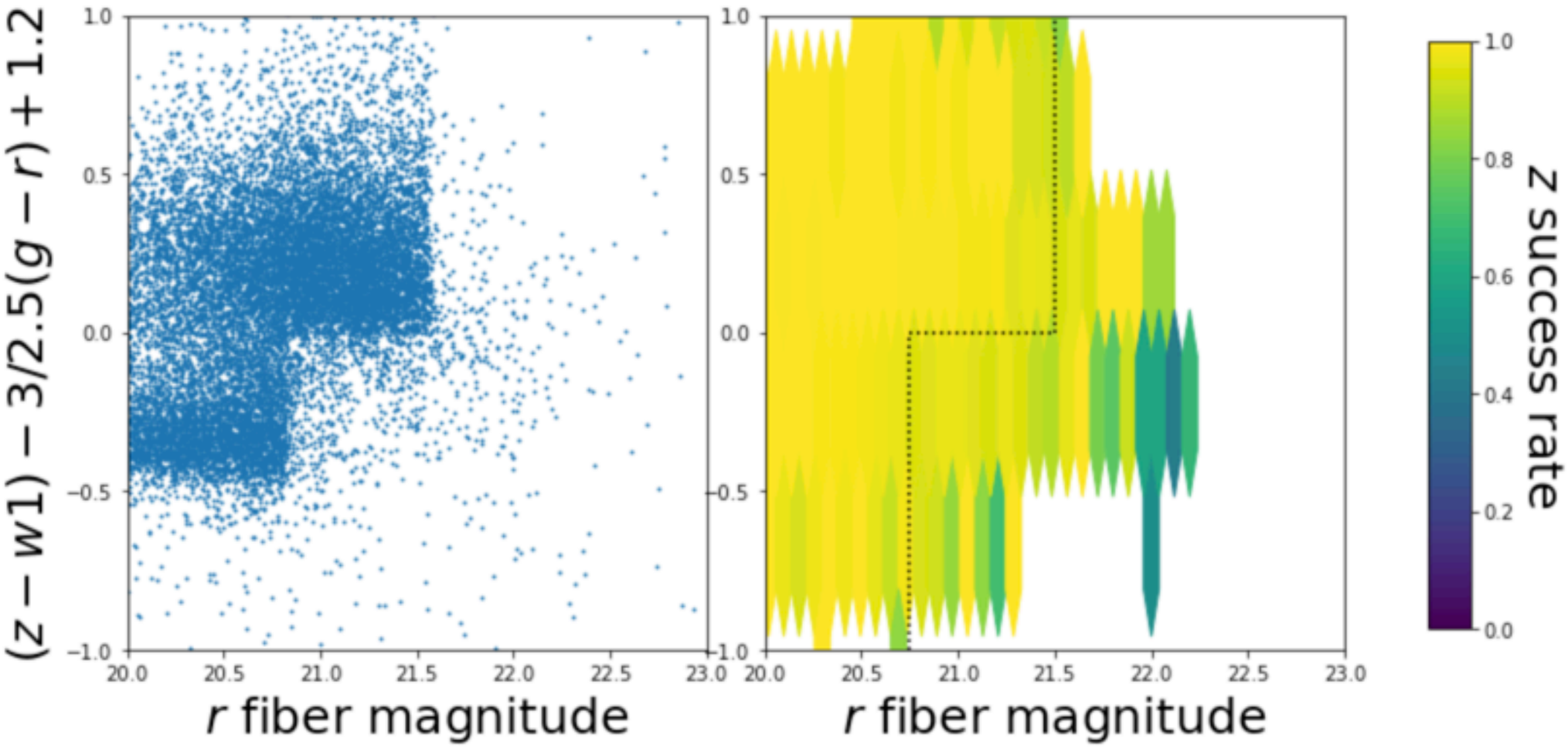

