



# 12365 - A CHandra survey of Extended Emission-line Regions in nearby Seyfert galaxies (CHEERS)

Cycle: 18, Proposal Category: GO  
(Availability Mode: SUPPORTED)

## INVESTIGATORS

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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>
01	(1) NGC-3393	WFC3/UVIS	1	08-Dec-2010 21:48:53.0	yes
02	(2) NGC-4388	WFC3/UVIS	1	08-Dec-2010 21:48:58.0	yes
03	(3) NGC-4507	WFC3/UVIS	1	08-Dec-2010 21:49:02.0	yes
04	(4) NGC-5548	WFC3/UVIS	1	08-Dec-2010 21:49:07.0	yes
05	(5) IC-450	WFC3/UVIS	1	08-Dec-2010 21:49:11.0	yes

5 Total Orbits Used

## ABSTRACT

We propose the ‘ultimate’ resolution Chandra imaging survey (CHEERS) of a far-IR selected sample of active galactic nuclei (AGN) from Schmitt et al. (2003). With complementary high resolution HST and radio data, CHEERS will (1) resolve the detailed X-ray morphology of the extended narrow line region and obtain full picture of the multiphase interstellar medium (ISM) with typical resolution of 0.4 arcsec; (2) investigate the X-ray

emission mechanisms at AGN jet-ISM interaction regions and (3) measure mass and momentum outflow rates to evaluate the importance of AGN feedback. To achieve these goals, we request 335 ks ACIS-S observations and 5 HST orbits to supplement the archival data.

### **OBSERVING DESCRIPTION**

We request new HST WFC3 [OIII] (FQ508N), H $\alpha$ + [NII] (F665N), and [SII] (F673N for  $cz < 5000$  km s $^{-1}$  and F680N for  $cz > 5000$  km s $^{-1}$ ) imaging for 5 galaxies, to identify the additional extensions of an ionization cone, or “counter-cone” and the full morphology of the extended NLR. The exposure estimates are based on ground-based spectroscopy through a fixed size aperture. All targets have  $F[\text{OIII}] > 1\text{E}13$  erg s $^{-1}$  cm $^2$ ; if uniformly spread over a 3" diameter, the surface brightness would be  $> 1.4\text{E}14$  erg s $^{-1}$  cm $^2$  arcsec $^2$ . The WFC3 ETC show that we will then measure the line flux to better than 10% accuracy in a 0.1"  $\times$  0.1" box (WF CCD pixel size used in Schmitt et al.). We therefore take 550s as a minimum [OIII] exposure. Using the [OIII]/H $\alpha$  ratio in the literature (e.g., Falcke et al. 1998), 450 seconds for H $\alpha$ + [NII] is needed and 700s for [SII] to yield similar SNR. Together with continuum exposures (F547M and F621M), this corresponds to one full orbit for each target. For Seyfert 1s, we take an initial 10s exposure to avoid saturation of the bright nucleus. For NGC 5548, we take only one short exposure in F547M since a new 2200s WFC3 exposure from another program becomes available.

