15471 - The Extreme Starbursts that Re-ionized the Universe: Definitive Spectroscopic Detections of Escaping Lyman Limit Photons

Cycle: 25, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
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VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) SDSS-J090334.59+174717.7	COS/FUV COS/NUV	3	07-Aug-2018 11:02:16.0	yes
02	(2) SDSS-J020747.98+004735.4	COS/FUV COS/NUV	3	07-Aug-2018 11:02:17.0	yes

6 Total Orbits Used

ABSTRACT

We recently made a new broadband photometric search for galaxies in the SDSS DR14 having i-band excesses, due to extremely strong [OIII] emission lines (rest EW([OIII])>900Ang), at z~0.50. This identified a rapidly evolving population of "green pea" galaxies, which appear to be the likely sources of most of the ionizing photons escaping into the IGM. These spectroscopically confirmed extreme starbursts in metal-poor dwarf galaxies are the kind of 'young' galaxies which are thought to have re-ionized the universe. Their ISM is very highly ionized, and practically un-reddened. Their higher redshifts push their Lyman limits into a far more sensitive wavelength region of the HST/COS spectrograph than has been utilized on previous searches for ionizing photons leaking from lower-redshift galaxies. We propose FUV spectroscopy of two representatives of this newly studied galaxy population with very bright [OIII]. They are very compact intense starbursts (sSFR~10**-8 /year), with no trace of an AGN.

Their extremely blue stellar continuum is well detected in the NUV and FUV by GALEX.Their continuum brightness at an observed wavelength of 1400Ang (just redward of the Lyman limit) guarantees us of DETECTING their escaping Lyman limit fluxes at the 3-sigma level, even if the relative ionizing escape fraction is as low as 3.7%. We will also simultaneously measure their Lyman-alpha emission line profiles, to search for outflows and/or closely spaced double peaked emission that may be correlated with Lyman continuum leakage.

OBSERVING DESCRIPTION

We will obtain FUV spectroscopy of two extreme emission-line galaxies. Their extremely high specific star formation rates, and high-ionization gas make them prime candidates for detectable 'leakage' of ionizing photons. Their high redsfhits (z~0.5) shift their continuum shortward of the Lyman limit into the sensitive region of the COS spectrograph. We will therefore observe each of the two targets spectroscopically in the same short-wavelength setting for 3 full orbits apiece.

Visit

Proposal 15471, First Visit, First Target Galaxy (01), implementation Tue Aug 07 15:02:18 GMT 2018

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Comments: SDSS090334.59

Diagnostics

(First Visit, First Target Galaxy (01)) Warning (Form): If the target coordinates are not known to 0.4" (or better), an ACQ/SEARCH should precede the ACQ/IMAGE.

(SDSS090334.59+174717.7 (01.002)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.

(SDSS090334.59+174717.7 (01.003)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.

(SDSS090334.59+174717.7 (01.004)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.

(SDSS090334.59+174717.7 (01.005)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.

Fixed Targets

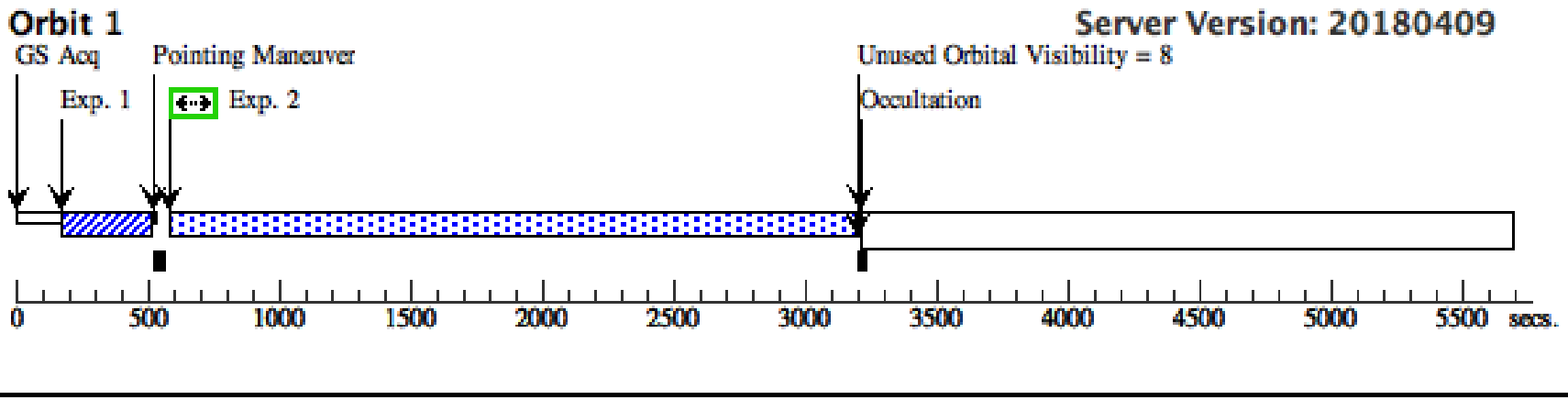
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SDSS-J090334.59+174717.7	RA: 09 03 34.5900 (135.8941250d) Dec: +17 47 17.74 (17.78826d) Equinox: J2000		V=19.9+/-0.05	Reference Frame: ICRS

