feasibility of BGS

Or: ***how I learned to stop worrying and love bright time***

changhoon hahn

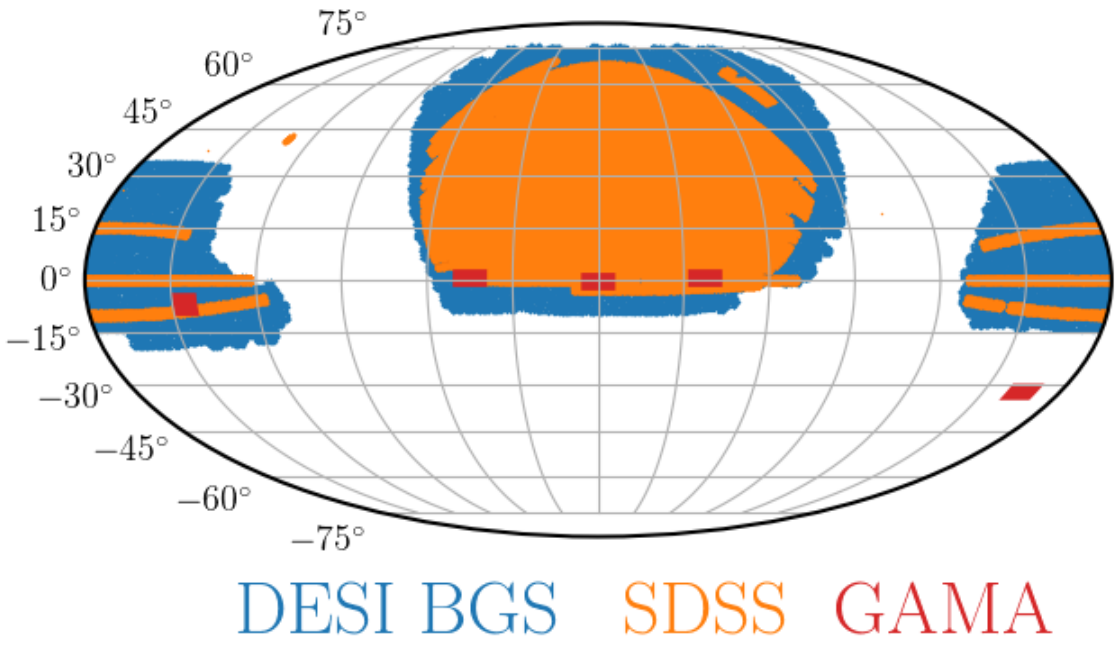
*http://github.com/changhoonhahn/**feasiBGS***

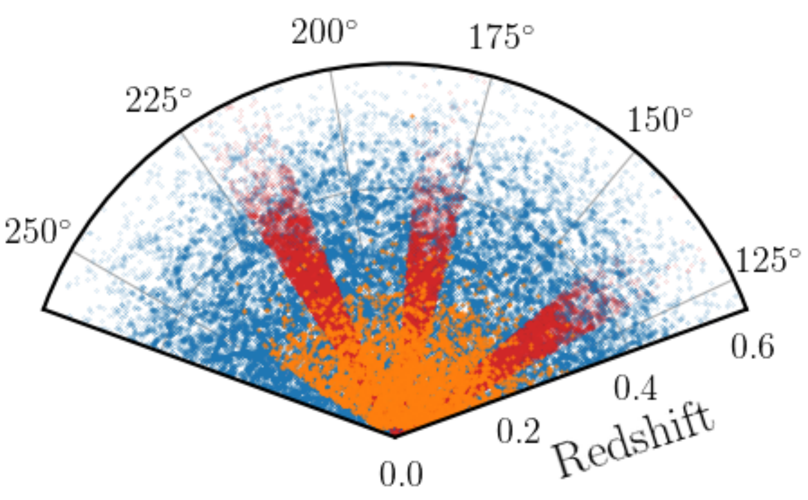
the Bright Galaxy Survey will…

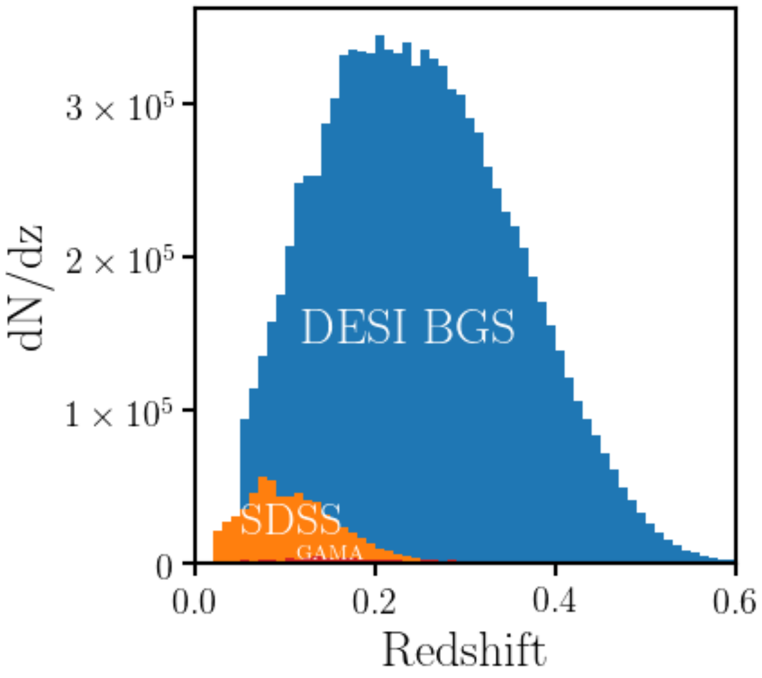
10 million galaxy spectra over 14,000 deg^2

~2 magnitudes deeper than SDSS main survey

~800 deg^2 to r < 19.5 and ~600 deg^2 19.5 < r < 20.







the Bright Galaxy Survey will...

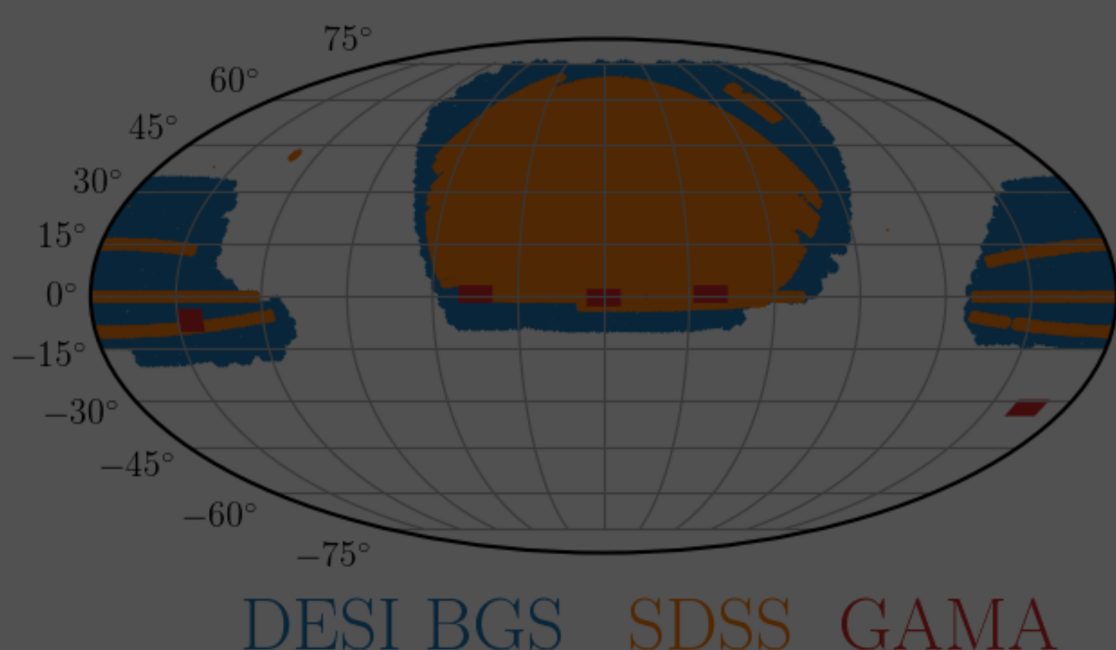
10 million galaxy spectra over 14,000 deg²