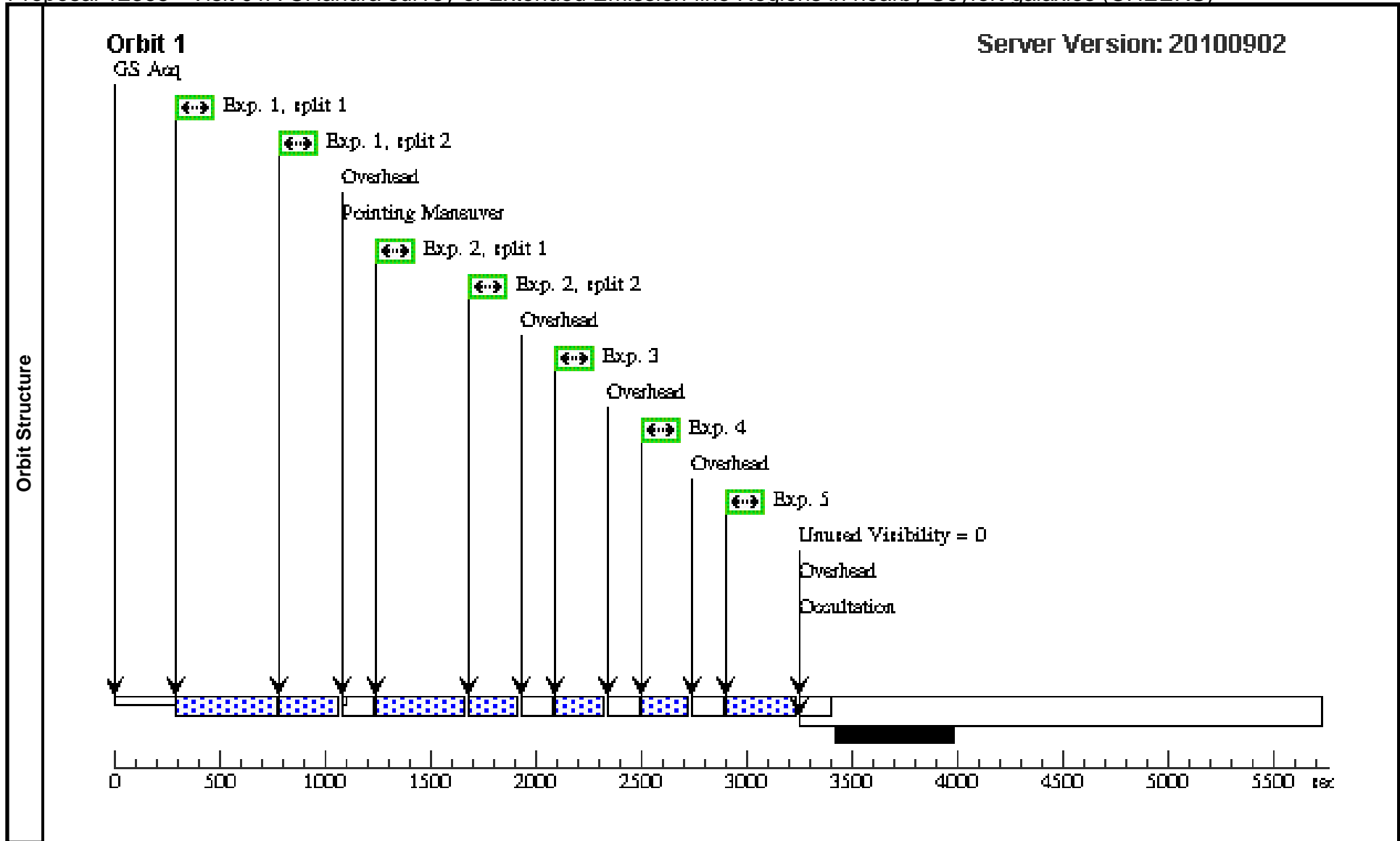
Proposal 12365 - Visit 01A CHandra survey of Extended Emission-line Regions in nearby Seyfert galaxies (CHEERS)

Thu Dec 09 02:49:15 GMT 2010

Fixed Targets	#		Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous		
		(1)		NGC-3393	RA: 10 48 24.0000 (162.1000000d) Dec: -25 09 40.20 (-25.16117d) Equinox: J2000	Proper Motion RA: null Proper Motion Dec: null Epoch of Position:	V=13.95+/-	Reference Frame: ICRS	
<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>									

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(1) NGC-3393	WFC3/UVIS, ACCUM, UVIS-QUAD-SUB	FQ508N	CR-SPLIT=2			550 Secs [=>283.0 Secs (Split 1)] [=>283.0 Secs (Split 2)]	[1]
	2		(1) NGC-3393	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F665N	CR-SPLIT=2			450 Secs [=>233.0 Secs (Split 1)] [=>233.0 Secs (Split 2)]	[1]
	3		(1) NGC-3393	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F547M				200 Secs [=>208.0 Secs ]	[1]
	4		(1) NGC-3393	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F621M				200 Secs [=>208.0 Secs ]	[1]
	5		(1) NGC-3393	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F673N				314 Secs [=>314.0 Secs ]	[1]



