16054 - Mapping HI 21cm emission in Green Pea galaxies

Cycle: 27, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. Nissim Kanekar (PI) (Contact)	**National Centre for Radio Astrophysics, TIFR**	**nkanekar@ncra.tifr.res.in**
Dr. Sangeeta Malhotra (CoI)	NASA Goddard Space Flight Center	sangeeta.malhotra@nasa.gov
Dr. James Rhoads (CoI)	NASA Goddard Space Flight Center	james.rhoads@asu.edu
Tapasi Ghosh (CoI)	National Centre for Radio Astrophysics, TIFR	tghosh@nrao.edu
Jayaram Chengalur (CoI)	National Centre for Radio Astrophysics, TIFR	chengalu@ncra.tifr.res.in
Huan Yang (CoI)	Carnegie Institution of Washington	hyang@carnegiescience.edu
Dr. Santosh Harish (CoI)	Arizona State University	santosh.harish@asu.edu
Mr. John Pharo (CoI)	Arizona State University	jpharo91@gmail.com

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) GP1108+2238	COS/FUV COS/NUV	2	30-Jan-2020 16:01:31.0	yes
03	(3) GP1302+6534	COS/FUV COS/NUV	1	30-Jan-2020 16:01:32.0	yes
05	(5) GP1345+442	COS/FUV COS/NUV	1	30-Jan-2020 16:01:33.0	yes
04	(4) GP1455+3808	COS/FUV COS/NUV	2	30-Jan-2020 16:01:33.0	yes

6 Total Orbits Used

ABSTRACT

Green Pea Galaxies are compact, low-mass, extreme starburst systems in the nearby Universe, with strong emission lines that rival the stellar continuum in their total luminosity. Such strong line emission demands vigorous star formation, with characteristic ages of just a few million years for the stellar populations that dominate the optical and UV light. Green Peas are the best analogs of high redshift Lyman-alpha emitting galaxies, with many showing high leakage of ionizing photons. Until recently, little information was available about the neutral gas, the fuel for star formation, in Green Peas. We have now used the Arecibo and Green Bank Telescopes to measure the HI content of a sample of Green Peas. We propose here to use the JVLA to map the HI 21cm emission from six galaxies of our sample, and to also obtain HST-COS FUV spectroscopy covering the Lyman-alpha line and the far-ultraviolet metal lines of five of the six galaxies, to infer the spatial distribution of the HI, and derive the HI column density, filling factor, and kinematics, to understand the conditions that promote Ly-alpha escape. We request 48 JVLA L- band hours in C-array, and seven HST-COS orbits, for this project, including all overheads and calibration.

OBSERVING DESCRIPTION

We wish to obtain COS FUV spectra of 6 low-redshift green peas that have detected 21-cm HI radio emission and have no UV spectra covering restframe \lya\ line in the archives. We will use these spectra to characterize \lya\ line emission (where present), \lya\ line absorption, and metal line absorption. These measurements will enable us to measure the \lya\ escape fraction, and to measure the neutral gas column density and covering fraction using multiple tracers. This will enable the \lya\ escape to be compared to the neutral gas supply in a statistically useful sample of Green Peas for the first time. Existing archival data + currently approved observing programs supply another 2 (soon to be 3 objects), which we will include in our analysis for an overall sample of 9 objects. Among the two currently in the archive, all show measurable damped \lya\ absorption, and one shows a strong, narrow \lya\ emission line also. One object has a spectrum taken with G140L which is low enough resolution to preclude robust radiative transfer modelling.

Visit

Proposal 16054, Visit 01, implementation Thu Jan 30 21:01:34 GMT 2020

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: SCHED 70%

Diagnostics

(Exposure 2 (Visit 01)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.