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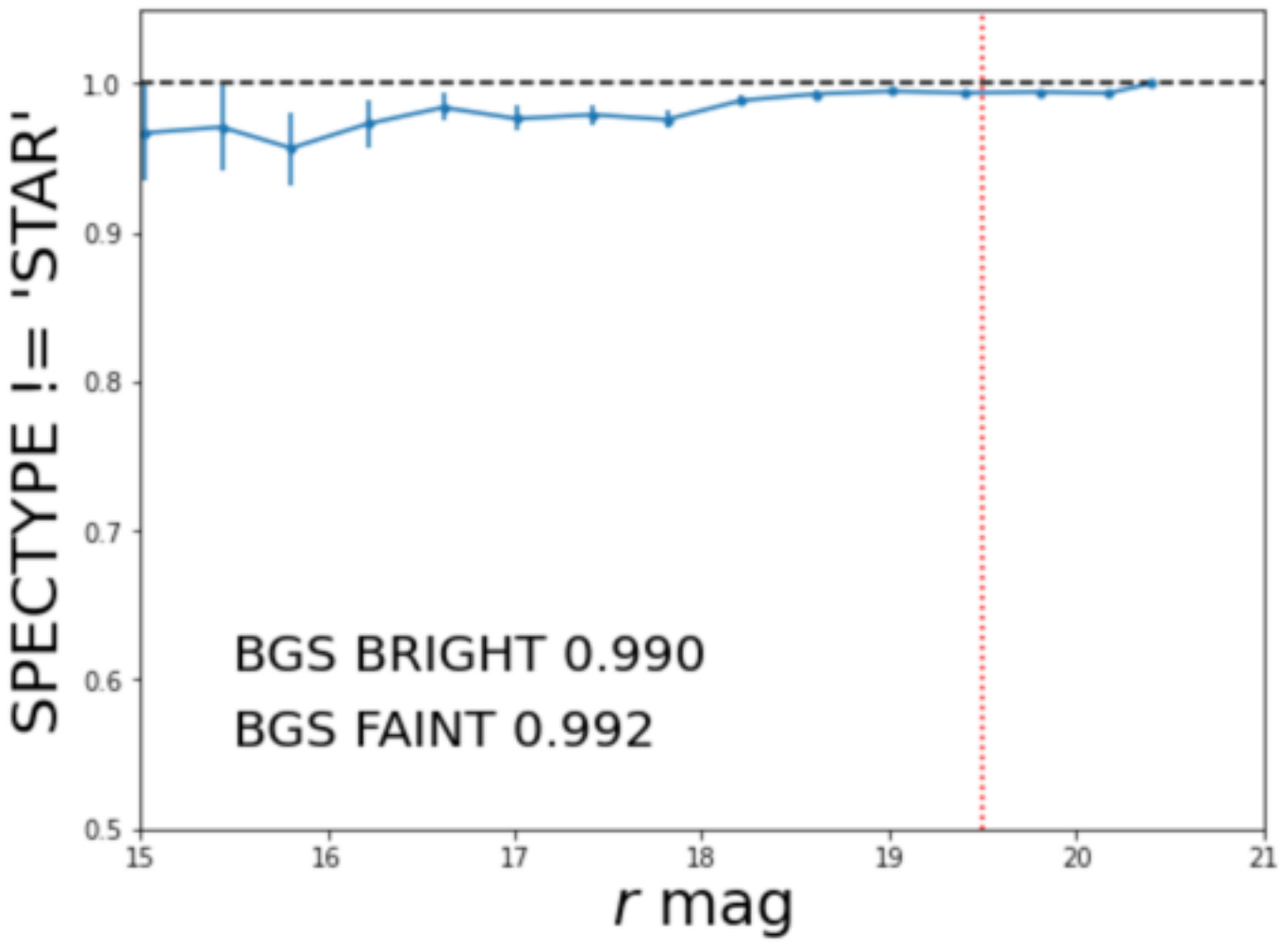
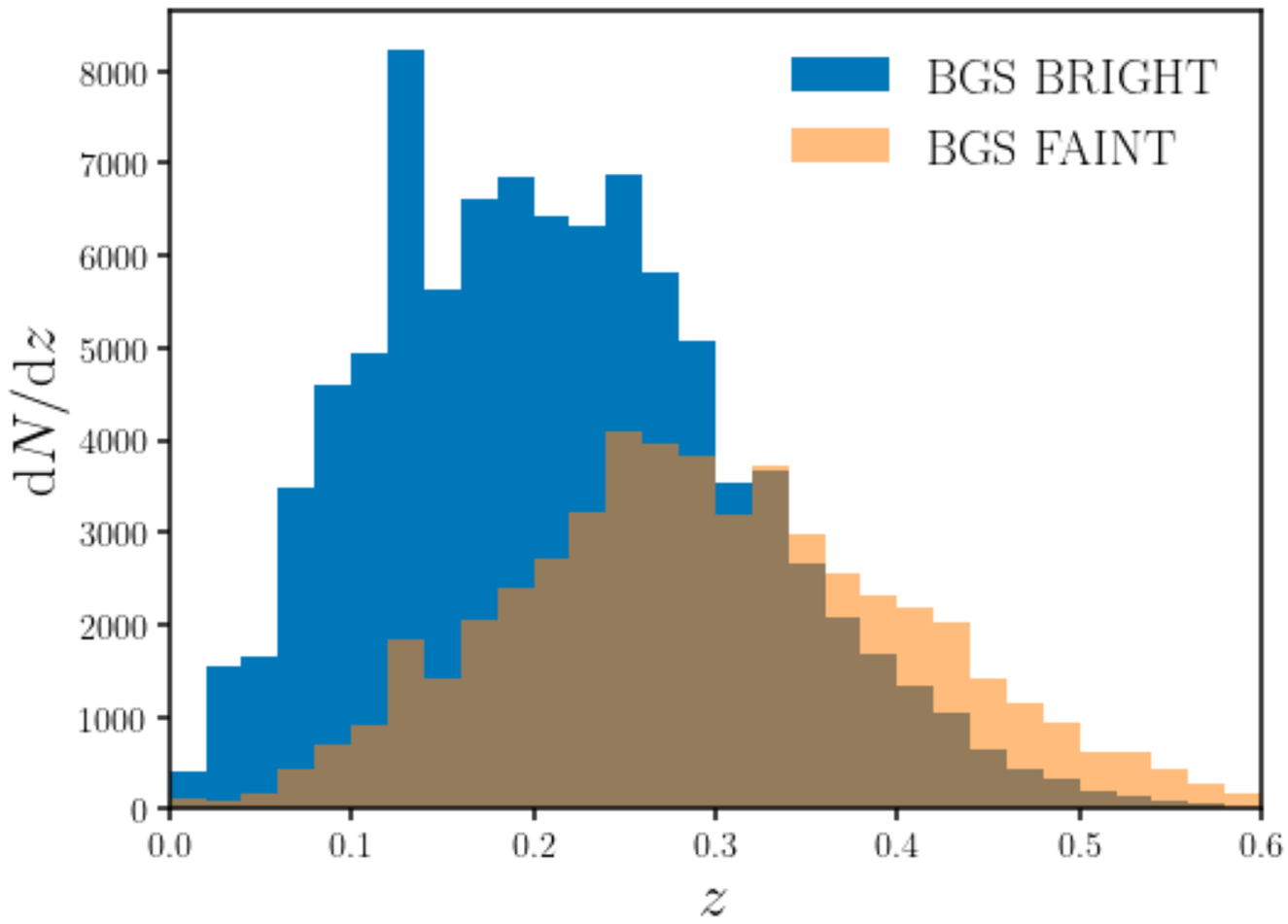