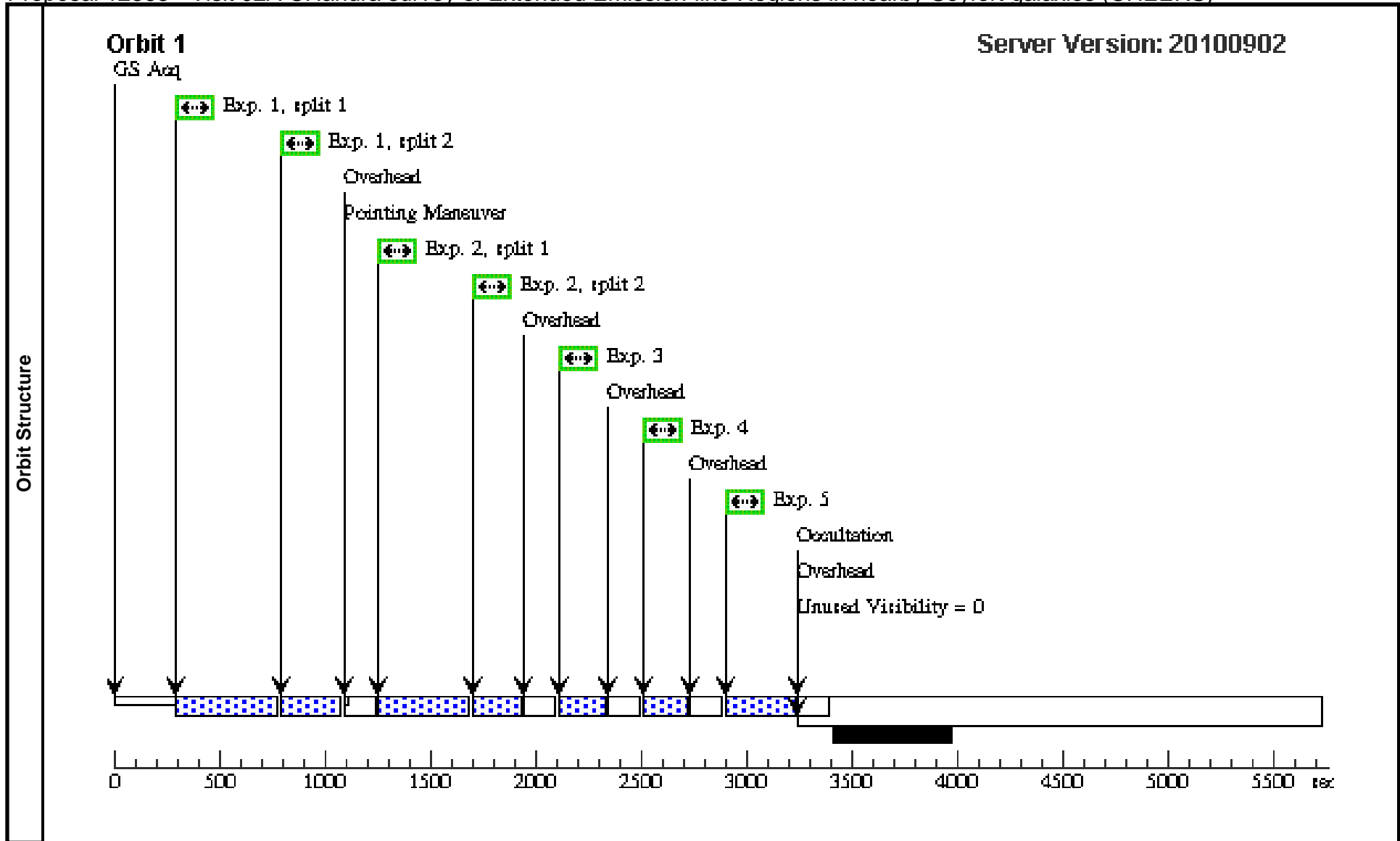
Proposal 12365 - Visit 02A CHandra survey of Extended Emission-line Regions in nearby Seyfert galaxies (CHEERS)

Thu Dec 09 02:49:17 GMT 2010

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(2)	NGC-4388	RA: 12 25 46.8200 (186.4450833d) Dec: +12 39 43.45 (12.66207d) Equinox: J2000	Proper Motion RA: null Proper Motion Dec: null Epoch of Position:	V=11.02+/-	Reference Frame: ICRS
<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>						