~2 magnitudes deeper than SDSS main survey

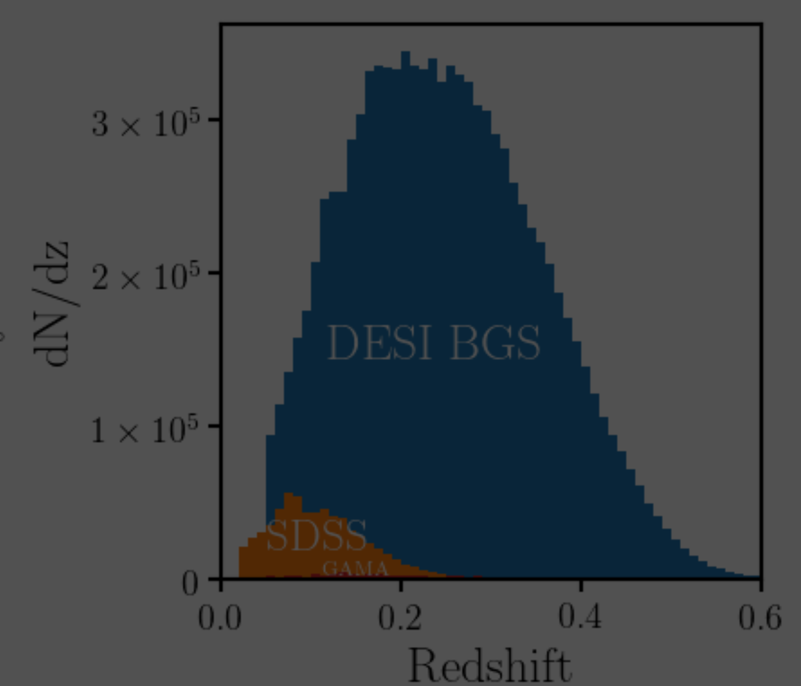
first extragalactic survey during bright time

~800 deg² to r < 19.5 and ~600 deg² 19.5 < r < 20.

(bright sky) = 2.5 x (dark sky) @ 7000A



???



…forecasts based on sky brightness from

UVES dark sky

+

*Krisciunas & Schaefer (**1991**)*

...forecasts based on sky brightness from

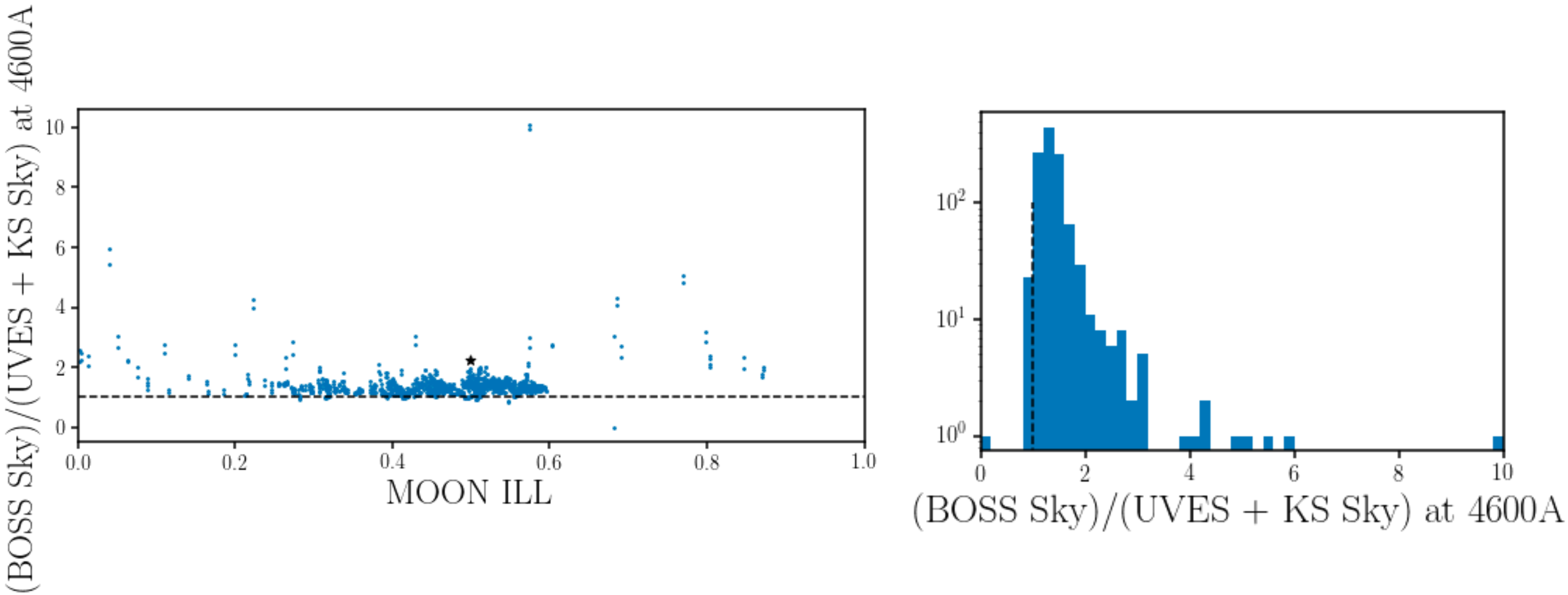
UVES dark sky

\+

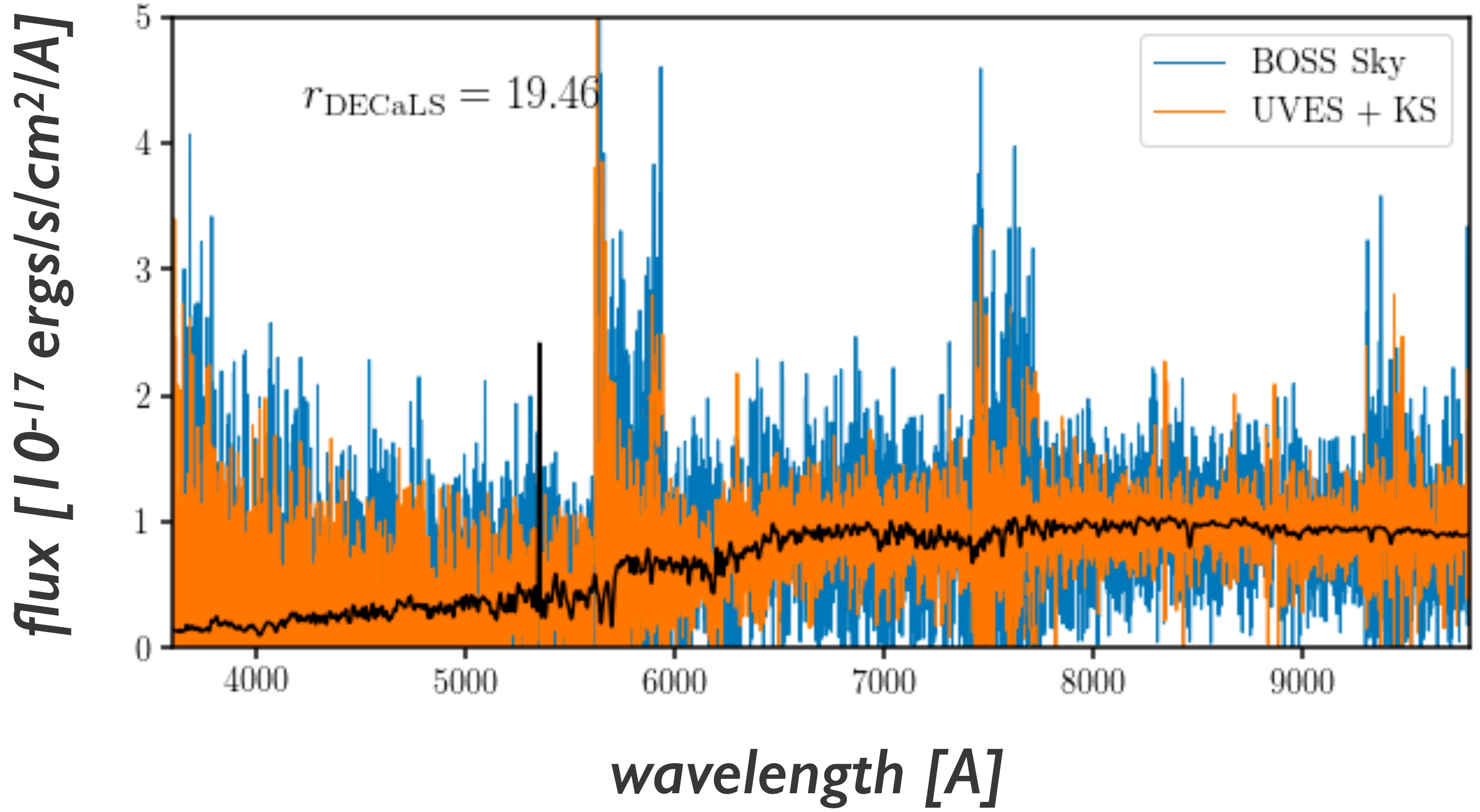
Krisciunas & Schaefer (1991)