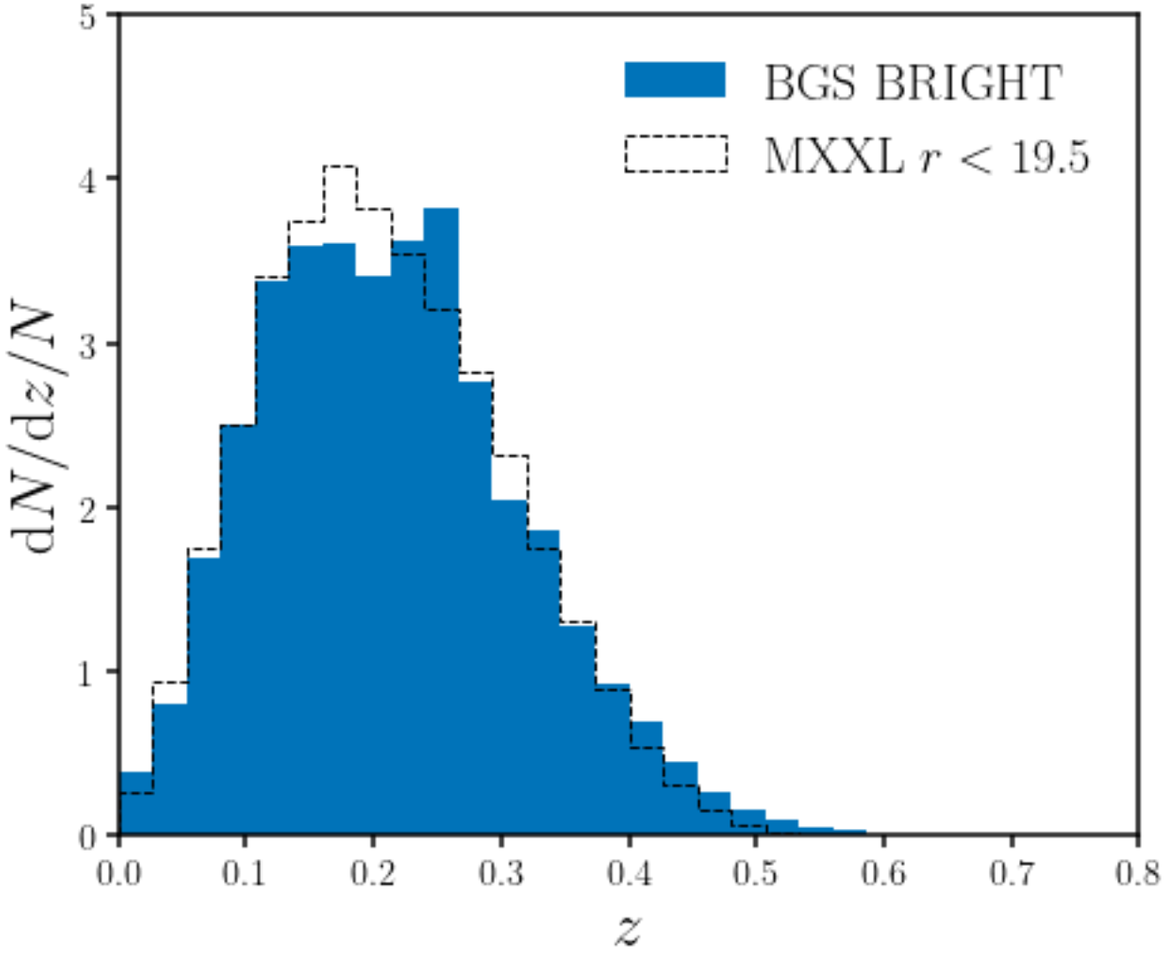