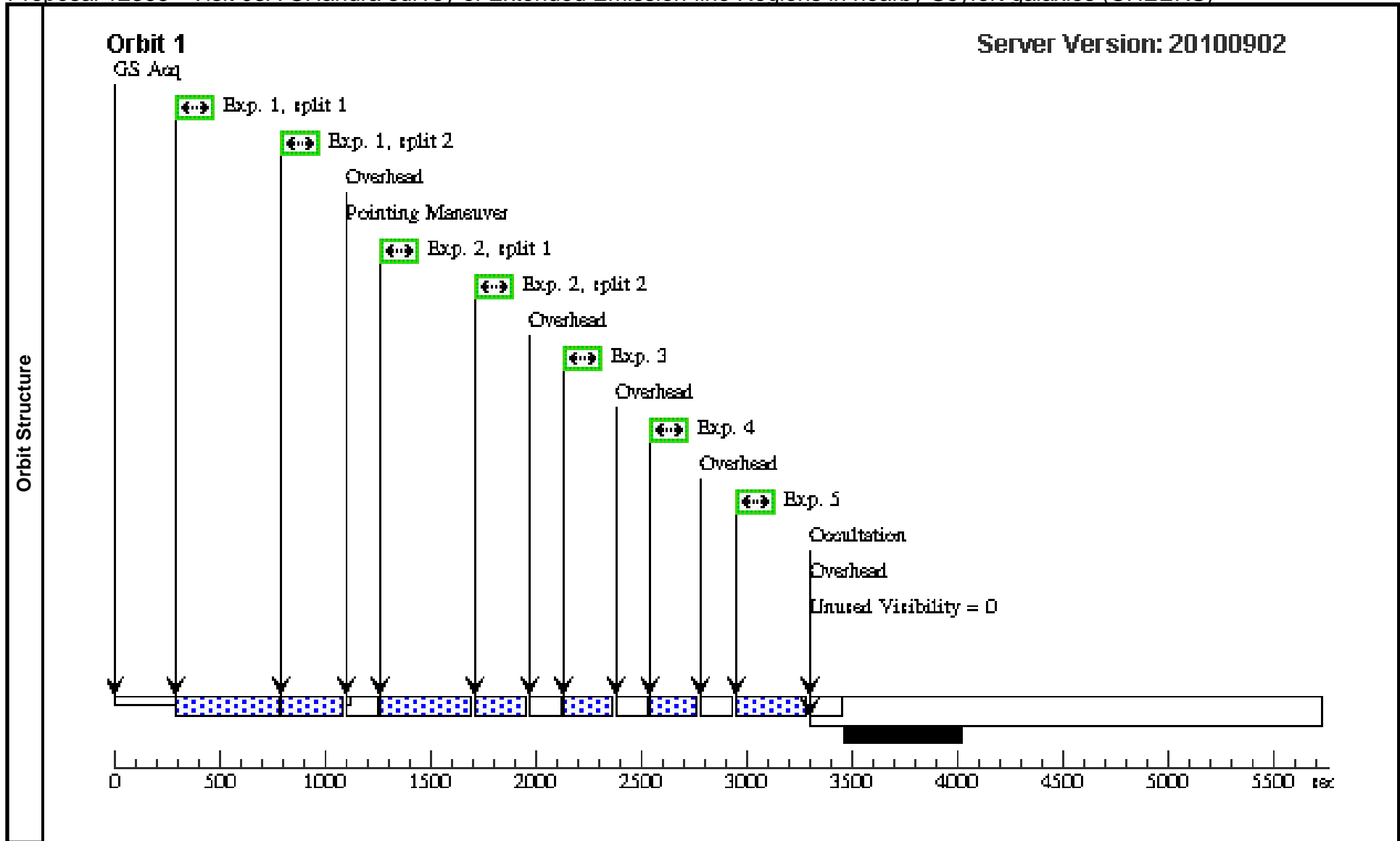
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	(2) NGC-4388	(2) NGC-4388	WFC3/UVIS, ACCUM, UVIS-QUAD-SUB	FQ508N	CR-SPLIT=2			550 Secs [=>287.0 Secs (Split 1)] [=>287.0 Secs (Split 2)]	[1]
	2	(2) NGC-4388	(2) NGC-4388	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F665N	CR-SPLIT=2			450 Secs [=>237.0 Secs (Split 1)] [=>237.0 Secs (Split 2)]	[1]
	3	(2) NGC-4388	(2) NGC-4388	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F547M				190 Secs [=>194.0 Secs ]	[1]
	4	(2) NGC-4388	(2) NGC-4388	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F621M				190 Secs [=>194.0 Secs ]	[1]
	5	(2) NGC-4388	(2) NGC-4388	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F673N				300 Secs [=>306.0 Secs ]	[1]



