



12263 - Three Dimensional Mapping of the Magellanic Bridge by High-Resolution Spectroscopy toward Multiple Sightlines

Cycle: 18, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

<i>Name</i>	<i>Institution</i>	<i>E-Mail</i>
Dr. Toru Misawa (PI)	Shinshu University	misawa@crab.riken.jp
Prof. Jane C. Charlton (CoI) (AdminUSPI) (Contact)	The Pennsylvania State University	charlton@astro.psu.edu
Dr. Henry A. Kobulnicky (CoI)	University of Wyoming	chipk@uwyo.edu
Prof. Philipp Richter (CoI) (ESA Member)	Universitat Potsdam	prichter@astro.physik.uni-potsdam.de
Dr. Paola Rodriguez Hidalgo (CoI)	The Pennsylvania State University	paola@astro.psu.edu
Dr. Bart P. Wakker (CoI)	University of Wisconsin - Madison	wakker@astro.wisc.edu

VISITS

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(1) HB89-0202-765	COS/FUV	4	10-Jul-2010 02:18:13.0	yes
02	(2) UKS-0242-724	COS/FUV	2	10-Jul-2010 02:18:20.0	yes
03	(3) ESO-031--G-008	COS/FUV	2	10-Jul-2010 02:18:27.0	yes

8 Total Orbits Used

ABSTRACT

The Magellanic Bridge (the MB) is a physical connection between the Large Magellanic Cloud (LMC) and the Small Magellanic Cloud (SMC). The MB contains a young stellar population that was probably formed in local molecular clouds, while it is still not fully settled whether the larger

Magellanic Stream, produced by the LMC/SMC unit sweeping through the Milky Way halo, contains only gas or has any stellar populations. We propose HST/COS spectroscopy of four sight-lines of the MB toward QSOs/AGNs behind it, covering various absorption lines such as O I, Fe II, Si II, C II, Si IV, and C IV. This will be combined with one existing STIS observation of B0312-770 which we have already modeled in detail, and with our recent high resolution VLT/UVES observations of all five sight-lines, covering Ca II H,K and Na I D₁, D₂. The five sight-lines cover a range of H I column densities from 10^{19} (cm⁻²) up to above the damped Ly α (DLA) threshold. Effectively, the proposed COS observations of multiple sightlines through the MB will provide a map of the surroundings of a DLA absorber, allowing us to study how it connects with other classes of absorbers, and with the surrounding structures. Our goals are to (1) evaluate physical conditions of gas clouds in the MB along multiple sight-lines derived from the photoionization models, (2) search for correlations between the physical conditions of the MB gas, the H I 21cm radio emission density, and the distance from the SMC, and (3) compare the physical conditions of the MB to those of high-*z* absorption systems like DLA systems because the MB, with its low metallicity and possible dust deficiency, could be a local analog.

OBSERVING DESCRIPTION

Our goal is to observe 3 QSOs/AGNs with sufficiently high S/N ratios ($S/N \sim 10$ per resolution element) in order to detect various UV absorption lines arising in the Magellanic Bridge absorbers, and fit Voigt profile models to them. For all the lines of sight we will use the G130M grating with $\lambda_c = 1291\text{\AA}$ to cover 1132–1433\AA, and the G160M grating with $\lambda_c = 1600\text{\AA}$ to cover 1405–1775\AA. The former covers Si II 1190,1193, N I 1200, Si III 1207, Ly, N V 1239,1243, S II 1254, Si II 1260, O I 1302, Si II 1304, N II 1317, C I 1329, C II 1335, and Si IV 1394,1403, while the latter covers Si II 1527, C IV 1548,1551, Fe II 1608, Al II 1671. All of these were detected in the sightline toward B 0312 770. The spectral resolution of G130M and G160M ($R = 20,000 - 24,000$, FWHM $12.5 - 15$ km/s) is high enough to resolve absorption profiles into multiple narrower components.

As the TAC suggested, the flux of one the originally proposed lines of sight might have been overestimated, thus we selected the three best targets and redistributed 2 orbits to increase the S/N of the selected targets. As a result, we also include the setups G130M grating with $\lambda_c = 1327\text{\AA}$ and G160M grating with $\lambda_c = 1577\text{\AA}$ for HB89-0202-765. For the four setups of this line of sight, and the two setups of UKS-0242-724 and ESO031-G08, we will use the four-step 3 and 4 COS FP-SPLIT mode to reduce fixed pattern noise and avoid having important lines fall on grid wires.

