14687 - The Origin of the Leading Arm of the Magellanic Stream

Cycle: 24, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

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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) UVQSJ101629.20-315023.6	COS/FUV COS/NUV	4	29-Jul-2016 14:51:06.0	yes
02	(2) CD14-A05	COS/FUV COS/NUV	2	29-Jul-2016 14:51:08.0	yes

6 Total Orbits Used

ABSTRACT

A vast debris field of gas connects the Magellanic Clouds and the Milky Way. Known as the Leading Arm (LA), this structure is actively feeding the Galactic disk with new fuel for star formation. Three main concentrations of gas exist, named LA I, LA II, and LA III, but the metallicity has only been measured in one of these three (S/H=0.25+/-0.07 solar in LA II), and the physical connections between the regions are unclear. Here we propose COS FUV spectroscopy of two additional targets (one star and one QSO) that probe LA I and LA III, to map the LA metallicity as a function of position. By comparing the LA chemical abundances in each region we will directly test models of LA formation (single stripping event vs multiple episodes) and therefore constrain the dynamics of the Magellanic System. The observations will also provide measurements of the dust content of the LA via the S/Fe ratio, and the high-ion content via the Si IV doublet, which traces the interaction between the LA and the hot halo of the Milky Way.

Overall, this program will form a case study of the only gas structure accreting onto the Milky Way that can be traced to a neighboring galaxy, and will therefore explore the mechanisms by which galaxies fuel their star formation.

OBSERVING DESCRIPTION

This is a 6-orbit proposal to observe two targets (one star and one QSO) in the direction of the Leading Arm of the Magellanic Stream.

V01 observes a QSO (UVQSJ101629.20-315023.6, z=0.24) with the G130M/1291 setting, for four orbits. It uses an ACQ/SEARCH (2x2) and an ACQ/IMAGE, both with MIRRORB.

V02 observes a B V star (CD14-A05, T_eff=15000; spectral type B5 IV, this target is not in SIMBAD since it was discovered and characterized by members of our team), for two orbits total, one with G130M/1291 and one with G160M/1600. This also uses an ACQ/SEARCH (2x2) and ACQ/IMAGE, both with MIRRORB.

Note that CD14-A05 was not in the original Phase I proposal. Our original stellar target was SPM4.0. However, observations obtained after the Phase I deadline revealed that this target was a sub-dwarf, much closer than previously thought, and of no connection to the Leading Arm. Therefore we requested a target switch to CD14-A05 in HOPR 85049, approved by the TTRB on 7/7/16.

Visit

Proposal 14687, UVQSJ1016 (01), implementation Fri Jul 29 18:51:09 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Fixed Targets

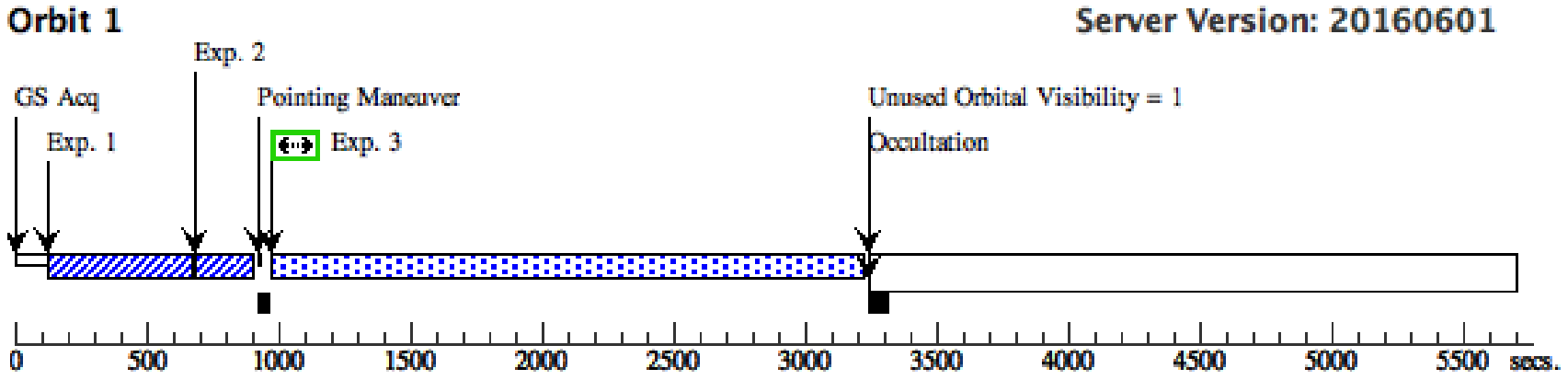
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	UVQSJ101629.20-315023.6	RA: 10 16 29.2080 (154.1217000d) Dec: -31 50 23.64 (-31.83990d) Equinox: J2000		V=18.45 FUV=17.32, NUV=17.13, Magnitude given above is B (V unavailable)	Reference Frame: ICRS