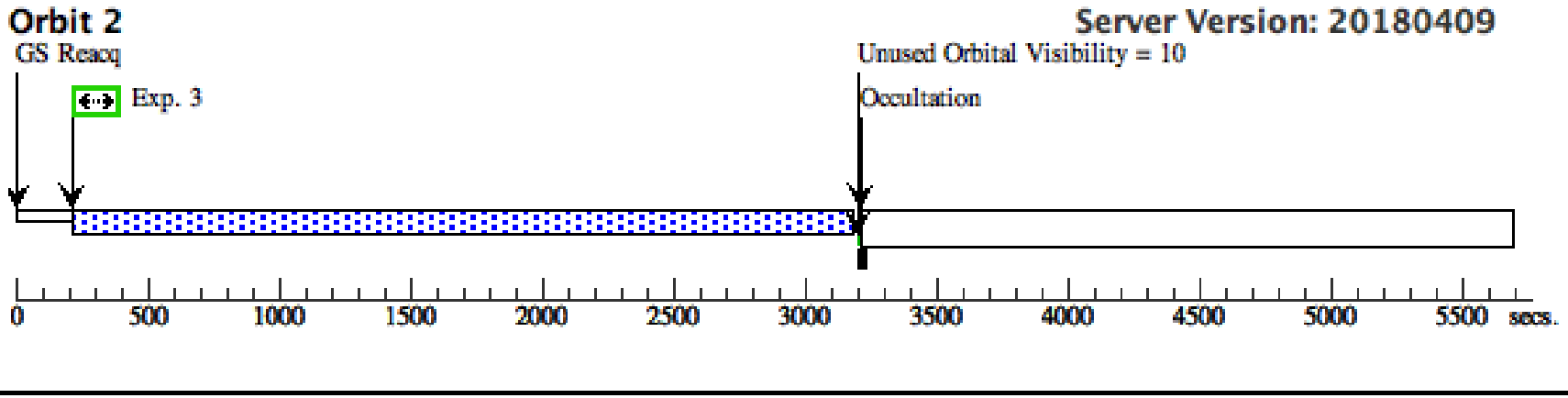
Comments: This object was generated by the targetselector and retrieved from the NED database.
Category=GALAXY
Description=[DWARF COMPACT, STARBURST]
Extended=YES