We used the ETC on the HST/COS web-site to calculate the necessary exposure times to obtain spectra with, at least, $S/N = 10$ per resolution element. The only direct information we have about UV flux of our targets are from the GALEX archive. However, most of our targets are located at

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the edge of observed frames and their GALEX fluxes might not be reliable. Instead, we estimated the UV fluxes of our targets by extrapolating from their optical fluxes. This procedure is acceptable because our targets are all at low redshift ($z < 0.4$) and Lyman limit (LL) systems, if present, would not affect our observed wavelength range ($\lambda > 1132\text{\AA}$) unless $z_{\text{LL}} > 0.24$. We used $\alpha = -1$ as power-law index of quasar spectra, with which we never over-estimate the UV fluxes because the typical power-law index is $\alpha = -1.56$. These fluxes are included as "Other Fluxes" later in the proposal.

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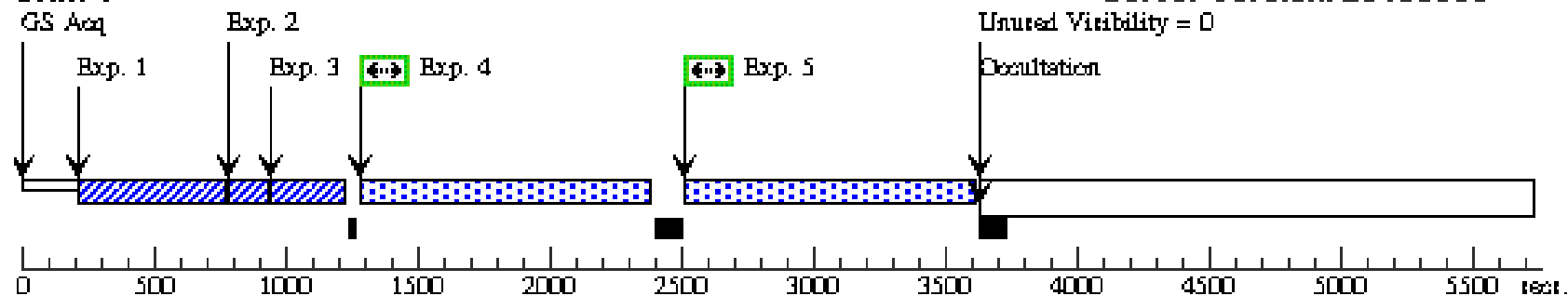
Visit	Proposal 12263, Visit 01 Diagnostic Status: No Diagnostics Scientific Instruments: COS/FUV Special Requirements: (none)					Sat Jul 10 06:18:31 GMT 2010
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	HB89-0202-765	RA: 02 02 13.7000 (30.5570833d) Dec: -76 20 3.00 (-76.33417d) Equinox: J2000		V=16.90 0.3E-14 ergs/s/cm2/A	Reference Frame: ICRS
<i>Comments: This object was generated by the targetselector and retrieved from the NED database.</i>						