Everett Collection

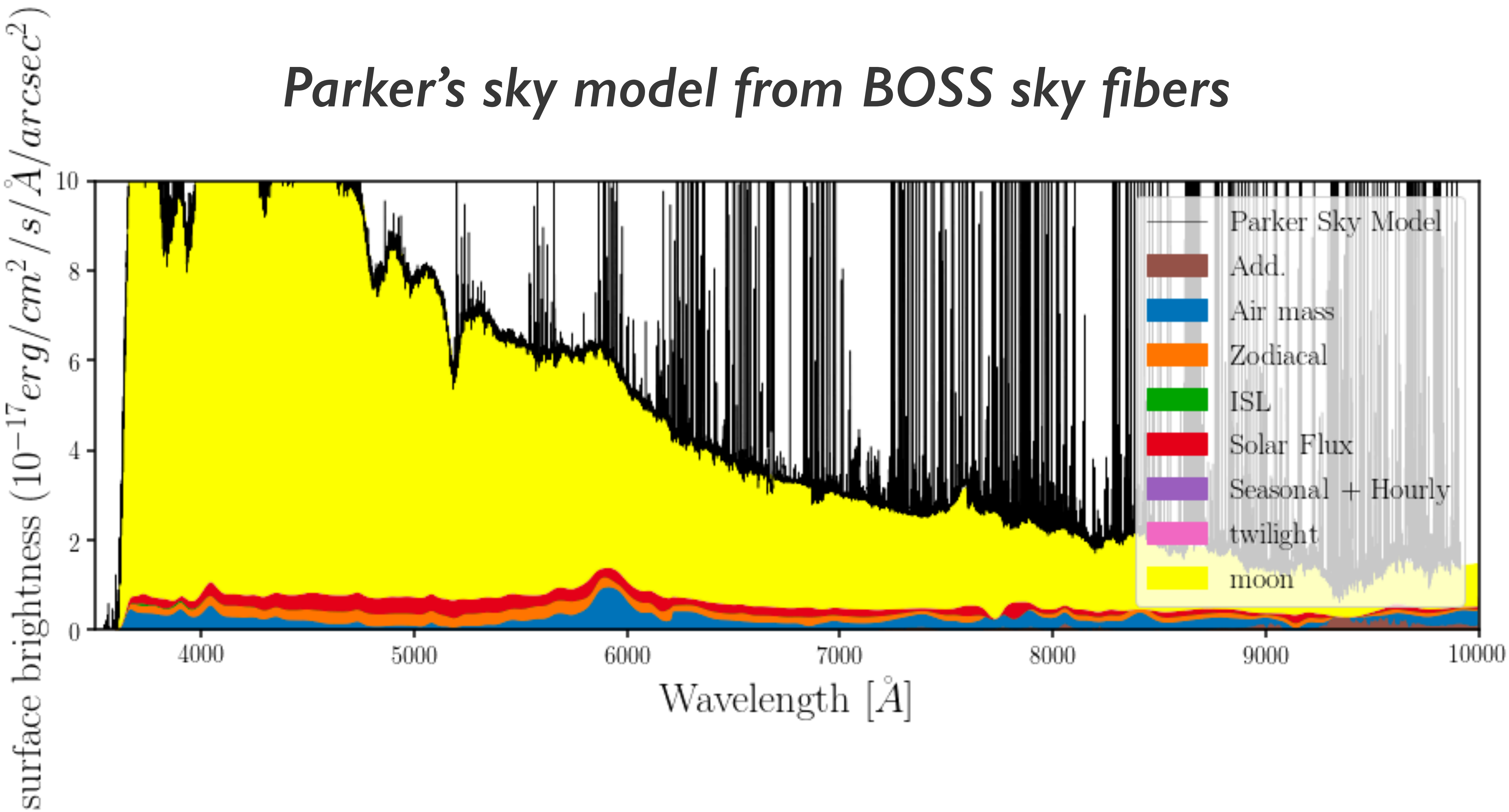
*UVES dark sky + Krisciunas & Schaefer (**1991**)* ***underestimates*** *the sky brightness*



*UVES dark sky + Krisciunas & Schaefer (**1991**)*
underestimates *the sky brightness*

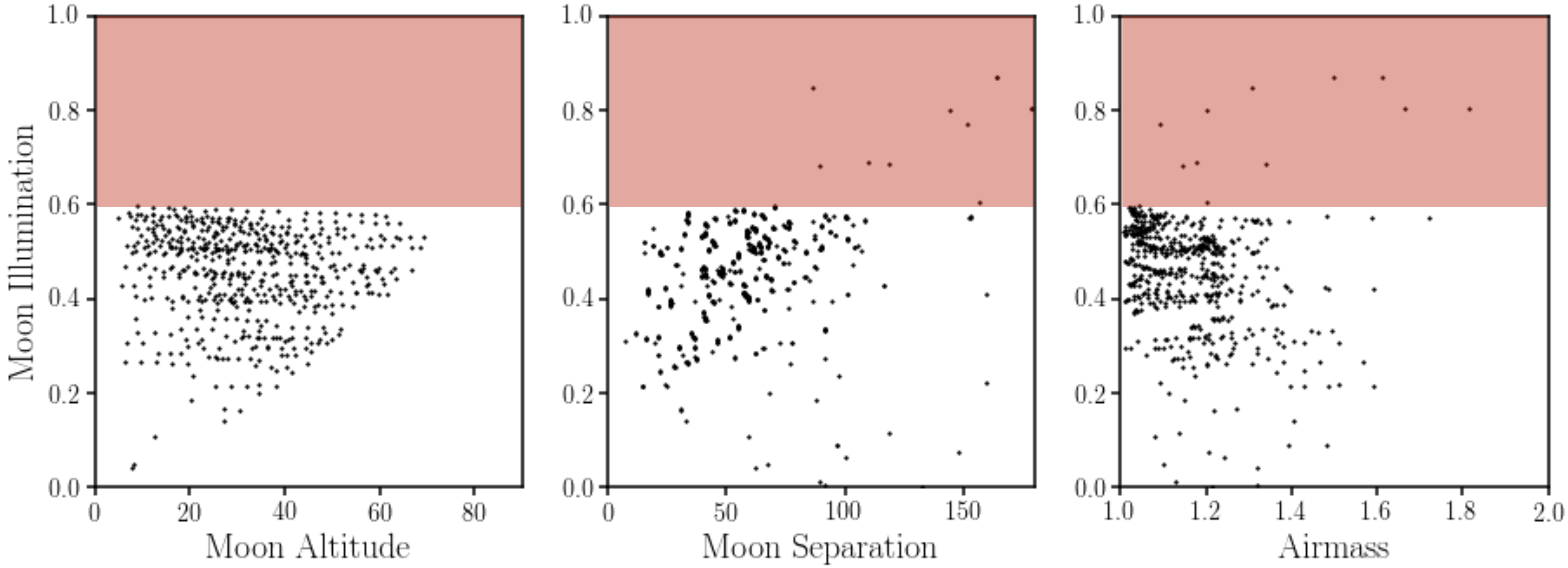


Parker's sky model from BOSS sky fibers



credit: Parker's thesis

~~Parker's sky model from BOSS sky fibers~~



BGS exposures typically above moon illumination of 0.6

credit: Parker's thesis

accurate redshift success rates for BGS:

reinventing the wheel (moon)

