



12921 - Multiwavelength Spectroscopy of the Interstellar Medium: O and Ne

Abundance ratio

Cycle: 20, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

<i>Name</i>	<i>Institution</i>	<i>E-Mail</i>
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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>
1A	(1) 4U0512-401	COS/FUV	5	02-Aug-2013 21:01:14.0	yes
2A	(1) 4U0512-401	COS/FUV	4	02-Aug-2013 21:01:33.0	yes

9 Total Orbits Used

ABSTRACT

The solar abundances have been referenced in studies of the interstellar and intergalactic media. But the recent downward revision of several light elements has broken the accord of these abundances with helioseismological measurements. A much higher Ne/O abundance ratio may solve this problem. But due to the absence of the suitable photospheric lines of Ne, this scenario has not been tested observationally. The interstellar medium (ISM) provides a natural laboratory for testing such a hypothesis. We propose a joint program by requesting COS-HST and LETG-Chandra observations of the low mass X-ray binary 4U 0512-401. The required observations will utilize the high resolving power of the COS to resolve the kinematic velocity components of the ISM absorbers and to measure column densities of OI and HI, and then utilize LETG observations to measure column densities of OI, OII, NeI, NeII, and NeIII. The results will enable us to evaluate the depletion level of oxygen into dust grains, measure the