Fixed Targets

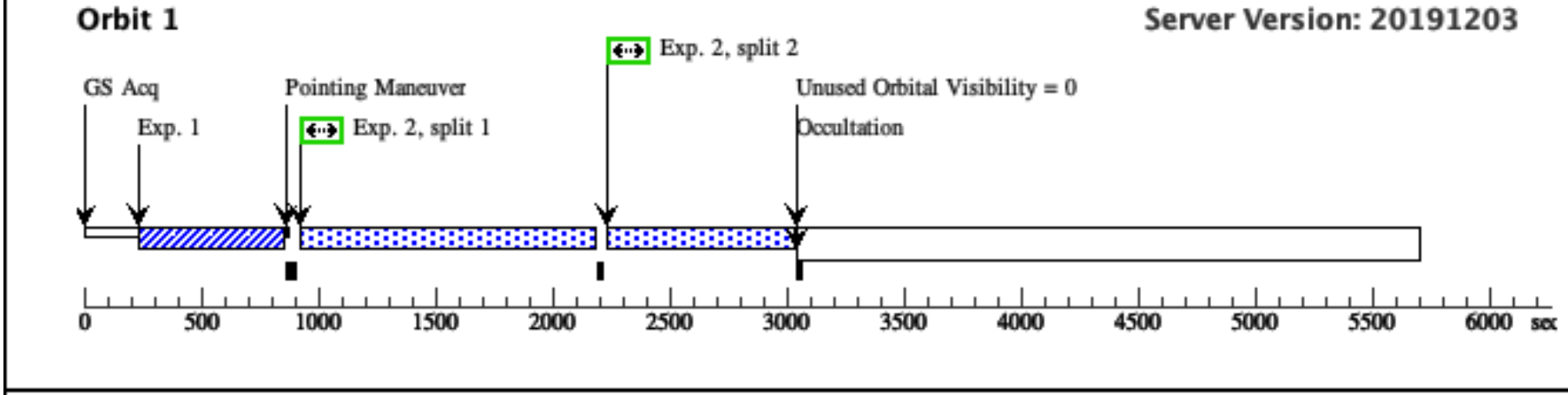
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GP1108+2238	RA: 11 08 38.5000 (167.1604167d) Dec: +22 38 9.78 (22.63605d) Equinox: J2000		V=17	Reference Frame: ICRS

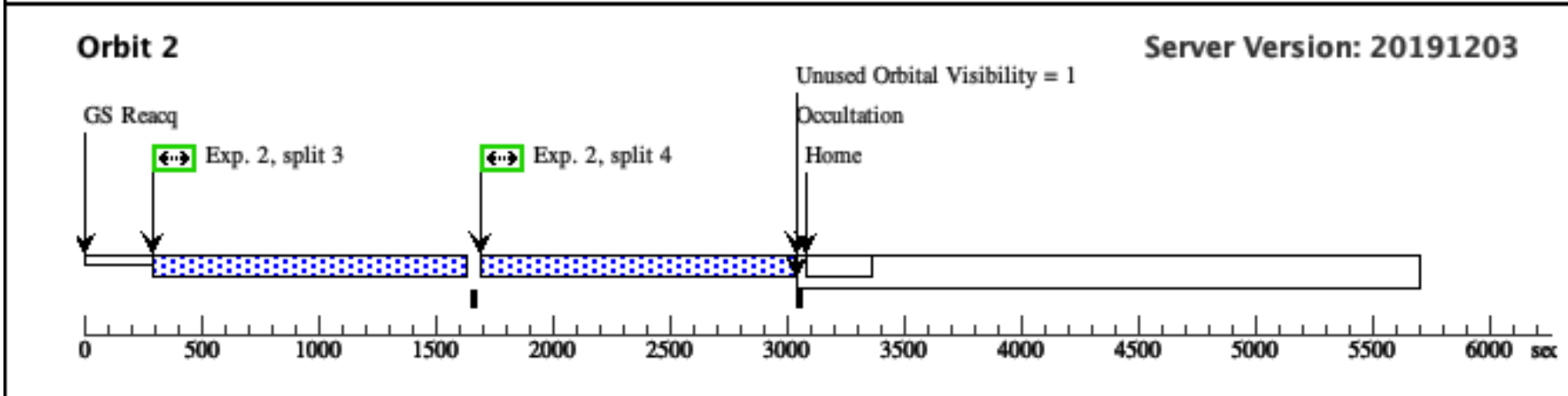
Comments:
Category=GALAXY
Description=[DWARF COMPACT, STARBURST]
Extended=YES

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.ta.1401220)	(1) GP1108+2238	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				200 Secs (200 Secs) *[==>]*	 ***[1]***
2	(COS.sp.1401203)	(1) GP1108+2238	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=ALL; BUFFER-TIME=14 291			500 Secs (4391 Secs) *[==>1074.0 Secs (Split 1)]* *[==>745.0 Secs (Split 2)]* *[==>1286.0 Secs (Split 3)]* *[==>1286.0 Secs (Split 4)]*	 ***[1]*** ***[2]***

Orbit Structure





Visit

Proposal 16054, Visit 03, implementation Thu Jan 30 21:01:34 GMT 2020

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Diagnostics

(Exposure 2 (Visit 03)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.