2019 lunar eclipse (credit: Manu Schaan) *source spectra*

+

new sky model

↓

realistic DESI BGS spectra

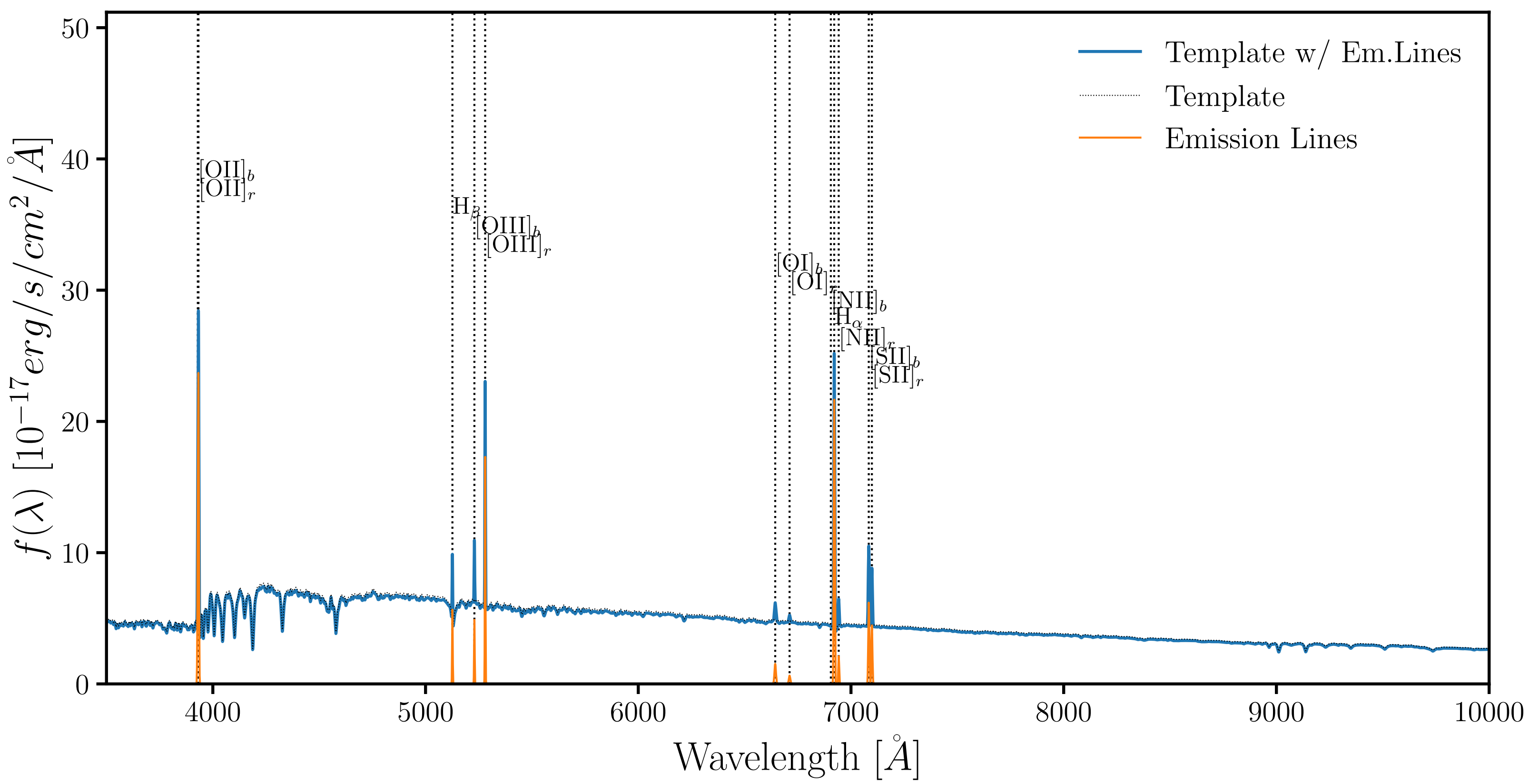
↓

redrock

source spectra

GAMA DR3 objects

(AGES templates based on Legacy photometry + GAMA emission lines)
x
normalized to match Legacy 1" aperture flux



