



13041 - Diagnosing Ionization Mechanisms in Blue Compact Dwarfs, the Local Analogues to Primordial Galaxies

Cycle: 20, 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) MRK-71	WFC3/UVIS	4	17-Dec-2012 21:11:35.0	yes
02	(2) MRK-209	WFC3/UVIS	6	17-Dec-2012 21:12:11.0	yes

10 Total Orbits Used

ABSTRACT

Nearby Blue Compact Dwarf (BCD) galaxies are excellent laboratories for studying star-formation (SF) and feedback in relatively pristine, low-metallicity environments analogous to those thought to exist in the early Universe. Until recently, the dominant ISM energy source in BCDs was assumed to be photoionization from the young starburst. However, recent spectroscopic evidence suggests that energy input from shocks or AGN may also play a significant role, particularly on local scales. Distinguishing between these mechanisms/sources is key to understanding the evolution and composition of the ISM, and requires spatially resolving the structure and physical properties of the BCD's ISM, particularly the spatially narrow

shock fronts (~ 10 pc $\sim 0.4''$ at 5 Mpc). This can only be achieved with the unrivalled angular-resolution, sensitivity and FoV of WFC3. Here we propose to take advantage of the extensive filter set available on WFC3 to diagnose the ionization mechanisms within 2 nearby ($D < 5$ Mpc) BCDs via narrow-band imaging. These observations will allow us to 1) distinguish between ionization mechanisms on ~ 1 pc scales using diagnostic emission line ratios (e.g. [SII]/Ha and [OIII]/Hb; BPT diagram method); 2) locate WR stars from HeII4686 emission and correlate WR activity with shock and feedback activity; 3) investigate the electron density and metallicity (O/H) variations within these systems, via [OII] and [SII] doublet imaging. This study will provide significant insight into the role of feedback in the energetics, structure and SF history of dwarf galaxies and essentially, primordial galaxies in the early Universe.

OBSERVING DESCRIPTION

1) Targets. Our sample consists of two BCDs; Mrk 71 and Mrk 209. Both BCDs lie at 4.3-5 Mpc (taken from NED) and are thus the only two BCDs capable of meeting our science goals and maximally exploiting the high angular resolution of WFC3/UVIS (1 pixel = 1 pc at 5 Mpc). They are also at comparable distances, in order to minimize differences in the physical size resolved by HST.

2) Emission Line Filters. Imaging will be performed in a total of eleven filters, covering seven emission lines and four continuum regions. The narrow band images F487N and F656N will map the ionized gas via the H α (4861) and H β (4861) emission, respectively. The [O ii] (3727; 29), [O iii] (5007) and He ii (4686) emission will be mapped with the F373N, F502N and F469N filters, respectively. Separated [S ii] doublet emission at 6716Å and 6731Å will be imaged using the FQ672N and FQ674N filters, respectively, and will map the electron density of the ionized gas via the ratio of these two lines. Each emission line lies within the wavelength range of its respective filter at the redshift of the galaxies and filter bandpasses are wide enough to accommodate the width of the broad component emission. The largest spatial dimension of the two proposed targets is $\sim 64'' \times 38''$, that can be covered by WFC3 quad filters (FoV of $80''^2$).

3) Continuum Filters. Four continuum filters (F336W, F438W, F547M and F814W) have been chosen to sample the continuum at suitable wavelength intervals. These images will be

used to accurately measure the continuum level at each emission line image and allow for its subtraction.

Breakdown of exposure times (in seconds) per galaxy and filter:

Filter	Line	Mrk 71	Mrk 209
F336W	Continuum	350	350
F373N	[O ii] 3727, 3729	1200	800
F438W	Continuum	200	200
F469N	He ii 4686	7000	3800
F487N	Ha	1000	250
F502N	[O iii] 5007	550	60
F547M	Continuum	100	100
F656N	H	850	200
FQ672N	[S ii] 6717	2250	1300
FQ674N	[S ii] 6731 5	300	2300
F814W	Continuum 4	50	450
Total exp time		19250	9810
No. Orbits (inc. overheads)		5.0a	5.0