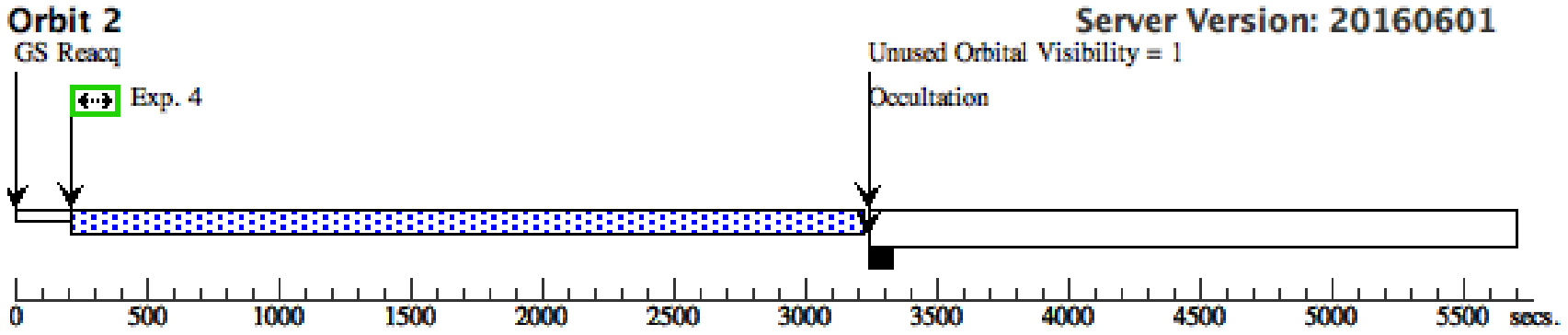
Comments: Extended=NO

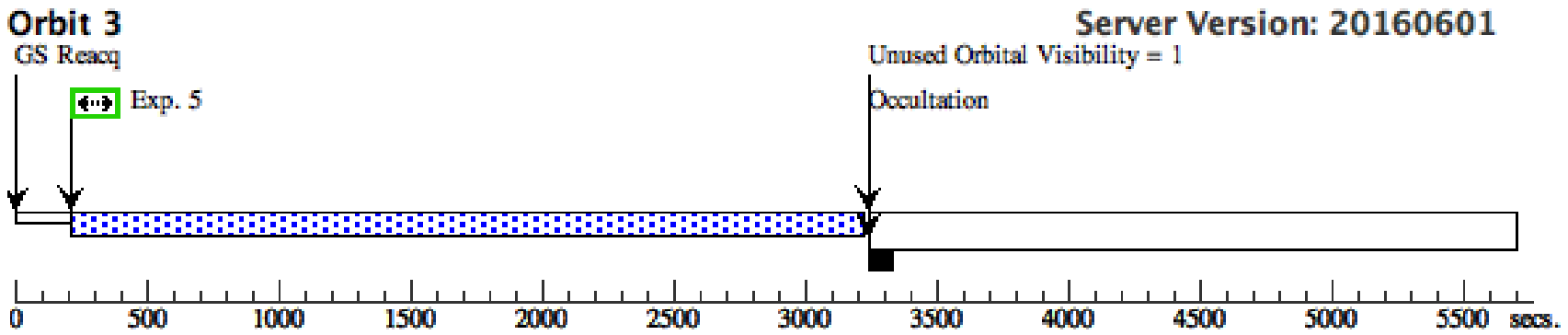
Exposures

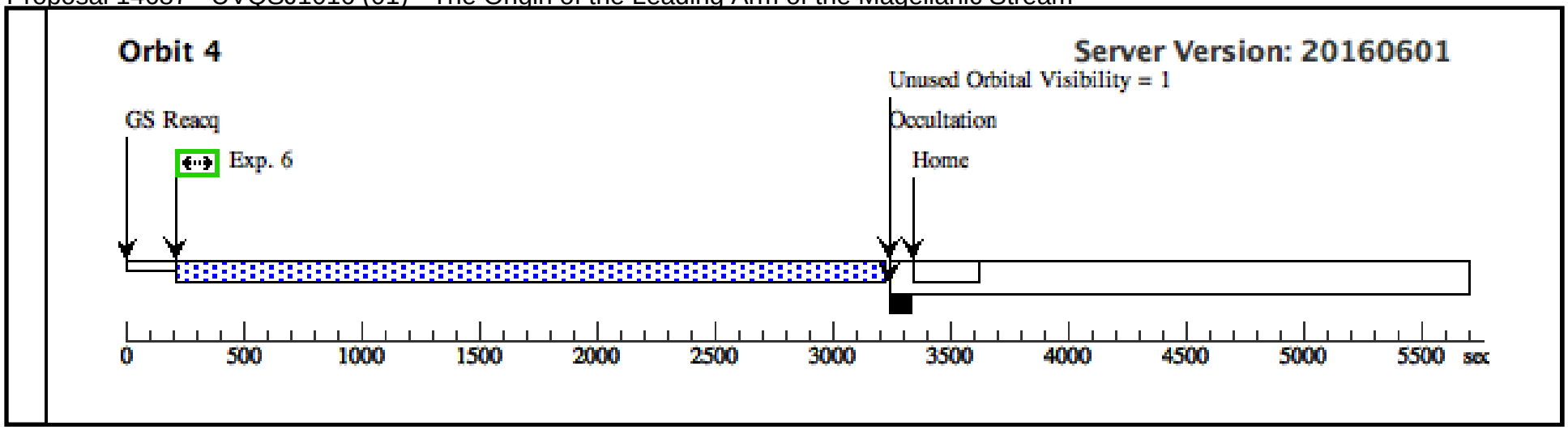
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/SEARCH (822776)	(1) UVQSJ101629.20-315023.6	COS/NUV, ACQ/SEARCH, PSA	MIRRORB	SCAN-SIZE=2; STEP-SIZE=1.767; CENTER=FLUX-WT			49 Secs (49 Secs) *[==>]*	*[1]*
2	ACQ/IMAGE (822776)	(1) UVQSJ101629.20-315023.6	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				49 Secs (49 Secs) *[==>]*	*[1]*
3	UVQSJ1016-FPPOS1 (822777)	(1) UVQSJ101629.20-315023.6	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=1; BUFFER-TIME=3546			2086 Secs (2086 Secs) *[==>]*	*[1]*
4	UVQSJ1016-FPPOS2 (822777)	(1) UVQSJ101629.20-315023.6	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=2; BUFFER-TIME=3546			2958 Secs (2958 Secs) *[==>]*	*[2]*
5	UVQSJ1016-FPPOS3 (822777)	(1) UVQSJ101629.20-315023.6	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=3; BUFFER-TIME=3546			2958 Secs (2958 Secs) *[==>]*	*[3]*
6	UVQSJ1016-FPPOS4 (822777)	(1) UVQSJ101629.20-315023.6	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=4; BUFFER-TIME=3546			2958 Secs (2958 Secs) *[==>]*	*[4]*

Orbit Structure





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sec

Visit

Proposal 14687, CD14-A05 (02), implementation Fri Jul 29 18:51:09 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	CD14-A05	RA: 11 10 58.3400 (167.7430833d) Dec: -73 14 9.63 (-73.23601d) Equinox: J2000		V=15.8 GALEX NUV=16.83, FUV=16.70	Reference Frame: ICRS

Comments: Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/SEARCH (822791)	(2) CD14-A05	COS/NUV, ACQ/SEARCH, PSA	MIRRORB	CENTER=FLUX-WT; SCAN-SIZE=2; STEP-SIZE=1.767			36 Secs (36 Secs) *[==>]*	***[1]***
2	ACQ/IMAGE (822791)	(2) CD14-A05	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				36 Secs (36 Secs) *[==>]*	***[1]***
3	CD14-A05-G130M (822804)	(2) CD14-A05	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=ALL; BUFFER-TIME=2700			542 Secs (2168 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	***[1]***
4	CD14-A05-G160M (822669)	(2) CD14-A05	COS/FUV, TIME-TAG, PSA	G160M 1600 A	FP-POS=ALL; BUFFER-TIME=2700			734 Secs (2936 Secs) *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	***[2]***

Orbit Structure