Fixed Targets

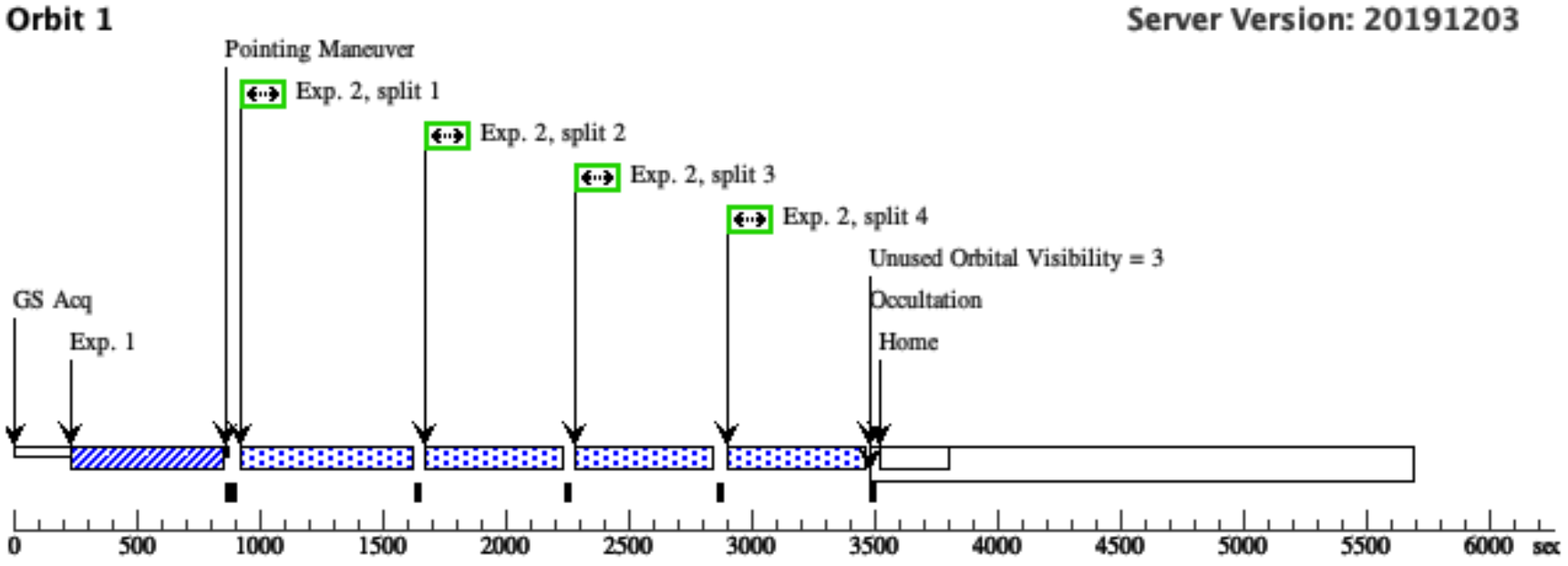
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	GP1302+6534	RA: 13 02 49.2000 (195.7050000d) Dec: +65 34 49.30 (65.58036d) Equinox: J2000		V=17	Reference Frame: ICRS

Comments:
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	(COS.ta.1401220)	(3) GP1302+6534	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				200 Secs (200 Secs) *[==>]*	 ***[1]***
2	(COS.sp.1401203)	(3) GP1302+6534	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=ALL; BUFFER-TIME=14291			420 Secs (2048 Secs) *[==>512.0 Secs (Split 1)]* *[==>512.0 Secs (Split 2)]* *[==>512.0 Secs (Split 3)]* *[==>512.0 Secs (Split 4)]*	 ***[1]***

Orbit Structure



Visit

Proposal 16054, Visit 05, implementation Thu Jan 30 21:01:34 GMT 2020

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Diagnostics

(Exposure 2 (Visit 05)) Warning (Form): COS FUV PSA science exposures with extended targets have special calibration limitations. See "Errors and Warnings" for more details.