Ne/O abundance ratio of the ISM along the line of sight, and then examine whether the ratio is substantially higher than that usually adopted.

OBSERVING DESCRIPTION

The main goal of this project is to measure the abundance ratio between Neon and Oxygen in the interstellar medium. To this end, we seek to obtain high resolution spectra of the X-ray binary 4U 0512-401 covering OI, SiII, and SII and thus to constrain kinematics and dynamics of the ISM.

Detecting these lines is our fundamental requirement and also drives the requested S/N level.

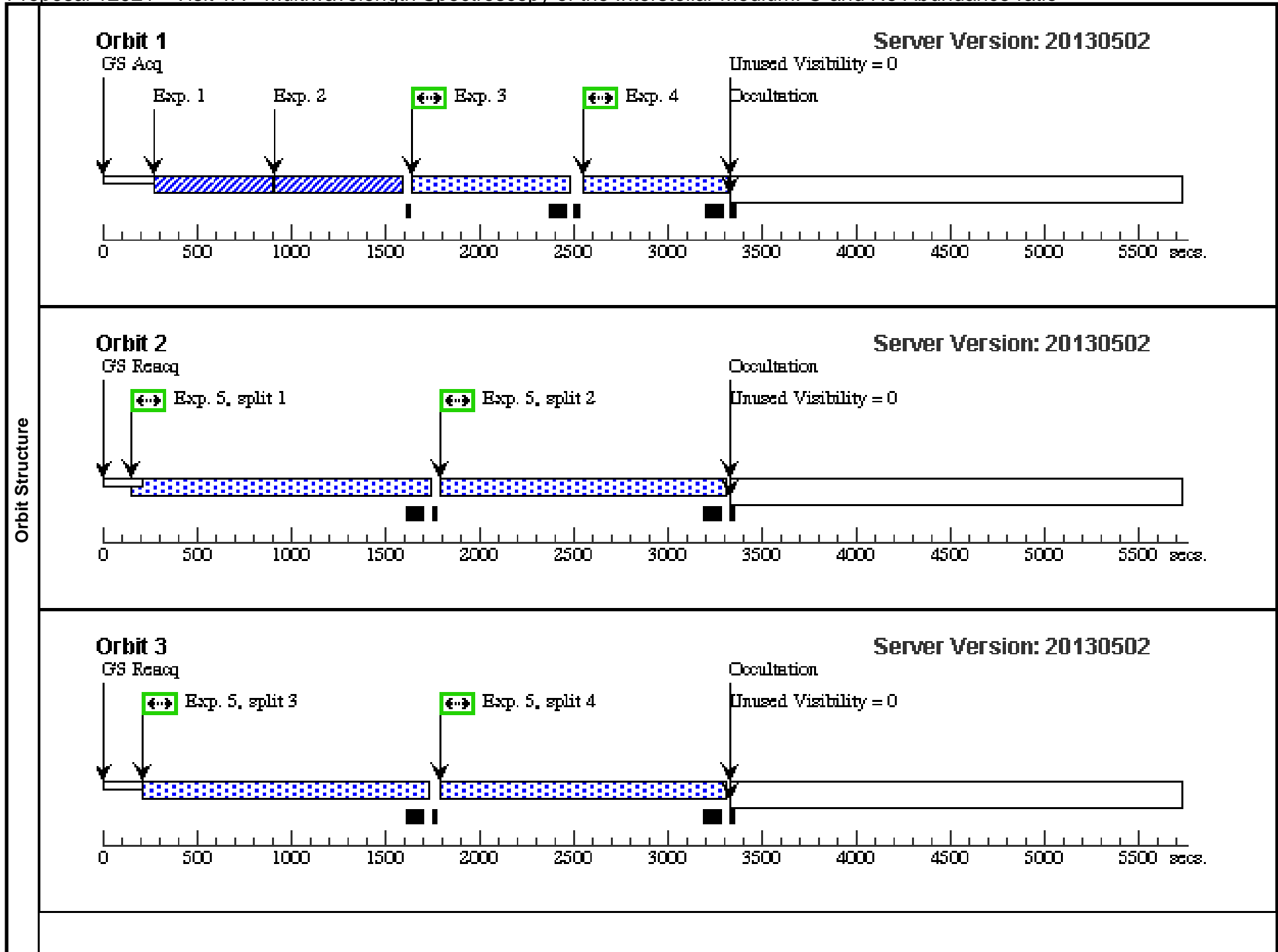
4U 0512-401 is a mildly variable in UV wavelength band. We therefore use a spectrum with a typical flux obtained from one previous observation [with the Faint Object Spectrograph (FOS) in 1997 for program 6892] as the input to the Exposure Time Calculator to estimate the ACQ-target-searching and ACQ-target-imaging time and to calculate the Buffer-time. The approved 9 orbits will use COS-G130 grating to detect the OI, SiII, and SII absorption lines and we expect to obtain a spectrum with S/N of 10 around OI wavelengths, which, together with SiII and SII absorption lines, allow us to constrain kinematics and dynamics of the ISM to be within 20% uncertainty range.