a = object in CVZ

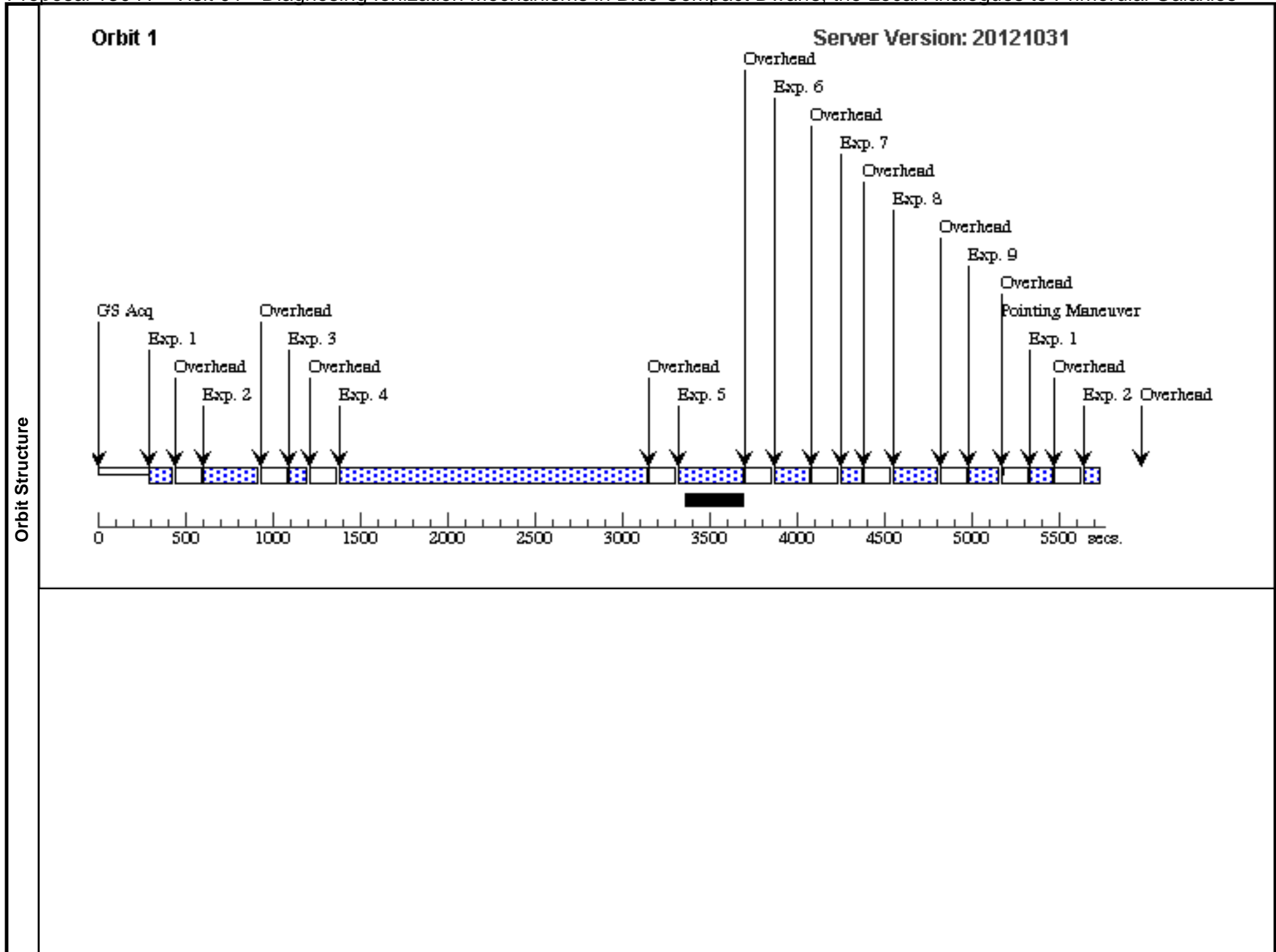
Proposal 13041 - Visit 01 - Diagnosing Ionization Mechanisms in Blue Compact Dwarfs, the Local Analogues to Primordial Galaxies

Tue Dec 18 02:12:27 GMT 2012

Visit	Proposal 13041, Visit 01, implementation Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: CVZ					
	(Exposure 10 (Pattern 1, Exps 10-11 in Visit 01)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp or WFC3 quad filters as central wavelengths & transmission efficiencies vary within the apertures. (Exposure 11 (Pattern 1, Exps 10-11 in Visit 01)) Warning (Form): POS TARG & PATTERN should be used carefully with ACS ramp or WFC3 quad filters as central wavelengths & transmission efficiencies vary within the apertures.					
Diagnosics						
Patterns	#	Primary Pattern	Secondary Pattern	Exposures		
	(1)	Pattern Type=WFC3-UVIS-DITHER- LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing= Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1-9), (10-11)		
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	MRK-71	RA: 07 28 42.1994 (112.1758308d) Dec: +69 11 21.50 (69.18931d) Equinox: J2000	Redshift: 0.000360	V=10.85	Reference Frame: ICRS
<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>						