Fixed Targets

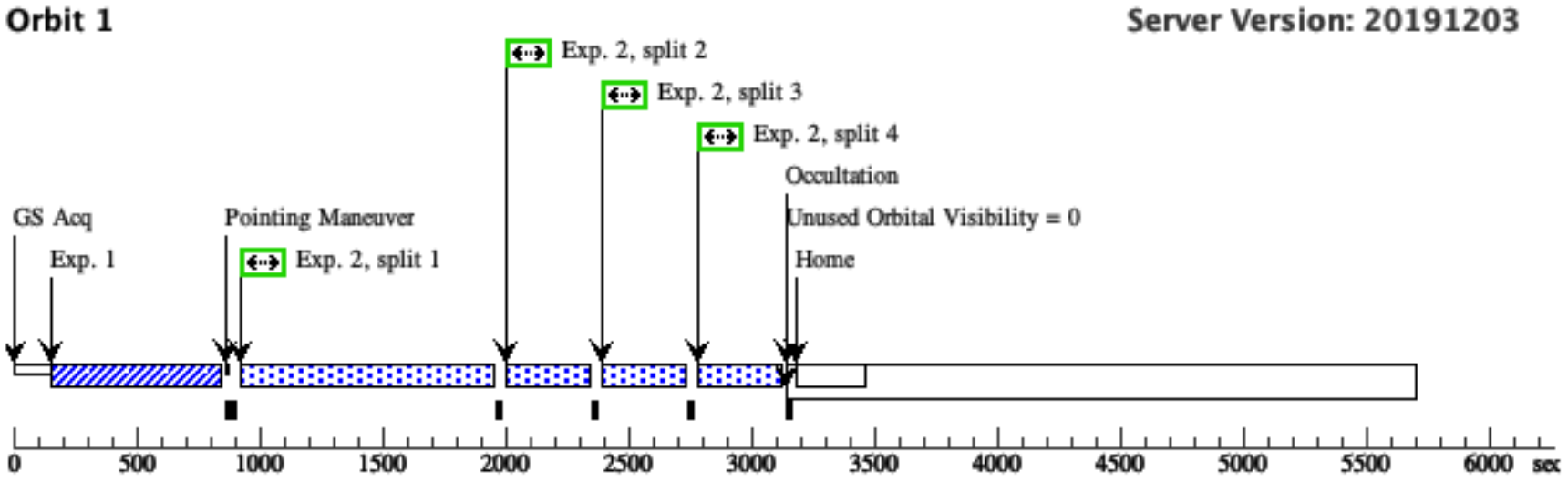
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(5)	GP1345+442	RA: 13 45 31.5000 (206.3812500d) Dec: +04 42 32.70 (4.70908d) Equinox: J2000		V=17	Reference Frame: ICRS

Comments:
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	(COS.ta.1401220)	(5) GP1345+442	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				200 Secs (200 Secs) *[==>]*	 ***[1]***
2	(COS.sp.1401203)	(5) GP1345+442	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=ALL; BUFFER-TIME=14 291			100 Secs (1707 Secs) *[==>843.0 Secs (Split 1)]* *[==>288.0 Secs (Split 2)]* *[==>288.0 Secs (Split 3)]* *[==>288.0 Secs (Split 4)]*	 ***[1]***

Orbit Structure



Visit

Proposal 16054, Visit 04, implementation Thu Jan 30 21:01:34 GMT 2020

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Diagnostics

(Exposure 2 (Visit 04)) 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
(4)	GP1455+3808	RA: 14 55 6.0800 (223.7753333d) Dec: +38 08 16.69 (38.13797d) Equinox: J2000		V=17	Reference Frame: ICRS

Comments:
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	(COS.ta.1401220)	(4) GP1455+3808	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				200 Secs (200 Secs) *[==>]*	 ***[1]***
2	(COS.sp.1401203)	(4) GP1455+3808	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=ALL; BUFFER-TIME=14291			500 Secs (4703 Secs) *[==>1475.0 Secs (Split 1)]* *[==>(Split 2)]* *[==>1364.0 Secs (Split 3)]* *[==>1364.0 Secs (Split 4)]*	 ***[1]*** ***[2]***

Orbit Structure