To reduce COS fixed-pattern noise, we use the G130 grating at different central wavelengths in successive exposures and use the different FP-POS offsets. By doing this, we will also obtain a spectrum covering the maximal wavelength range; the gaps at different wavelengths are also filled up with nearly even exposures.

Proposal 12921 - Visit 1A - Multiwavelength Spectroscopy of the Interstellar Medium: O and Ne Abundance ratio

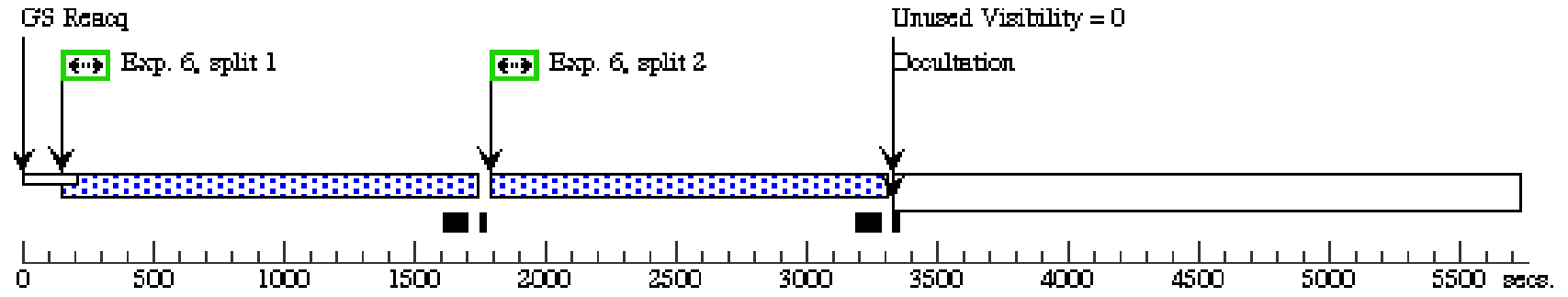
Sat Aug 03 01:01:42 GMT 2013

Visit	Proposal 12921, Visit 1A Diagnostic Status: Warning Scientific Instruments: COS/FUV Special Requirements: ORIENT 264D TO 282 D <i>Comments: Roll-angle limited to 264--282 to restrict BOA BOP area to the existing ACS F140LP image. TA changed to spectroscopic.</i>									
	Diagnosics (Visit 1A) Warning (Form): For the best data quality, it is strongly recommended that all four FP-POS positions be used when observing at a given COS CENWAVE setting.									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	4U0512-401 Alt Name1: X0512-401	RA: 05 14 6.4491 (78.5268712d) Dec: -40 02 38.14 (-40.04393d) Equinox: J2000		V=16.65	Reference Frame: ICRS				
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	ACQ-XD (COS.sa.524 365)	(1) 4U0512-401	COS/FUV, ACQ/PEAKXD, PSA	G130M 1309 A				537 Secs (537 Secs) [==>]	[1]
	<i>Comments: FUVA only S/N=40 using the FOS spectrum Y3HG0205P. Using the IUE spectrum, which includes many other stars in the aperture produces a count rate of < 600 counts on both segments (COS.sa.524368). The count rates for the FOS spectrum are Count rate Segment A 74.255 Count rate Segment B 277.983</i>									
	2	ACQ-AD (COS.sa.524 365)	(1) 4U0512-401	COS/FUV, ACQ/PEAKD, PSA	G130M 1309 A	STEP-SIZE=1.25; NUM-POS=3			194 Secs (194 Secs) [==>]	[1]
	<i>Comments: FUVA only S/N=40 using the FOS spectrum Y3HG0205P. Using the IUE spectrum, which includes many other stars in the aperture produces a count rate of < 600 counts on both segments (COS.sa.524368). The count rates for the FOS spectrum are Count rate Segment A 74.255 Count rate Segment B 277.983</i>									
	3	Orbit 1-1291 -1 (COS.sp.413 227)	(1) 4U0512-401	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=1; BUFFER-TIME=62 0			720 Secs (720 Secs) [==>]	[1]
	4	Orbit 1-1291 -4 (COS.sp.413 227)	(1) 4U0512-401	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FP-POS=4; BUFFER-TIME=61 5			715 Secs (715 Secs) [==>]	[1]
	5	Orbit 23-130 0 (COS.sp.413 230)	(1) 4U0512-401	COS/FUV, TIME-TAG, PSA	G130M 1300 A	FP-POS=ALL; BUFFER-TIME=13 61			1471 Secs (5884 Secs) [==>(Split 1)] [==>(Split 2)] [==>(Split 3)] [==>(Split 4)]	[2] [3]
6	Orbit 45-130 9 (COS.sp.413 232)	(1) 4U0512-401	COS/FUV, TIME-TAG, PSA	G130M 1309 A	FP-POS=ALL; BUFFER-TIME=13 61			1471 Secs (5884 Secs) [==>(Split 1)] [==>(Split 2)] [==>(Split 3)] [==>(Split 4)]	[4] [5]	