new sky model

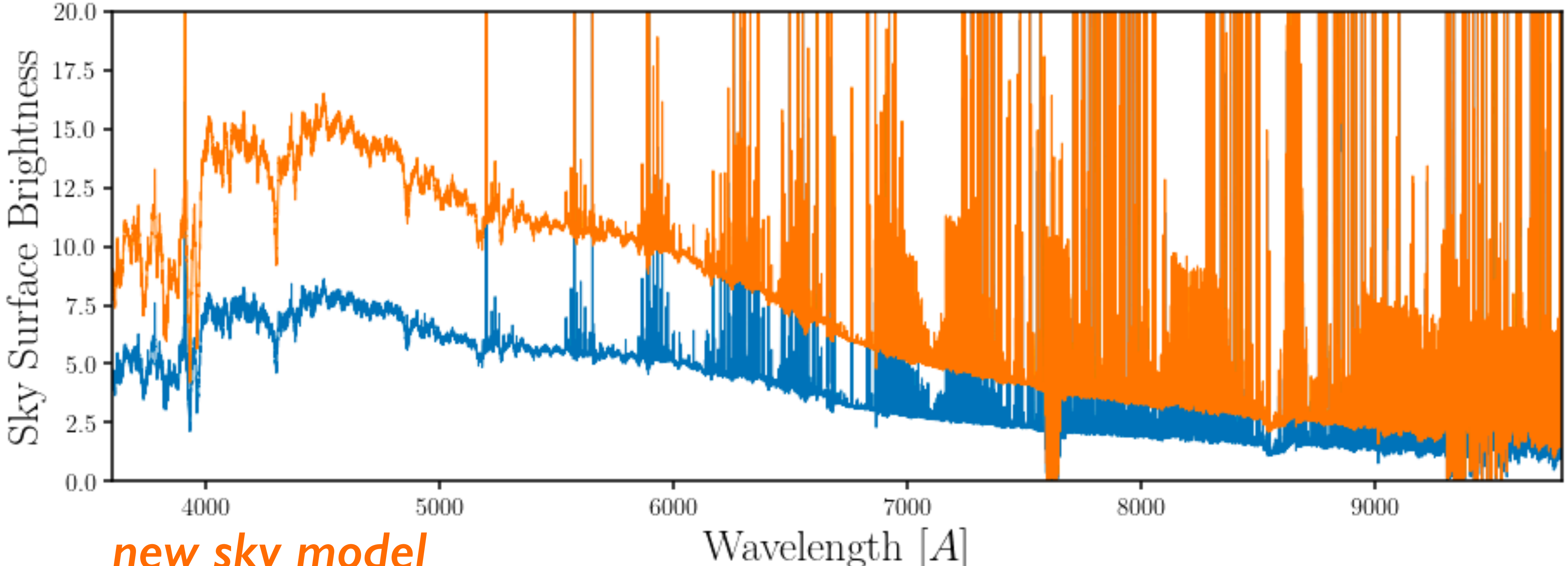
UVES dark sky

+

re-fit Krisciunas & Schaefer (1991) model

+

twilight contribution

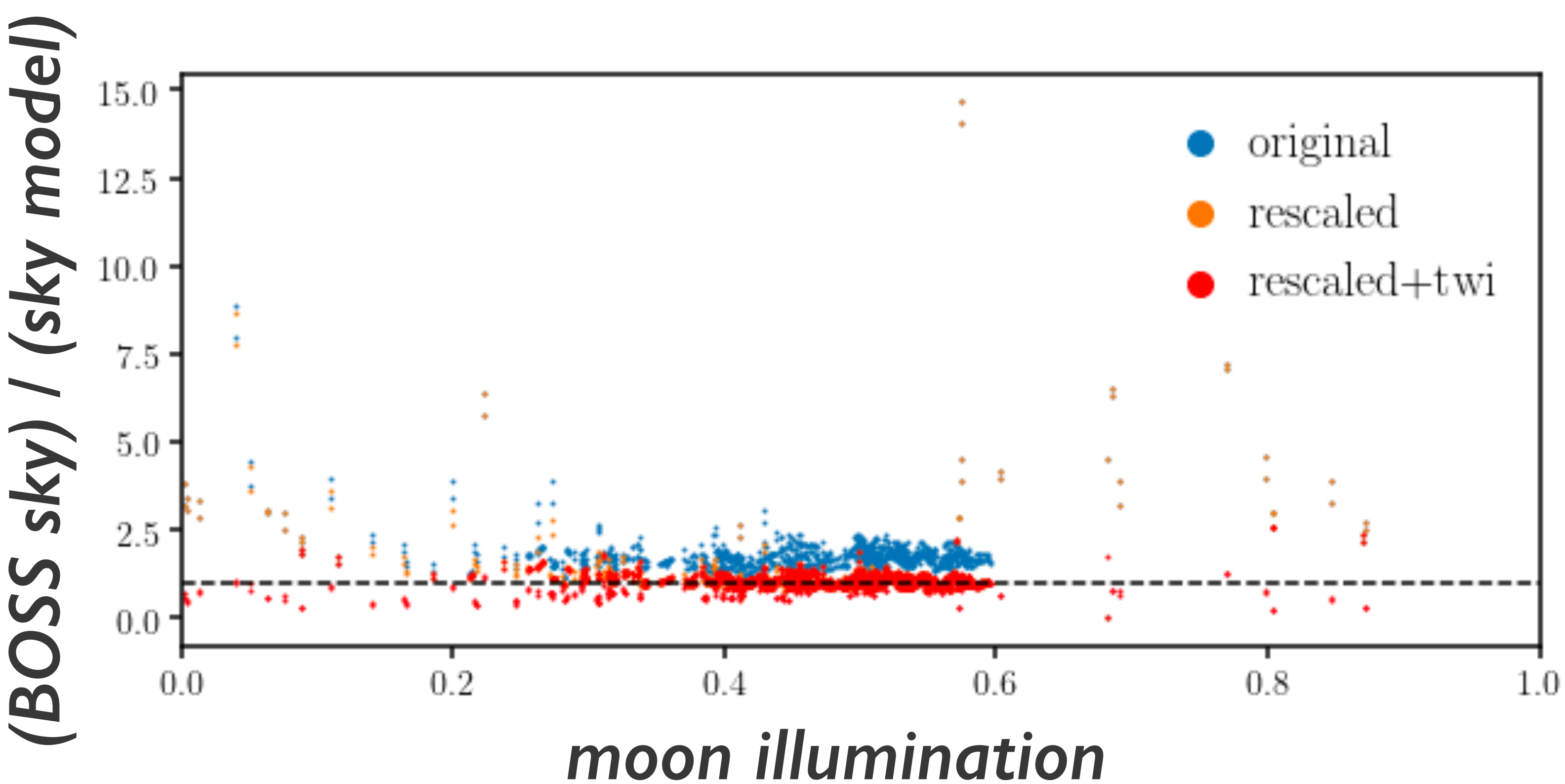


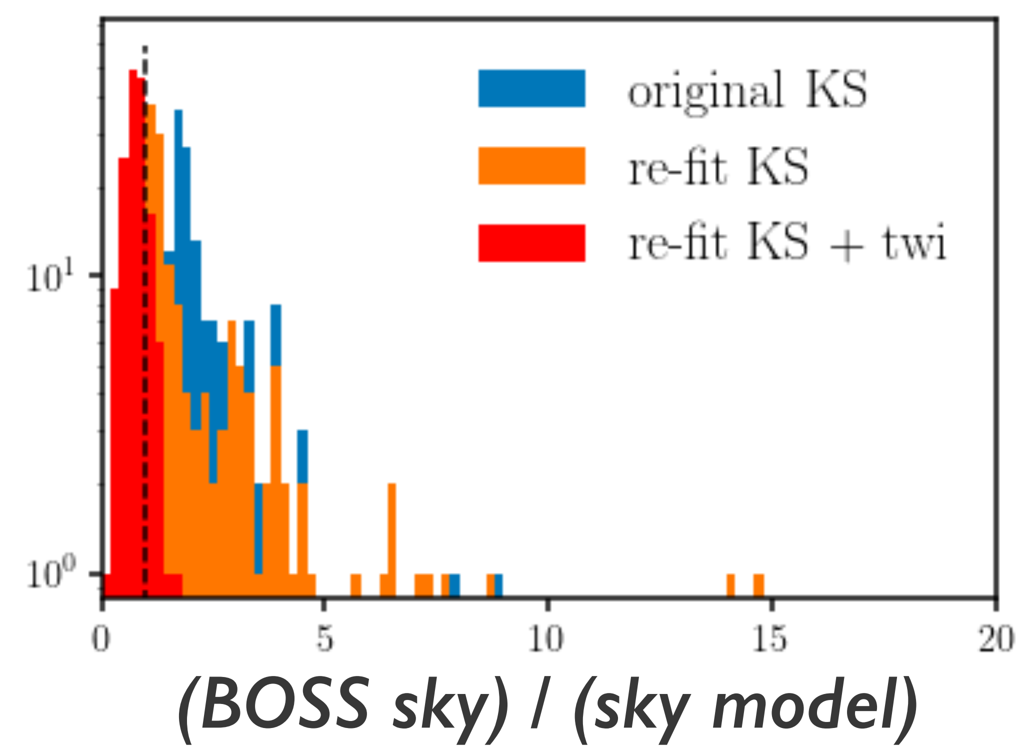
new sky model

old sky model

new sky model

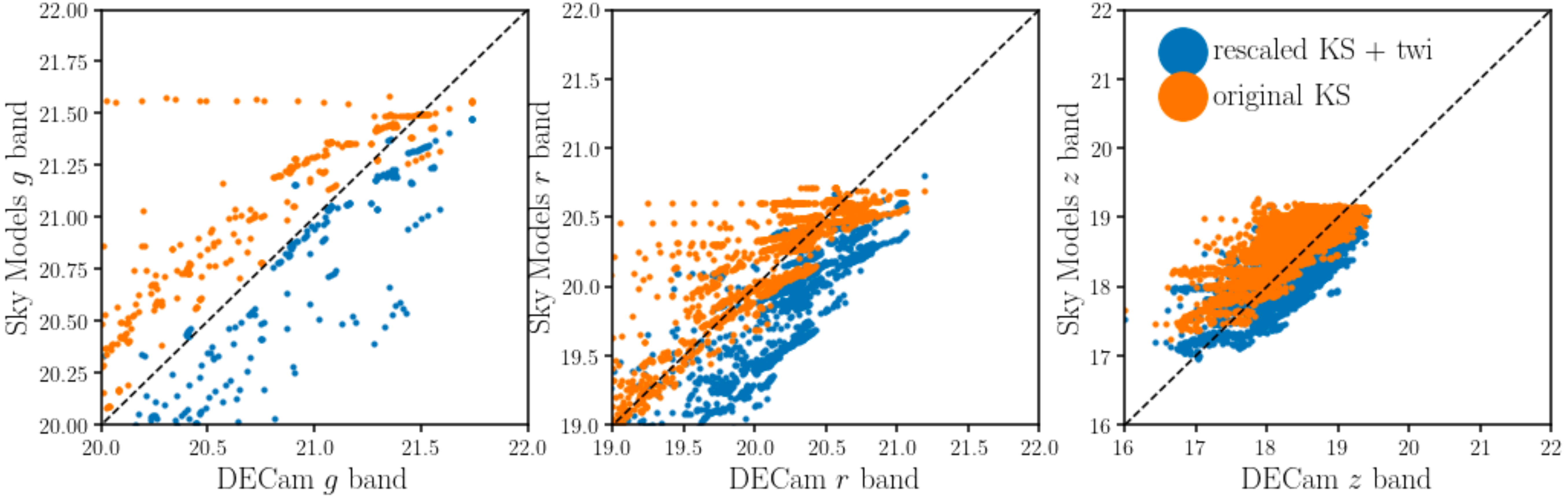
better reproduces BOSS sky fibers





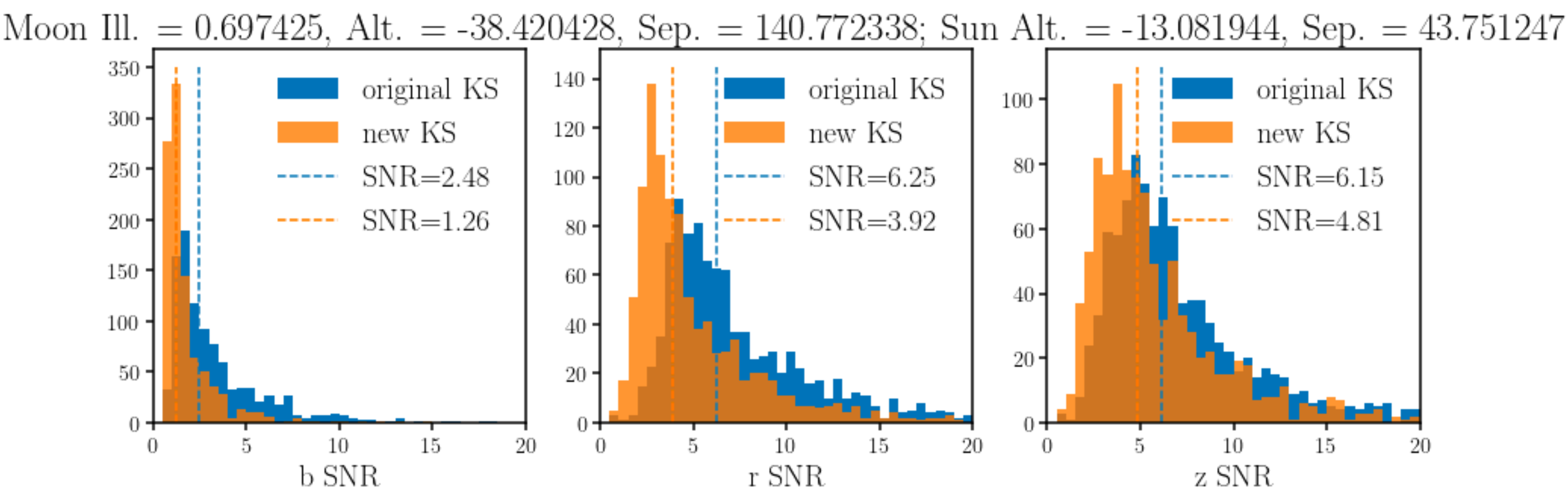