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Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	HB89-0202-765-ACQ/S EARCH	(1) HB89-0202-765	COS/FUV, ACQ/SEARCH, PSA	G130M 1291 A	SCAN-SIZE=3			17 Secs [==>]	[1]
	Comments: Acquisition exposure with G130M spectral element Calculated for 0.5*F(1700)=0.23E-14 erg/cm2/s/A COS ETC result for S/N=50 is 17 sec (id COS.A330397). Count rate 484 /sec.									
	2	HB89-0202-765-ACQ/P EAKXD	(1) HB89-0202-765	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A				17 Secs [==>]	[1]
	3	HB89-0202-765-ACQ/P EAKD	(1) HB89-0202-765	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	NUM-POS=5; STEP-SIZE=1.2			17 Secs [==>]	[1]
	4	HB89-0202-765-orbit1(1 291-3)	(1) HB89-0202-765	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=10 49; FP-POS=3			1049 Secs [==>]	[1]
	Comments: 2/3rds of buffer time at twice nominal flux is 1589 sec									
	5	HB89-0202-765-orbit1(1 291-4)	(1) HB89-0202-765	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=10 48; FP-POS=4			1048 Secs [==>]	[1]
	Comments: 2/3rds of buffer time at twice nominal flux is 1589 sec									
	6	HB89-0202-765-orbit2(1 327-3)	(1) HB89-0202-765	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=15 81; FP-POS=3			1581 Secs [==>]	[2]
Exposures	Comments: 2/3rds of buffer time at twice nominal flux is 1589 sec									
	7	HB89-0202-765-orbit2(1 327-4)	(1) HB89-0202-765	COS/FUV, TIME-TAG, PSA	G130M 1327 A	BUFFER-TIME=15 81; FP-POS=4			1581 Secs [==>]	[2]
	Comments: 2/3rds of buffer time at twice nominal flux is 1589 sec									
	8	HB89-0202-765-orbit3(1 577-3)	(1) HB89-0202-765	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=15 81; FP-POS=3			1581 Secs [==>]	[3]
	Comments: 2/3rds of buffer time at twice nominal flux is 1589 sec									
	9	HB89-0202-765-orbit3(1 577-4)	(1) HB89-0202-765	COS/FUV, TIME-TAG, PSA	G160M 1577 A	BUFFER-TIME=15 81; FP-POS=4			1581 Secs [==>]	[3]
	Comments: 2/3rds of buffer time at twice nominal flux is 1589 sec									
	10	HB89-0202-765-orbit4(1 600-3)	(1) HB89-0202-765	COS/FUV, TIME-TAG, PSA	G160M 1600 A	BUFFER-TIME=15 81; FP-POS=3			1581 Secs [==>]	[4]
	Comments: 2/3rds of buffer time at twice nominal flux is 1589 sec									
	11	HB89-0202-765-orbit4(1 600-4)	(1) HB89-0202-765	COS/FUV, TIME-TAG, PSA	G160M 1600 A	BUFFER-TIME=15 81; FP-POS=4			1581 Secs [==>]	[4]
	Comments: 2/3rds of buffer time at twice nominal flux is 1589 sec									