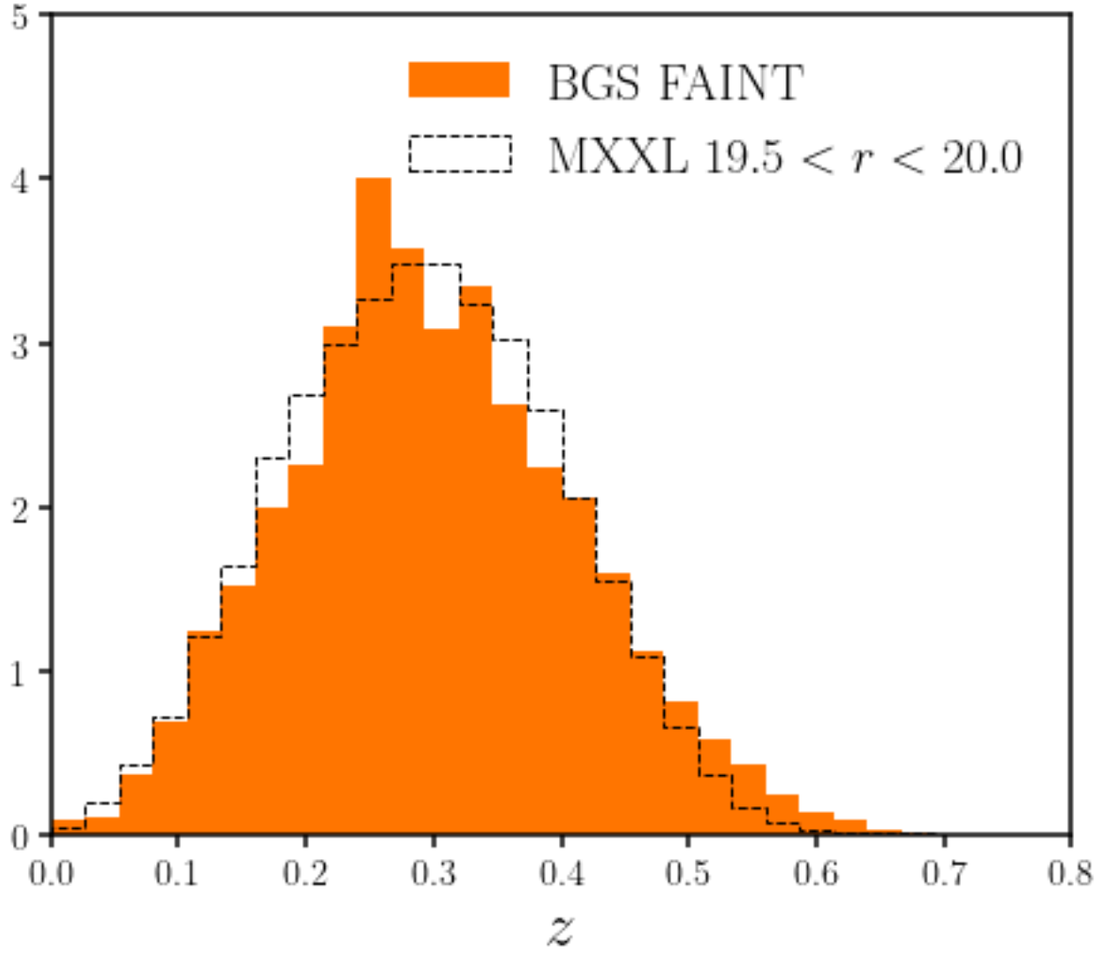
also low stellar contamination

BGS SV3 $\mathrm{d}N/\mathrm{d}z$ estimated from successful SV3 redshifts

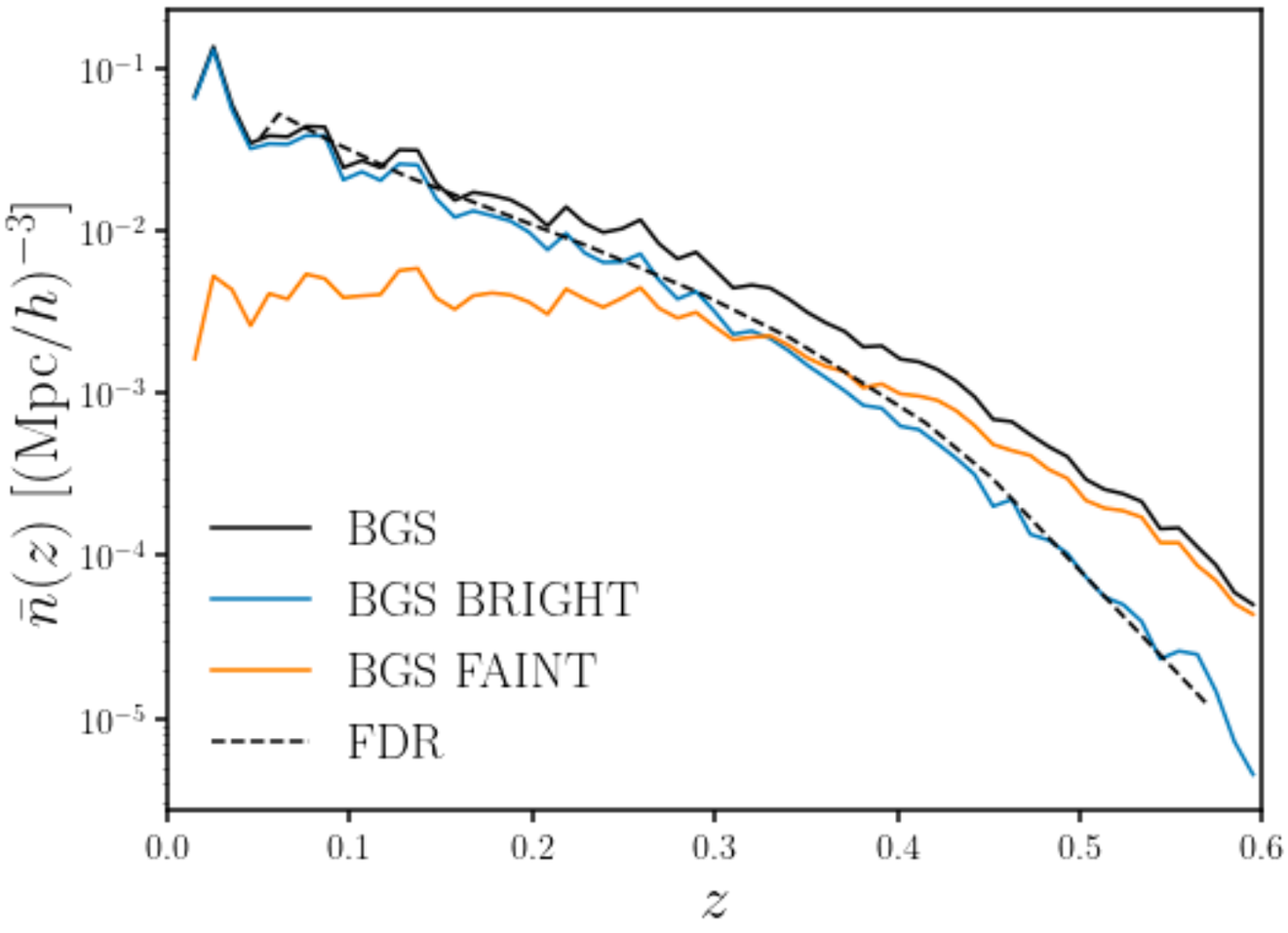


BGS SV3 $\mathrm{d}N/\mathrm{d}z/N$ estimated from successful SV3 redshifts compared to BGS MXXL mocks





BGS SV3 $\bar{n}(z)$ estimated from successful SV3 redshifts compared to FDR



BGS BRIGHT is in good agreement with FDR $\bar{n}(z)$

	targets (deg^{-2})	**exposures** (deg^{-2})	**good** z**'s** (deg^{-2})	**baseline sample**
BGS BRIGHT				
BGS FAINT				

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BGS BRIGHT	860			
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fiber efficiencies estimated from SV3 and fiberassign runs

SV3 rosette1 — 3 passes

```
0.683246 BGS BRIGHT
0.423432 BGS FAINT
0.699074 BGS FAINT HIP
```

SV3 rosette1 — 4 passes

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0.797557 BGS BRIGHT
0.577054 BGS FAINT
0.831019 BGS FAINT HIP
```

fiberassign runs