new sky model

and also DECam sky exposures



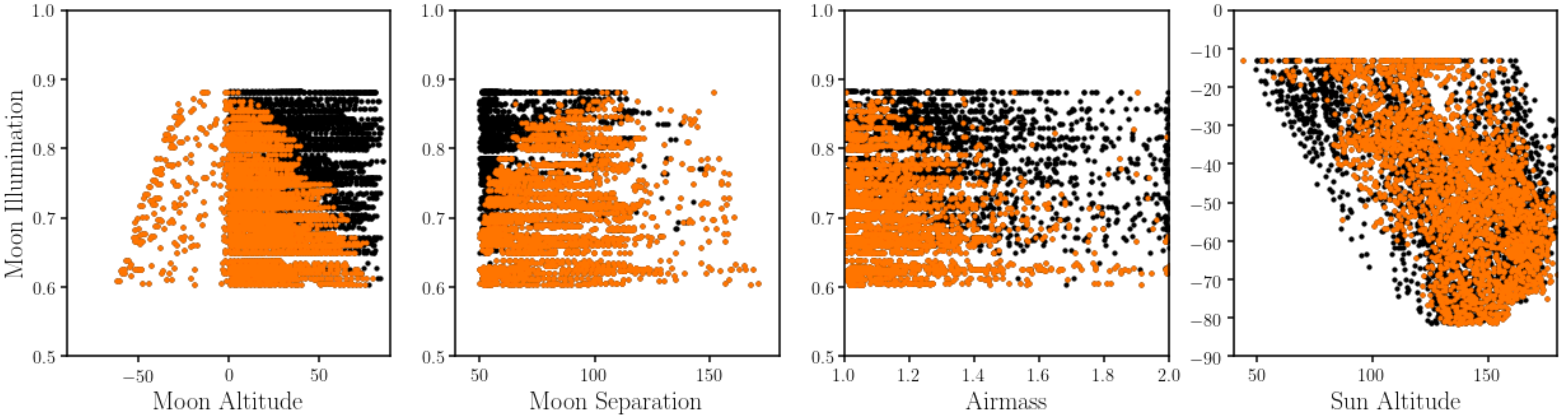
new sky model

reduces the signal-to-noise of the BGS spectra

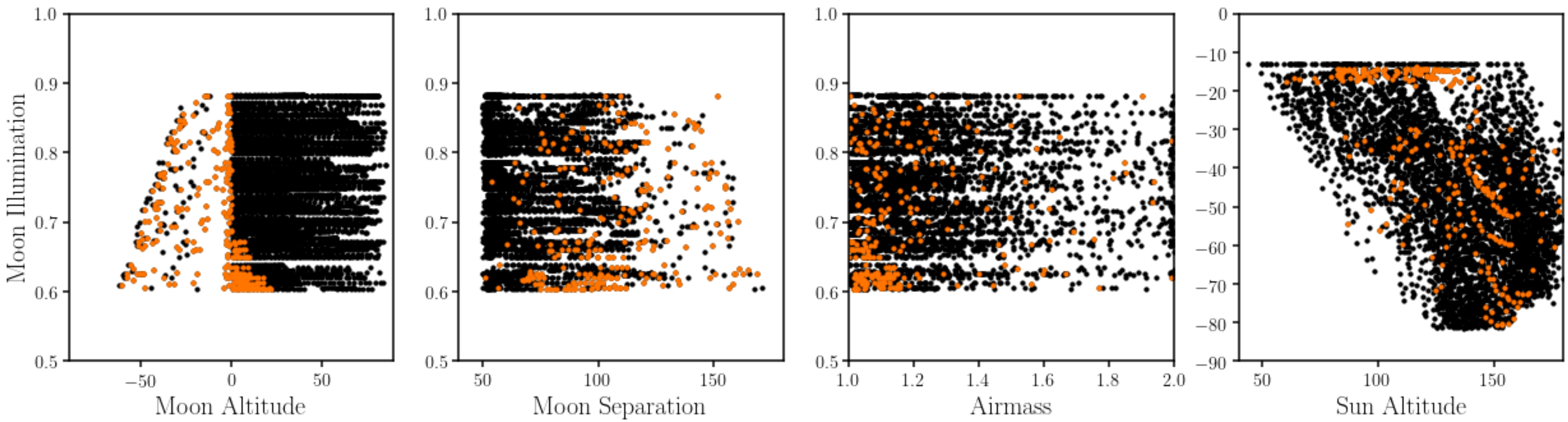


new sky model

*not **all** bad news:*
most of the BGS exposures from surveysim were <u>not</u> in bright time



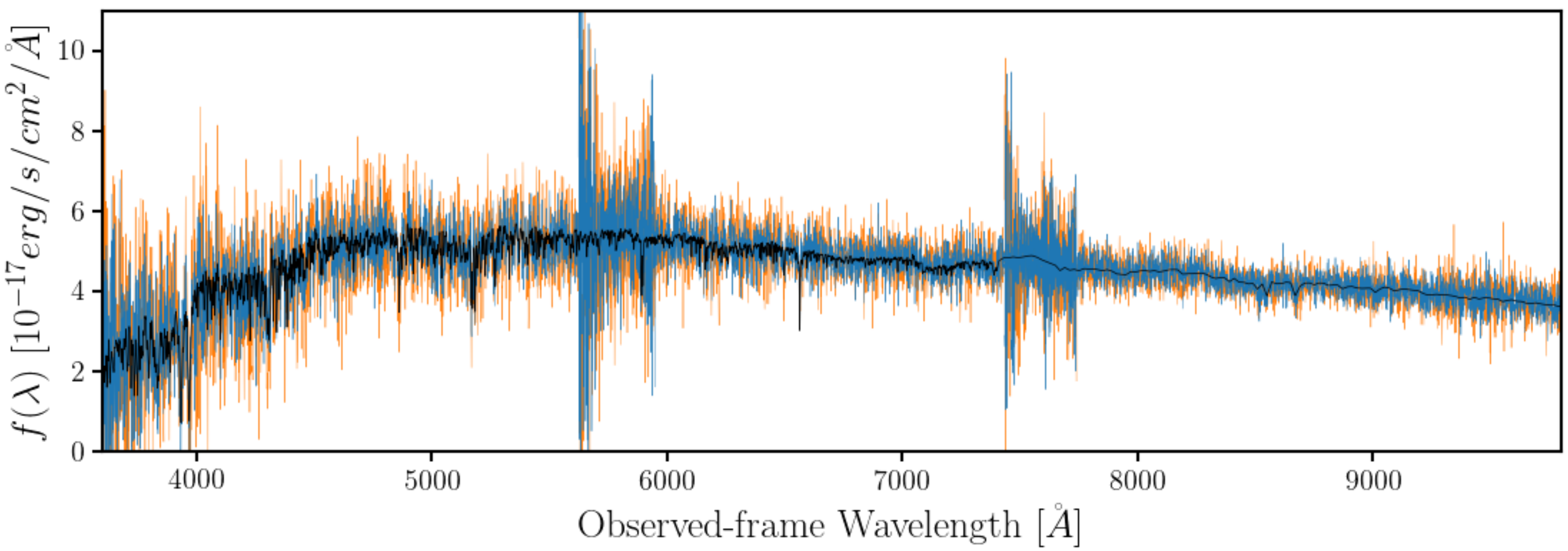
*when the **new sky model** makes things better*