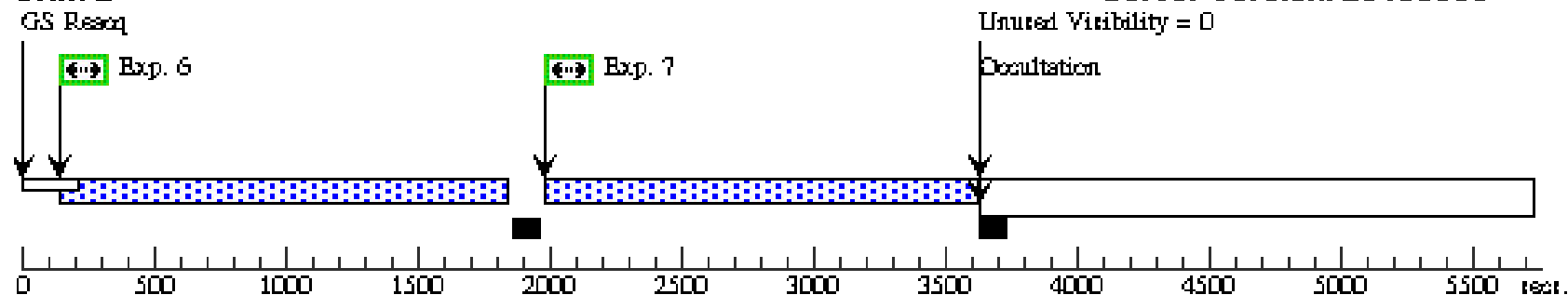
Orbit 1

Server Version: 20100505



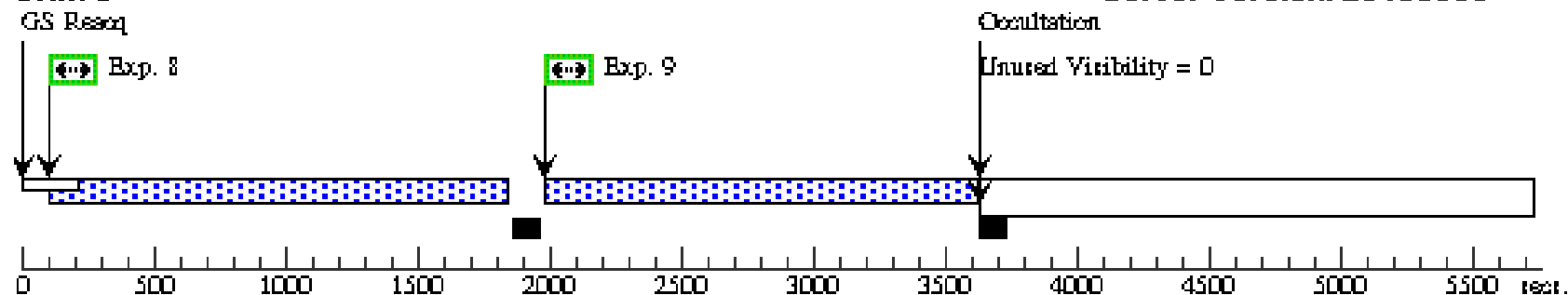
Orbit 2

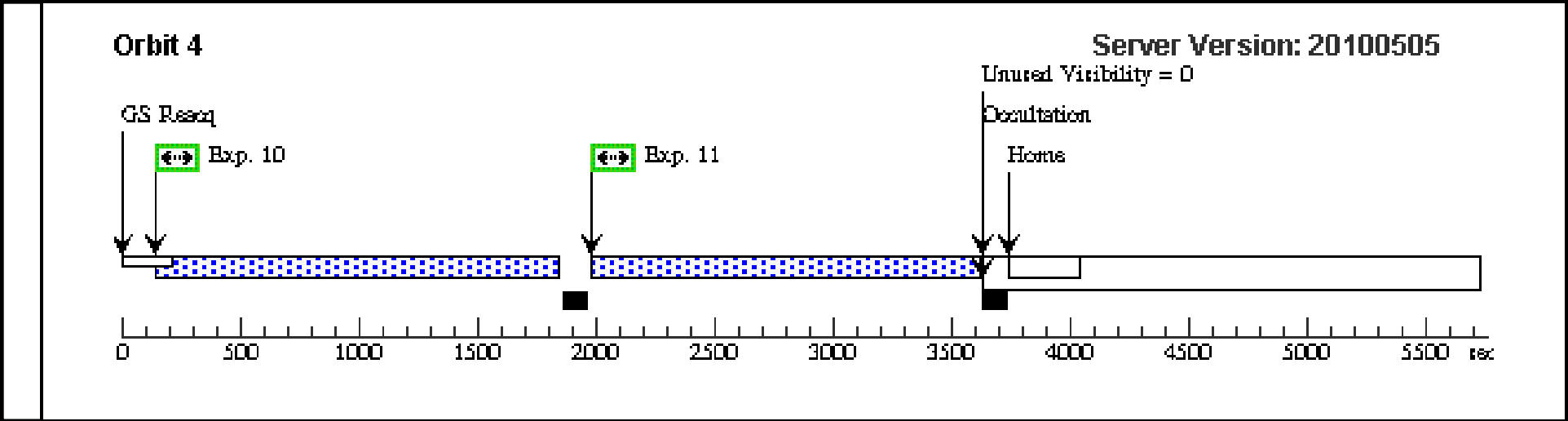
Server Version: 20100505