Proposal 12365 - Visit 03A CHandra survey of Extended Emission-line Regions in nearby Seyfert galaxies (CHEERS)

Thu Dec 09 02:49:17 GMT 2010

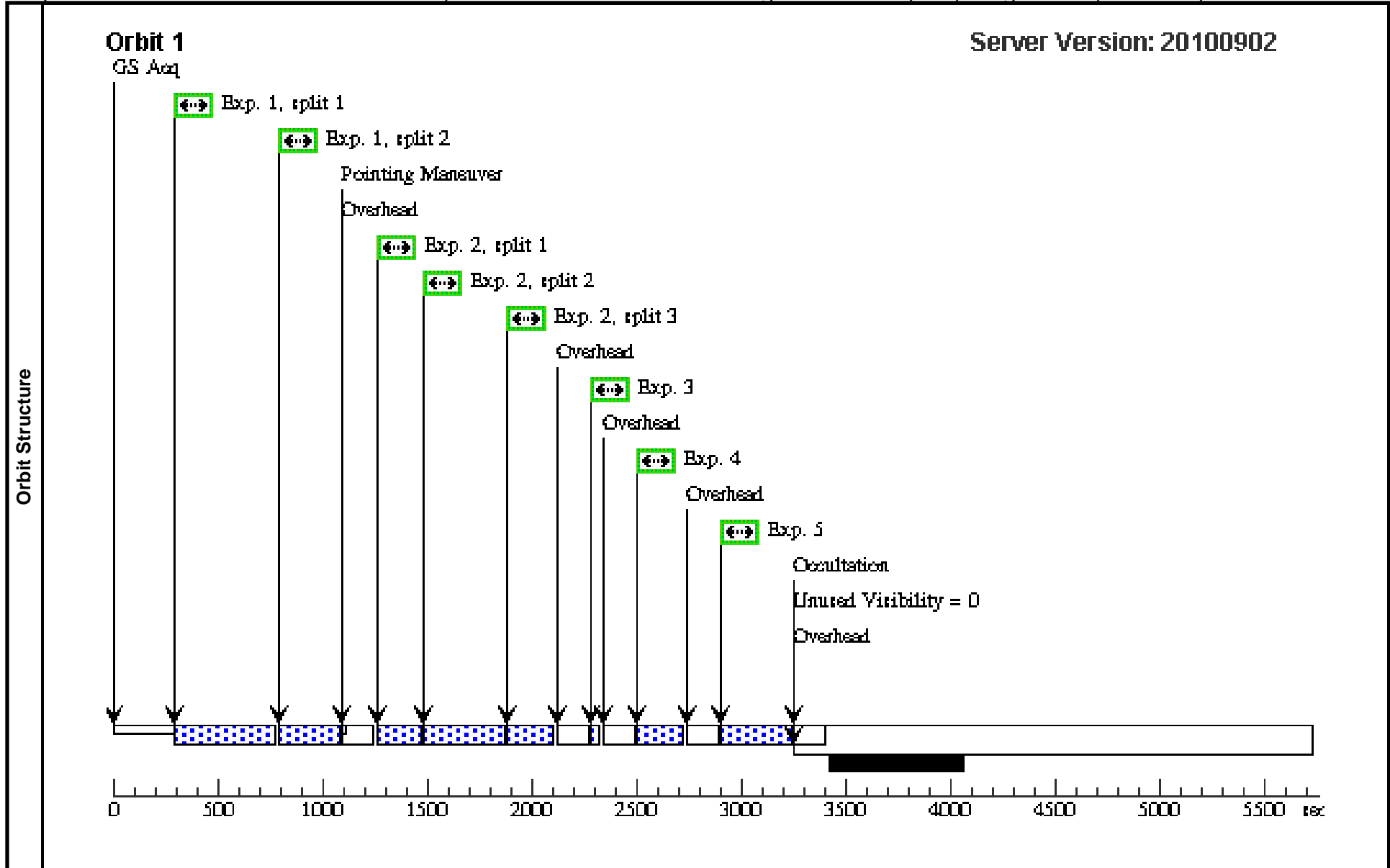
Fixed Targets	Proposed Observations						Actual Observations			
	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous	Obs. #	Obs. Name		
	<b>Proposal 12365, Visit 03, implementation</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/UVIS Special Requirements: (none)									
	(3)	NGC-4507	RA: 12 35 36.6180 (188.9025750d) Dec: -39 54 33.16 (-39.90921d) Equinox: J2000	Proper Motion RA: null Proper Motion Dec: null Epoch of Position:	V=11.89+/-	Reference Frame: ICRS				
<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	(3) NGC-4507	(3) NGC-4507	WFC3/UVIS, ACCUM, UVIS-QUAD-SUB	FQ508N	CR-SPLIT=2			550 Secs [=>293.0 Secs (Split 1)] [=>293.0 Secs (Split 2)]	[1]
	2	(3) NGC-4507	(3) NGC-4507	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F665N	CR-SPLIT=2			450 Secs [=>243.0 Secs (Split 1)] [=>243.0 Secs (Split 2)]	[1]
	3	(3) NGC-4507	(3) NGC-4507	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F547M				200 Secs [=>210.0 Secs ]	[1]
	4	(3) NGC-4507	(3) NGC-4507	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F621M				200 Secs [=>210.0 Secs ]	[1]
	5	(3) NGC-4507	(3) NGC-4507	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F673N				300 Secs [=>314 Secs ]	[1]