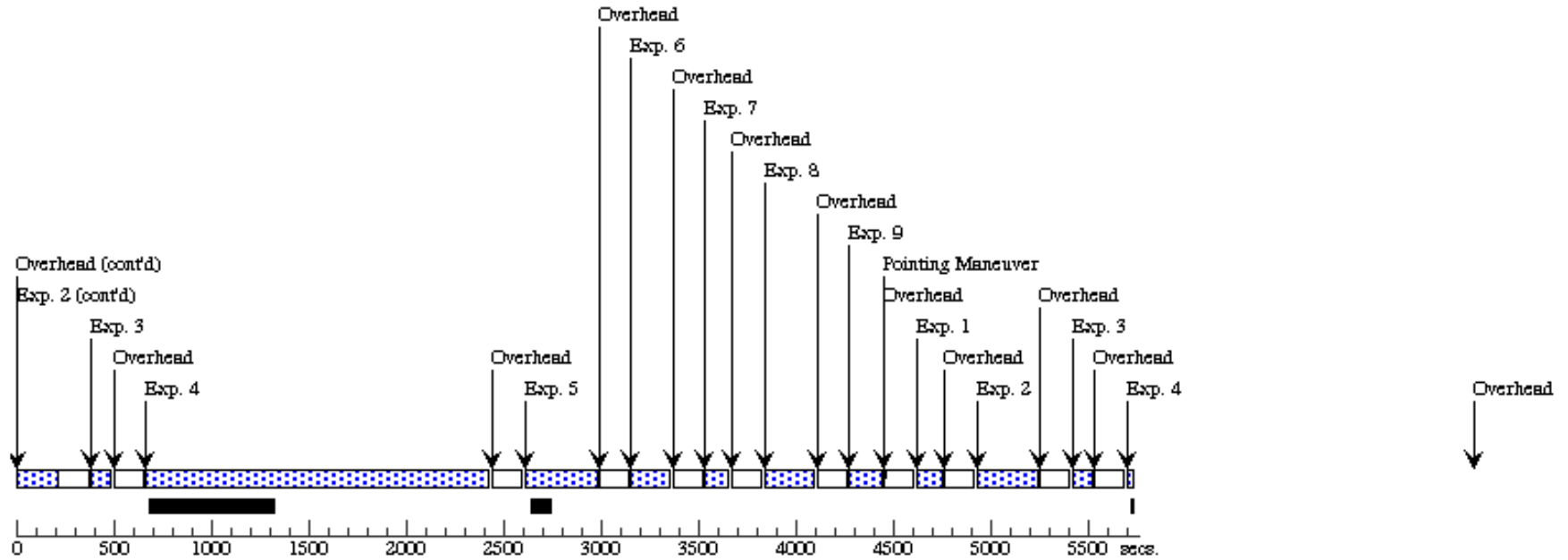
Proposal 13041 - Visit 01 - Diagnosing Ionization Mechanisms in Blue Compact Dwarfs, the Local Analogues to Primordial Galaxies