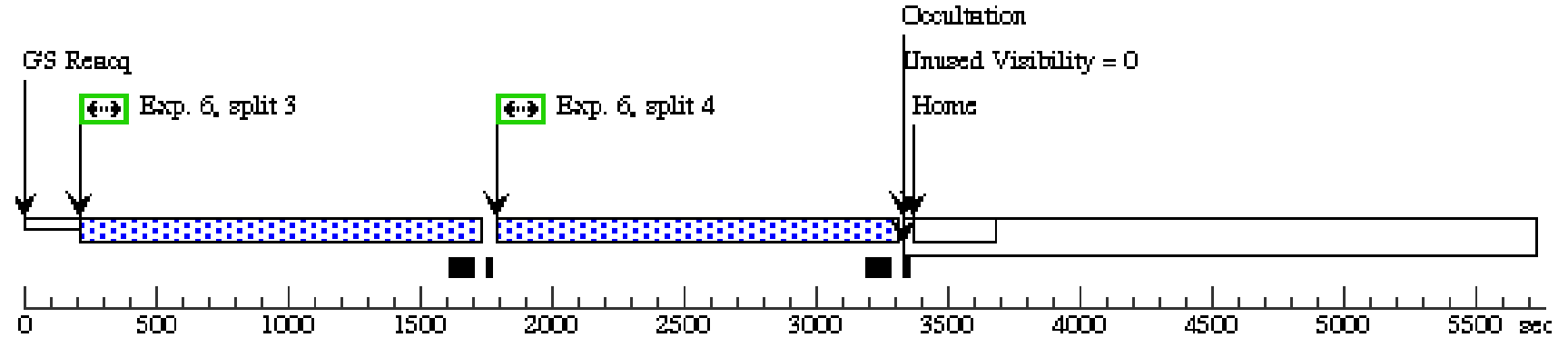
Orbit 4

Server Version: 20130502



Orbit 5

Server Version: 20130502



Proposal 12921 - Visit 2A - Multiwavelength Spectroscopy of the Interstellar Medium: O and Ne Abundance ratio

Sat Aug 03 01:01:46 GMT 2013

Visit	<p>Proposal 12921, Visit 2A Diagnostic Status: Warning Scientific Instruments: COS/FUV Special Requirements: ORIENT 264D TO 282 D <i>Comments: Roll-angle limited to 264--282 to restrict BOA BOP area to the existing ACS F140LP image.</i></p>					
Diagnostics	(Visit 2A) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	4U0512-401	RA: 05 14 6.4491 (78.5268712d)		V=16.65	Reference Frame: ICRS
		Alt Name1: X0512-401	Dec: -40 02 38.14 (-40.04393d)			
			Equinox: J2000			

Proposal 12921 - Visit 2A - Multiwavelength Spectroscopy of the Interstellar Medium: O and Ne Abundance ratio

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
Exposures	1	ACQ-XD (COS.sa.524 365)	(1) 4U0512-401	COS/FUV, ACQ/PEAKXD, PSA	G130M 1309 A			537 Secs (537 Secs) [==>]	[1]
	<i>Comments: FUV only S/N=40 using the FOS spectrum Y3HG0205P. Using the IUE spectrum, which includes many other stars in the aperture produces a count rate of < 600 counts on both segments (COS.sa.524368). The count rates for the FOS spectrum are Count rate Segment A 74.255 Count rate Segment B 277.983</i>								
	2	ACQ-AD (COS.sa.524 365)	(1) 4U0512-401	COS/FUV, ACQ/PEAKD, PSA	G130M 1309 A	STEP-SIZE=1.25; NUM-POS=3		194 Secs (194 Secs) [==>]	[1]
	<i>Comments: FUV only S/N=40 using the FOS spectrum Y3HG0205P. Using the IUE spectrum, which includes many other stars in the aperture produces a count rate of < 600 counts on both segments (COS.sa.524368). The count rates for the FOS spectrum are Count rate Segment A 74.255 Count rate Segment B 277.983</i>								
	3	Orbit 67-3-1 318 (COS.sp.413 233)	(1) 4U0512-401	COS/FUV, TIME-TAG, PSA	G130M 1318 A	FP-POS=3; BUFFER-TIME=62 0		720 Secs (720 Secs) [==>]	[1]
	4	Orbit 67-4-1 318 (COS.sp.413 233)	(1) 4U0512-401	COS/FUV, TIME-TAG, PSA	G130M 1318 A	FP-POS=4; BUFFER-TIME=61 5		715 Secs (715 Secs) [==>]	[1]
	5	Orbit 67-1-1 318 (COS.sp.413 233)	(1) 4U0512-401	COS/FUV, TIME-TAG, PSA	G130M 1318 A	FP-POS=1; BUFFER-TIME=13 60		1470 Secs (1470 Secs) [==>]	[2]
6	Orbit 67-2-1 318 (COS.sp.413 233)	(1) 4U0512-401	COS/FUV, TIME-TAG, PSA	G130M 1318 A	FP-POS=2; BUFFER-TIME=10 47		1472 Secs (1472 Secs) [==>]	[2]	
7	Orbit 89-132 7 (COS.sp.413 235)	(1) 4U0512-401	COS/FUV, TIME-TAG, PSA	G130M 1327 A	FP-POS=ALL; BUFFER-TIME=13 61		1471 Secs (5884 Secs) [==>(Split 1)] [==>(Split 2)] [==>(Split 3)] [==>(Split 4)]	[3] [4]	