Orbit 3

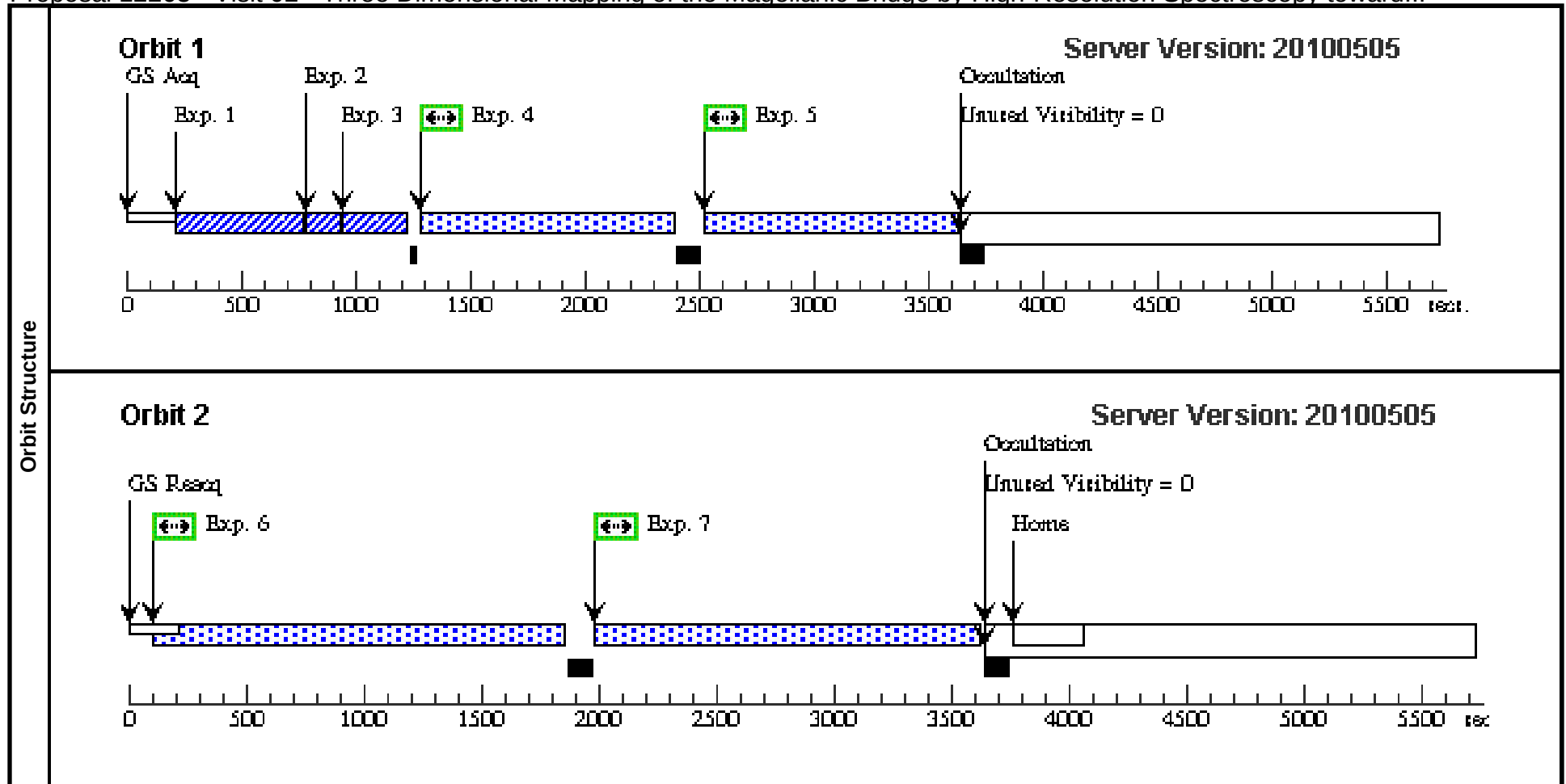
Server Version: 20100505





Proposal 12263 - Visit 01 - Three Dimensional Mapping of the Magellanic Bridge by High-Resolution Spectroscopy toward...