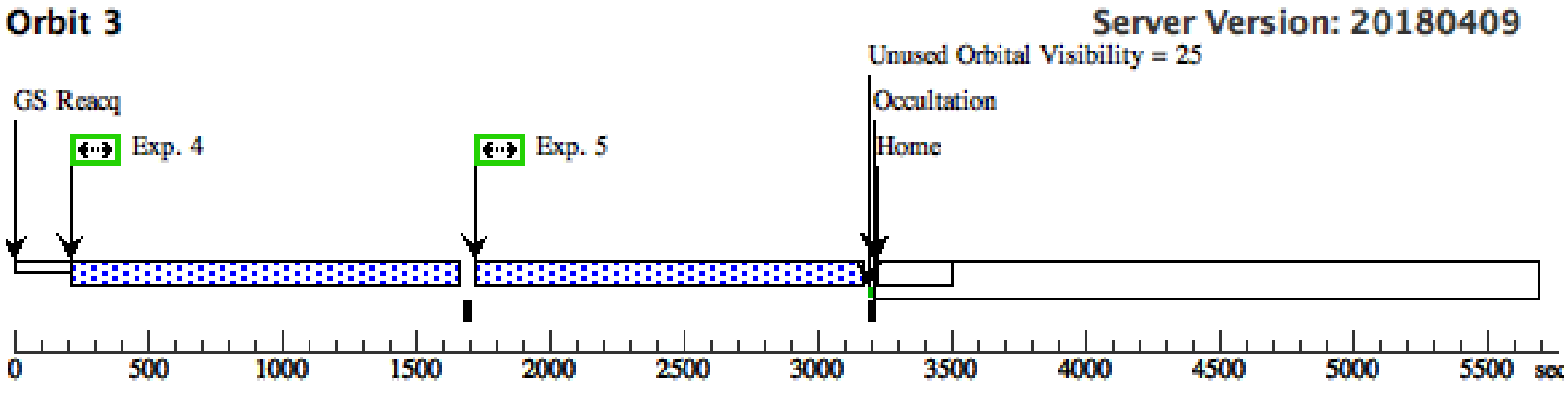
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	SDSS090334.59+174717.7 (COS.ta.1166198)	(1) SDSS-J090334.59+174717.7	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				60 Secs (60 Secs) *[==>]*	***[1]***
2	SDSS090334.59+174717.7 (COS.sp.1166067)	(1) SDSS-J090334.59+174717.7	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FP-POS=1; FLASH=YES; BUFFER-TIME=20000			2440 Secs (2440 Secs) *[==>]*	***[1]***
3	SDSS090334.59+174717.7 (COS.sp.1166067)	(1) SDSS-J090334.59+174717.7	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FP-POS=2; FLASH=YES; BUFFER-TIME=20000			2920 Secs (2920 Secs) *[==>]*	***[2]***
4	SDSS090334.59+174717.7 (COS.sp.1166067)	(1) SDSS-J090334.59+174717.7	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FP-POS=3; FLASH=YES; BUFFER-TIME=20000			1400 Secs (1400 Secs) *[==>]*	***[3]***
5	SDSS090334.59+174717.7 (COS.sp.1166067)	(1) SDSS-J090334.59+174717.7	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FP-POS=4; FLASH=YES; BUFFER-TIME=20000			1400 Secs (1400 Secs) *[==>]*	***[3]***

Orbit Structure







Visit

Proposal 15471, Second Visit, Second Target (02), implementation Tue Aug 07 15:02:18 GMT 2018

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Comments: [OIII] galaxy 020747.98

Diagnostics

(Second Visit, Second Target (02)) Warning (Form): If the target coordinates are not known to 0.4" (or better), an ACQ/SEARCH should precede the ACQ/IMAGE.

(SDSS-J020747.98+004735.4 (02.002)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.

(SDSS-J020747.98+004735.4 (02.003)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.

(SDSS-J020747.98+004735.4 (02.004)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.

(SDSS-J020747.98+004735.4 (02.005)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	SDSS-J020747.98+004735.4	RA: 02 07 47.9856 (31.9499400d) Dec: +00 47 35.45 (.79318d) Equinox: J2000		V=19.95+/-.05	Reference Frame: ICRS

Comments: This object was generated by the targetselector and retrieved from the NED database.
Category=GALAXY
Description=[DWARF COMPACT, STARBURST]
Extended=YES

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	SDSS-J020747.98+004735.4 (COS.ta.1166198)	(2) SDSS-J020747.98+004735.4	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				55 Secs (55 Secs) *[==>]*	***[1]***
2	SDSS-J020747.98+004735.4 (COS.sp.1166067)	(2) SDSS-J020747.98+004735.4	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FP-POS=1; FLASH=YES; BUFFER-TIME=20000			2440 Secs (2440 Secs) *[==>]*	***[1]***
3	SDSS-J020747.98+004735.4 (COS.sp.1166067)	(2) SDSS-J020747.98+004735.4	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FP-POS=2; FLASH=YES; BUFFER-TIME=20000			2900 Secs (2900 Secs) *[==>]*	***[2]***
4	SDSS-J020747.98+004735.4 (COS.sp.1166067)	(2) SDSS-J020747.98+004735.4	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FP-POS=3; FLASH=YES; BUFFER-TIME=20000			1400 Secs (1400 Secs) *[==>]*	***[3]***
5	SDSS-J020747.98+004735.4 (COS.sp.1166067)	(2) SDSS-J020747.98+004735.4	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FP-POS=4; FLASH=YES; BUFFER-TIME=20000			1400 Secs (1400 Secs) *[==>]*	***[3]***

Orbit Structure