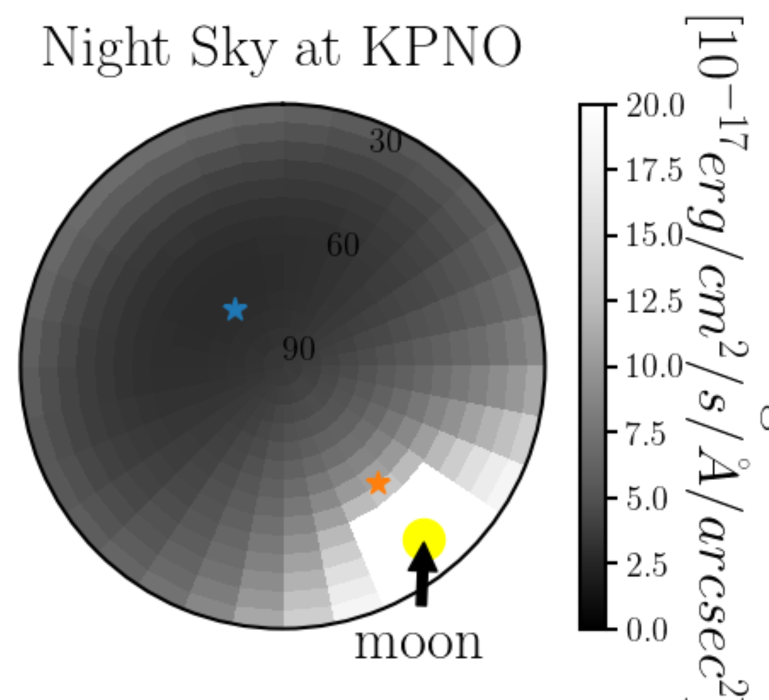


source spectra + new sky model

specsim

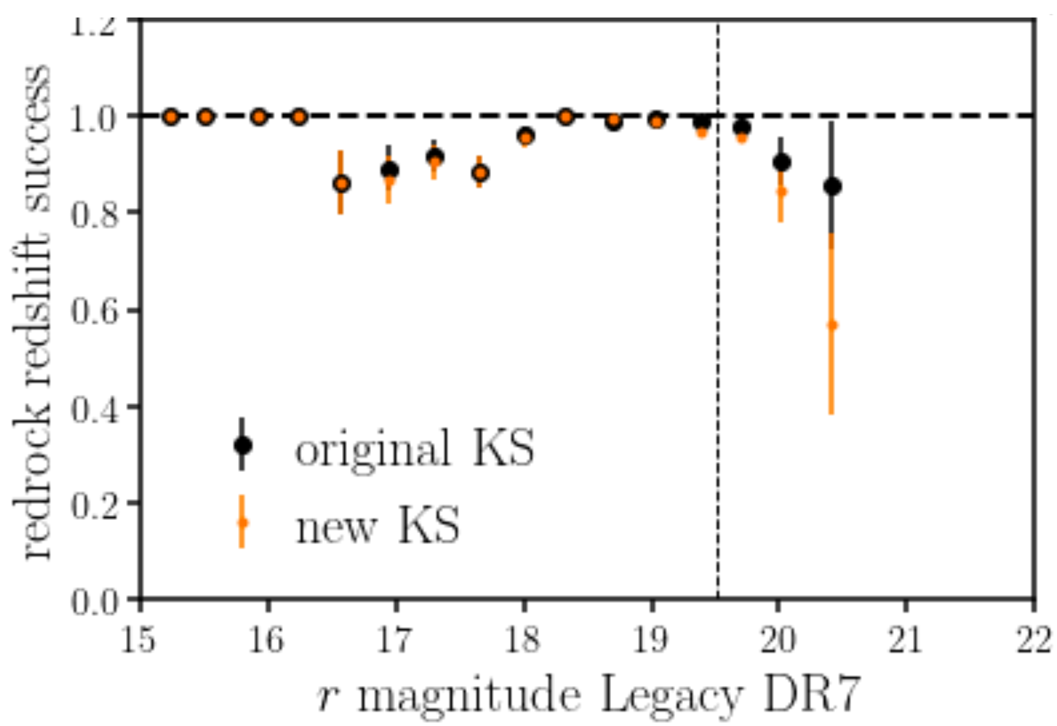
realistic DESI BGS spectra



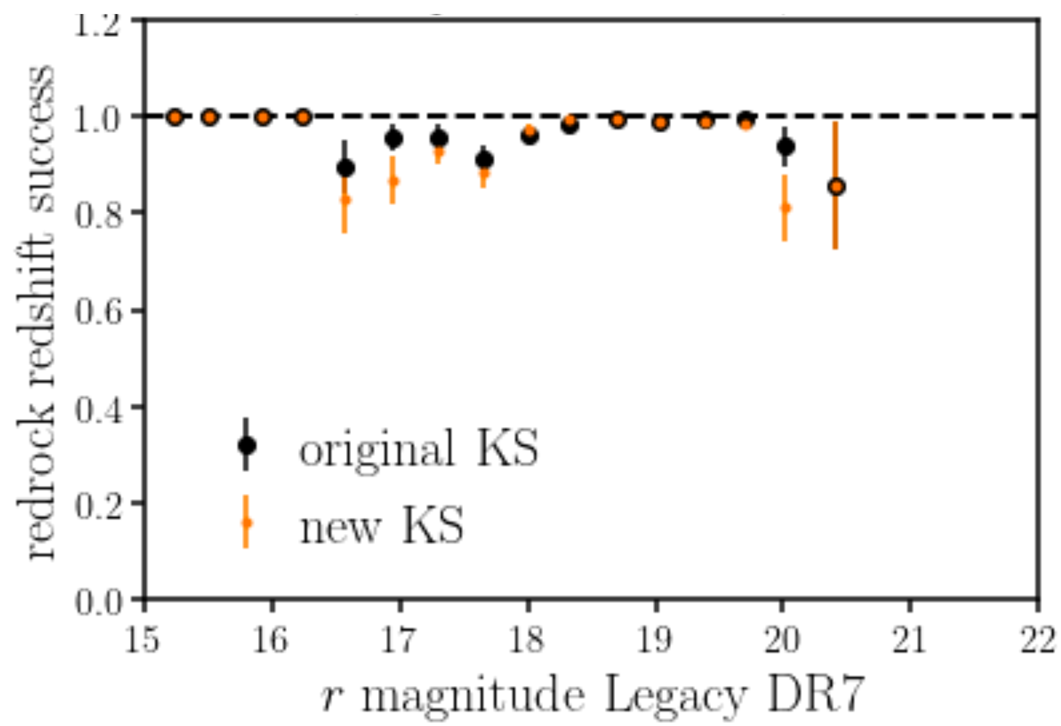


redshift success rate

fixed 480sec exposures



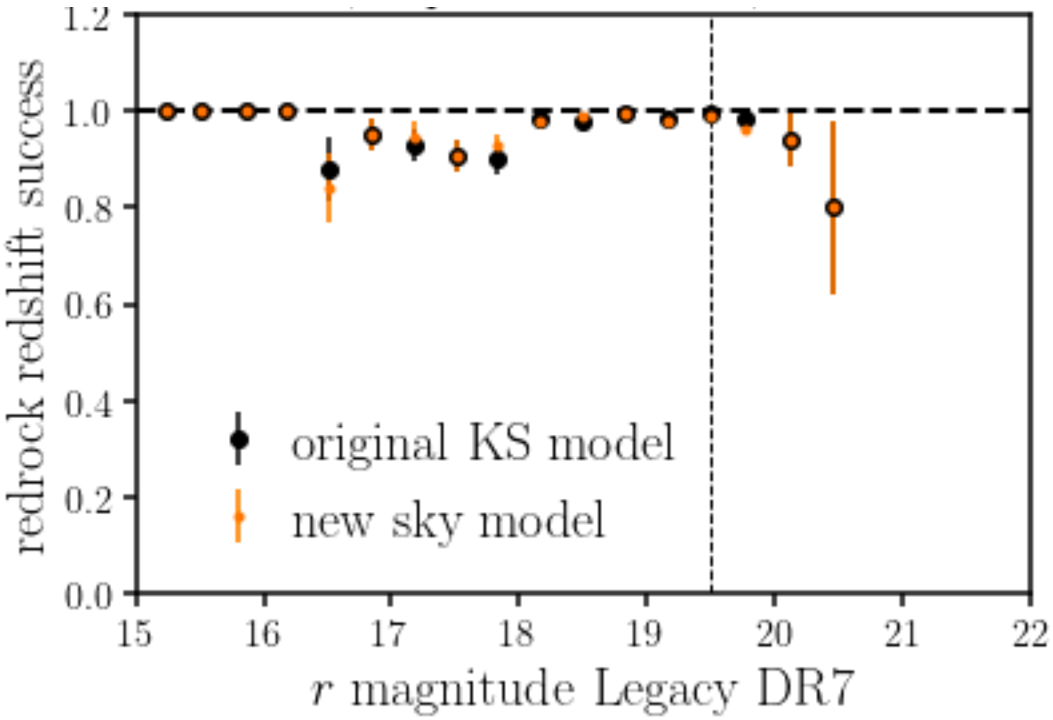
moon — ill: 0.88, alt: 50, sep: 72
sun — alt: -73, sep: 142
t_{exp} — 480 sec