Visit	Proposal 12263, Visit 02									Sat Jul 10 06:18:33 GMT 2010
	Diagnostic Status: No Diagnostics									
	Scientific Instruments: COS/FUV									
	Special Requirements: (none)									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(2)	UKS-0242-724	RA: 02 43 9.6000 (40.7900000d) Dec: -72 16 48.40 (-72.28011d) Equinox: J2000			V=15.9 0.9E-14 ergs/s/cm2/A		Reference Frame: ICRS		
	Comments: This object was generated by the targetselector and retrieved from the NED database.									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	UKS-0242-7 24-ACQ/SE ARCH	(2) UKS-0242-724	COS/FUV, ACQ/SEARCH, PSA	G130M 1291 A	SCAN-SIZE=3			17 Secs [==>]	[1]
	Comments: Acquisition exposure with G130M spectral element Calculated for 0.5*F(1700)=0.23E-14 erg/cm2/s/A COS ETC result for S/N=50 is 17 sec (id COS.A330397). Count rate 484 /sec.									
	2	UKS-0242-7 24-ACQ/PE AKXD	(2) UKS-0242-724	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A				17 Secs [==>]	[1]
	3	UKS-0242-7 24-ACQ/PE AKD	(2) UKS-0242-724	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	NUM-POS=5; STEP-SIZE=1.2			17 Secs [==>]	[1]
	4	UKS-0242-7 24-orbit1(12 91-3)	(2) UKS-0242-724	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=10 55; FP-POS=3			1055 Secs [==>]	[1]
	Comments: 2/3rds of buffer time at twice nominal flux is 1589 sec									
	5	UKS-0242-7 24-orbit1(12 91-4)	(2) UKS-0242-724	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=10 54; FP-POS=4			1054 Secs [==>]	[1]
	Comments: 2/3rds of buffer time at twice nominal flux is 1589 sec									
	6	UKS-0242-7 24-orbit2(16 00-3)	(2) UKS-0242-724	COS/FUV, TIME-TAG, PSA	G160M 1600 A	BUFFER-TIME=15 87; FP-POS=3			1587 Secs [==>]	[2]
	Comments: 2/3rds of buffer time at twice nominal flux is 1589 sec									
	7	UKS-0242-7 24-orbit2(16 00-4)	(2) UKS-0242-724	COS/FUV, TIME-TAG, PSA	G160M 1600 A	BUFFER-TIME=15 87; FP-POS=4			1587 Secs [==>]	[2]
	Comments: 2/3rds of buffer time at twice nominal flux is 1589 sec									



Proposal 12263 - Visit 02 - Three Dimensional Mapping of the Magellanic Bridge by High-Resolution Spectroscopy toward...

Visit	Proposal 12263, Visit 03										Sat Jul 10 06:18:34 GMT 2010
	Diagnostic Status: No Diagnostics										
	Scientific Instruments: COS/FUV										
	Special Requirements: (none)										
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(3)	ESO-031--G-008	RA: 03 07 35.5000 (46.8979167d) Dec: -72 50 2.50 (-72.83403d) Equinox: J2000				V=14.98 1.3E-14 ergs/s/cm2/A		Reference Frame: ICRS		
	Comments: This object was generated by the targetselector and retrieved from the NED database.										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]		Orbit
	1	ESO031-G0 8-ACQ/SEA RCH	(3) ESO-031--G-008	COS/FUV, ACQ/SEARCH, PSA	G130M 1291 A	SCAN-SIZE=3				12 Secs [==>]	 [1]
	Comments: Acquisition exposure with G130M spectral element Calculated for 0.5*F(1700)=0.33E-14 erg/cm2/s/A COS ETC result for S/N=50 is 12 sec (id COS.A330401). Count rate 559 /sec.										
	2	ESO031-G0 8-ACQ/PEA KXD	(3) ESO-031--G-008	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A					12 Secs [==>]	 [1]
	3	ESO031-G0 8-ACQ/PEA KD	(3) ESO-031--G-008	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	NUM-POS=5; STEP-SIZE=1.2				12 Secs [==>]	 [1]
	4	ESO031-G0 8-orbit1(129 1-3)	(3) ESO-031--G-008	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=10 92; FP-POS=3				1092 Secs [==>]	 [1]
	Comments: 2/3rds of buffer time at twice nominal flux is 1220 sec										
	5	ESO031-G0 8-orbit1(129 1-4)	(3) ESO-031--G-008	COS/FUV, TIME-TAG, PSA	G130M 1291 A	BUFFER-TIME=10 92; FP-POS=4				1092 Secs [==>]	 [1]
	Comments: 2/3rds of buffer time at twice nominal flux is 1220 sec										
	6	ESO031-G0 8-orbit2(160 0-3)	(3) ESO-031--G-008	COS/FUV, TIME-TAG, PSA	G160M 1600 A	BUFFER-TIME=15 87; FP-POS=3				1587 Secs [==>]	 [2]
	Comments: 2/3rds of buffer time at twice nominal flux is 1220 sec										
	7	ESO031-G0 8-orbit2(160 0-3)	(3) ESO-031--G-008	COS/FUV, TIME-TAG, PSA	G160M 1600 A	BUFFER-TIME=15 87; FP-POS=4				1587 Secs [==>]	 [2]
	Comments: 2/3rds of buffer time at twice nominal flux is 1220 sec										