Proposal 12365 - Visit 04A CHandra survey of Extended Emission-line Regions in nearby Seyfert galaxies (CHEERS)

Thu Dec 09 02:49:18 GMT 2010

Fixed Targets	#		Name		Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous	
		(4)		NGC-5548	RA: 14 17 59.5130 (214.4979708d)	Dec: +25 08 12.45 (25.13679d)	Equinox: J2000	Proper Motion RA: null	Proper Motion Dec: null	Epoch of Position:	V=13.7+/-	Reference Frame: ICRS
<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>												
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]		Orbit	
	1		(4) NGC-5548	WFC3/UVIS, ACCUM, UVIS-QUAD-SUB	FQ508N	CR-SPLIT=2			550 Secs			
									[==>289.0 Secs (Split 1)]		[1]	
									[==>289.0 Secs (Split 2)]			
	2		(4) NGC-5548	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F665N	CR-SPLIT=3			450 Secs			
									[==>10.0 Secs (Split 1)]		[1]	
									[==>226.0 Secs (Split 2)]			
								[==>226.0 Secs (Split 3)]				
3		(4) NGC-5548	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F547M				10 Secs				
								[==>16.0 Secs ]		[1]		
4		(4) NGC-5548	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F621M				200 Secs				
								[==>206.0 Secs ]		[1]		
5		(4) NGC-5548	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F680N				300 Secs				
								[==>318.0 Secs ]		[1]		



Proposal 12365 - Visit 05A CHandra survey of Extended Emission-line Regions in nearby Seyfert galaxies (CHEERS)

Thu Dec 09 02:49:19 GMT 2010

Visit	<b>Proposal 12365, Visit 05, implementation</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/UVIS Special Requirements: (none)									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
	(5)	IC-450	RA: 06 52 12.3610 (103.0515042d) Dec: +74 25 37.24 (74.42701d) Equinox: J2000	Proper Motion RA: null Proper Motion Dec: null Epoch of Position:	V=13.6+/-	Reference Frame: ICRS				
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	(5) IC-450	(5) IC-450	WFC3/UVIS, ACCUM, UVIS-QUAD-SUB	FQ508N	CR-SPLIT=2			550 Secs [==>288.0 Secs (Split 1)] [==>288.0 Secs (Split 2)]	[1]
	2	(5) IC-450	(5) IC-450	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F665N	CR-SPLIT=3			450 Secs [==>10.0 Secs (Split 1)] [==>225.0 Secs (Split 2)] [==>225.0 Secs (Split 3)]	[1]
	3	(5) IC-450	(5) IC-450	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F547M	CR-SPLIT=2			200 Secs [==>15.0 Secs (Split 1)] [==>195.0 Secs (Split 2)]	[1]
	4	(5) IC-450	(5) IC-450	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F621M				200 Secs [==>205.0 Secs ]	[1]
	5	(5) IC-450	(5) IC-450	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F680N				300 Secs [==>336.0 Secs ]	[1]