```
0.80 BGS BRIGHT
0.56 BGS FAINT
```

good agreement

credit: David Sierra-Porta, Mike Wilson, Jaime Forero

	targets (deg^{-2})	**exposures** (deg^{-2})	**good** z**'s** (deg^{-2})	**baseline sample**
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BGS FAINT	540	324		

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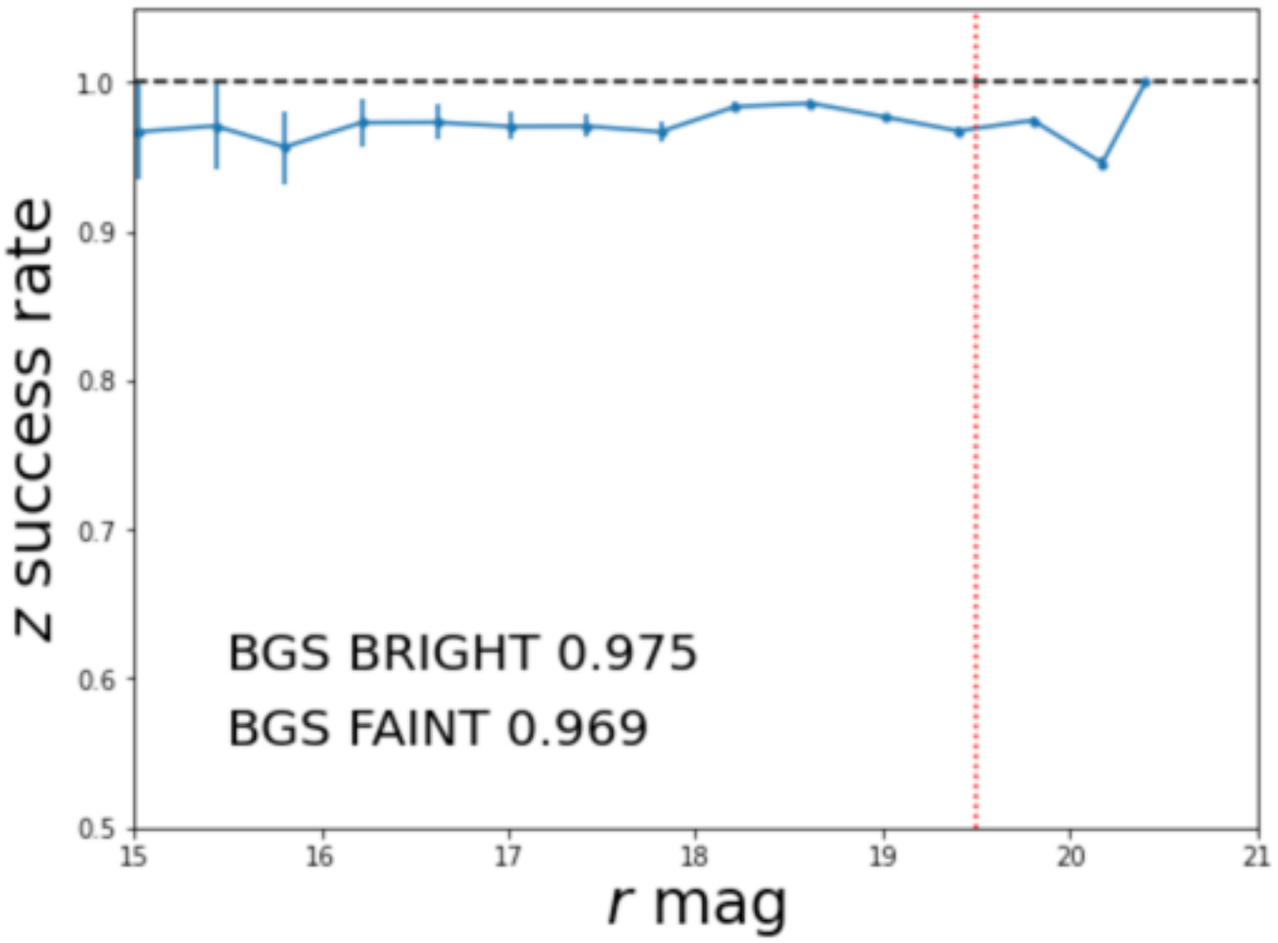
	targets (deg^{-2})	**exposures** (deg^{-2})	**good** z**'s** (deg^{-2})	**baseline sample**
BGS BRIGHT	860	688	678	
BGS FAINT	540	324	317	



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BGS BRIGHT	860	688	678	9.5M
BGS FAINT	540	324	317	4.4M