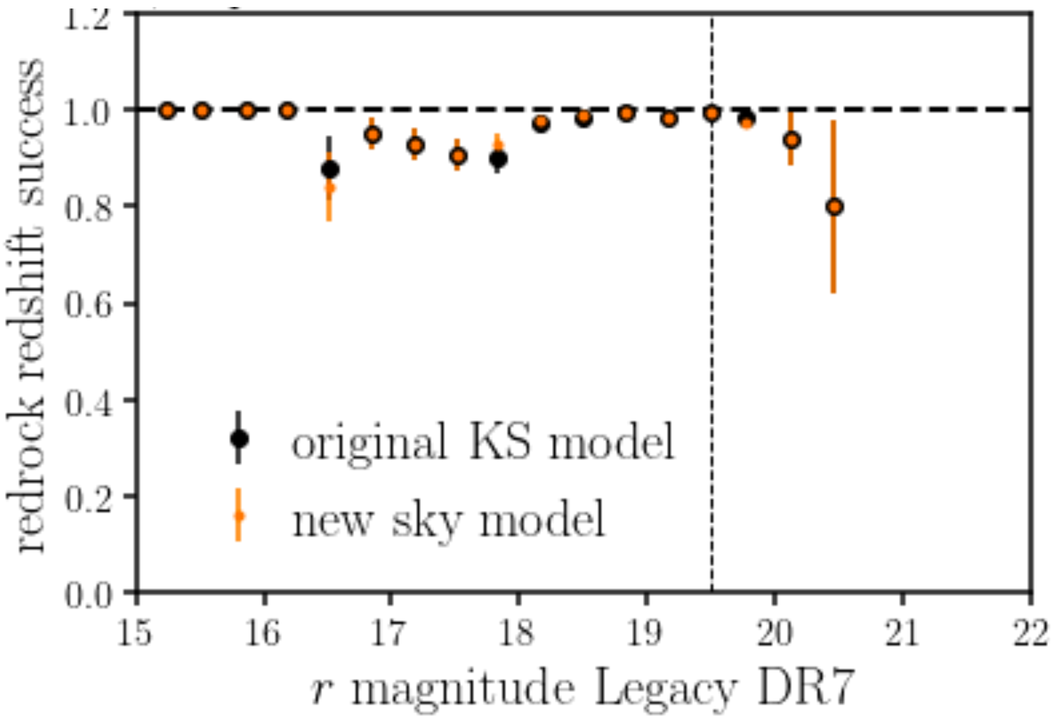
moon — ill: 0.7, alt: -38, sep: 140
sun — alt: -13, sep: 44
t_{exp} — 480 sec

redshift success rate

surveysim exposures



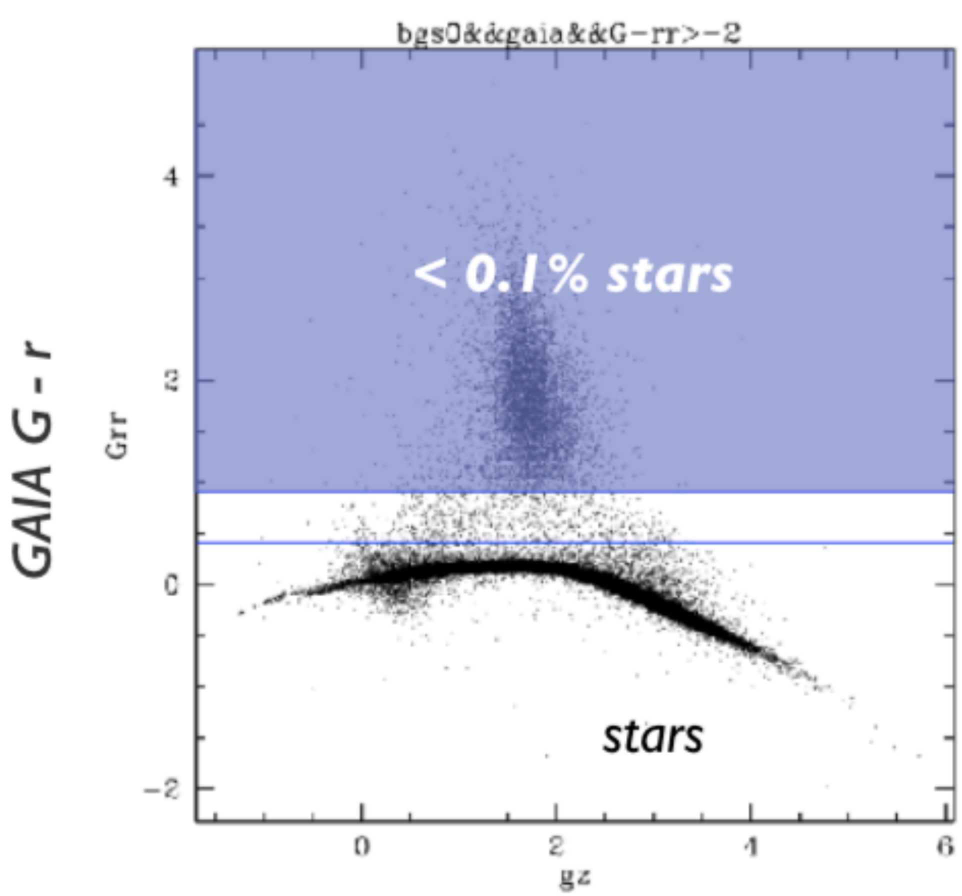
moon — ill: 0.84, alt: 51, sep: 71
sun — alt: -26, sep: 92
t_{exp} — 451 sec

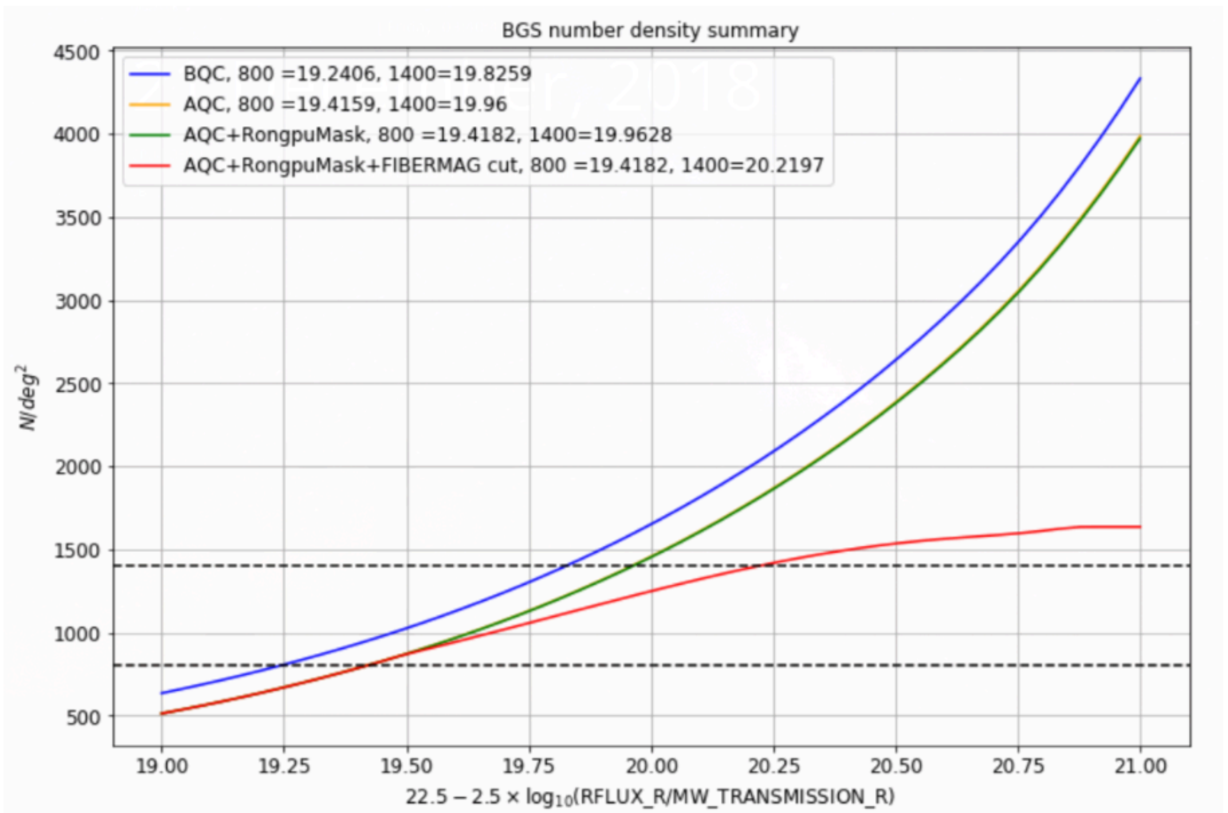


moon — ill: 0.73, alt: 66, sep: 54
sun — alt: -25, sep: 80
t_{exp} — 556 sec

survey validation: target selection

- GAMA fields to r < 20.1 (spectroscopic truth table)
- GAIA based star-galaxy separation
- Quality cuts + Rongpu's bright star mask + FIBERMAG cut





credit: Daniel Eisenstein, Omar Ruiz Macias (Durham)

survey validation: SV analyses

https://desi.lbl.gov/trac/wiki/BrightGalaxyWG/SVPlan

- *test sky model*
- *dark vs bright time comparison*
- *pipeline redshift vs GAMA redshifts*
- *clustering HOD analysis*

…

- *(your idea here!)*