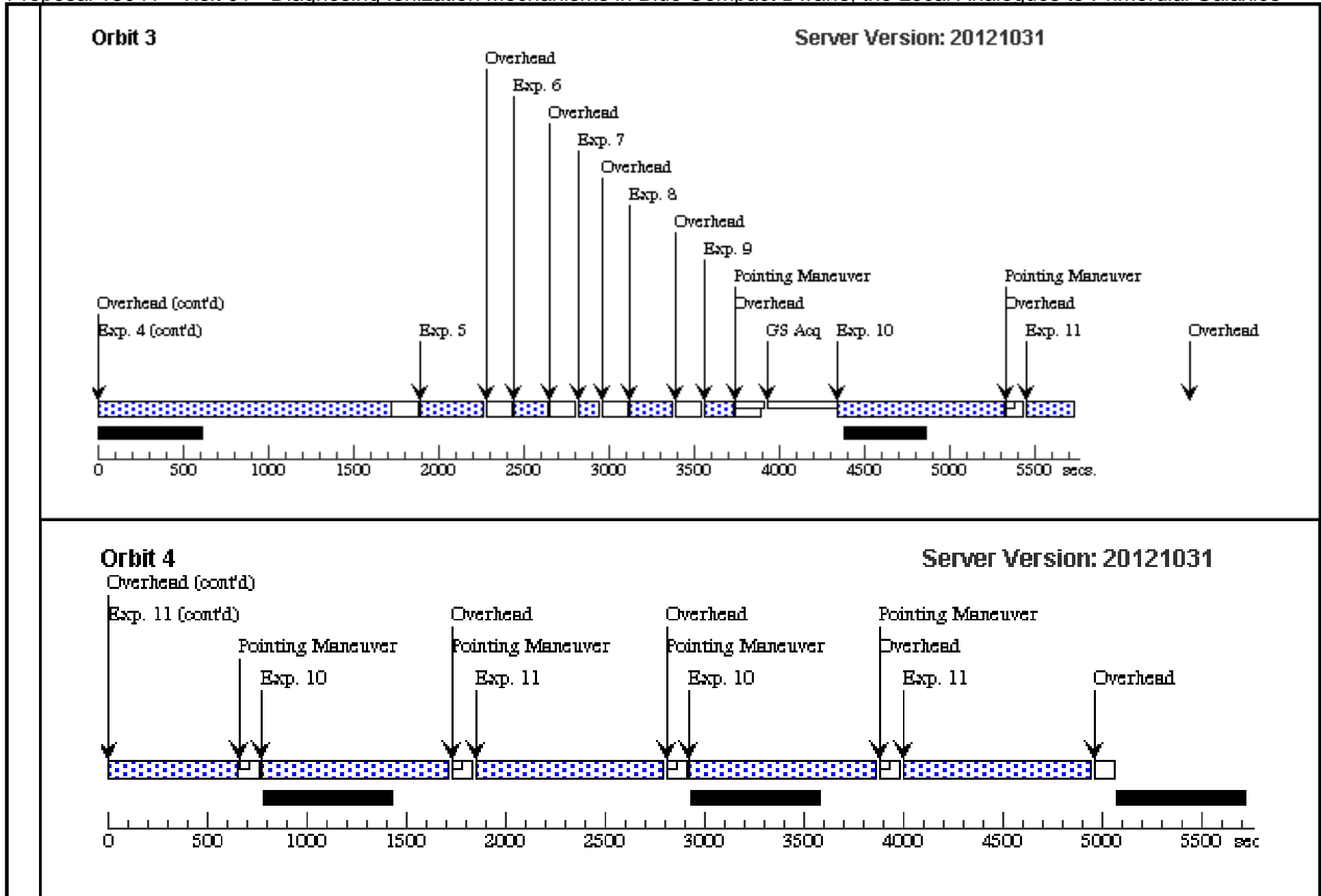
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	(1) MRK-71	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F336W				Pattern 1, Exps 1-9 in Visit 01 (1)	100 Secs [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)]	[1] [2]
	2	(1) MRK-71	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F373N				Pattern 1, Exps 1-9 in Visit 01 (1)	300 Secs [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)]	[1] [2]
	3	(1) MRK-71	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F438W				Pattern 1, Exps 1-9 in Visit 01 (1)	70 Secs [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)]	[1] [2]
	4	(1) MRK-71	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F469N				Pattern 1, Exps 1-9 in Visit 01 (1)	1750 Secs [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)]	[1] [2]
	5	(1) MRK-71	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F487N				Pattern 1, Exps 1-9 in Visit 01 (1)	340 Secs [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)]	[1] [2] [3]
	6	(1) MRK-71	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F502N				Pattern 1, Exps 1-9 in Visit 01 (1)	180 Secs [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)]	[1] [2] [3]
	7	(1) MRK-71	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F547M				Pattern 1, Exps 1-9 in Visit 01 (1)	100 Secs [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)]	[1] [2] [3]
	8	(1) MRK-71	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F656N				Pattern 1, Exps 1-9 in Visit 01 (1)	240 Secs [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)]	[1] [2] [3]
	9	(1) MRK-71	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F814W				Pattern 1, Exps 1-9 in Visit 01 (1)	140 Secs [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)]	[1] [2] [3]
	10	(1) MRK-71	WFC3/UVIS, ACCUM, UVIS-QUAD	FQ672N				Pattern 1, Exps 10-11 in Visit 01 (1)	947 Secs [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)]	[3] [4]
11	(1) MRK-71	WFC3/UVIS, ACCUM, UVIS-QUAD	FQ674N				Pattern 1, Exps 10-11 in Visit 01 (1)	947 Secs [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)]	[3] [4]	



Orbit 2

Server Version: 20121031





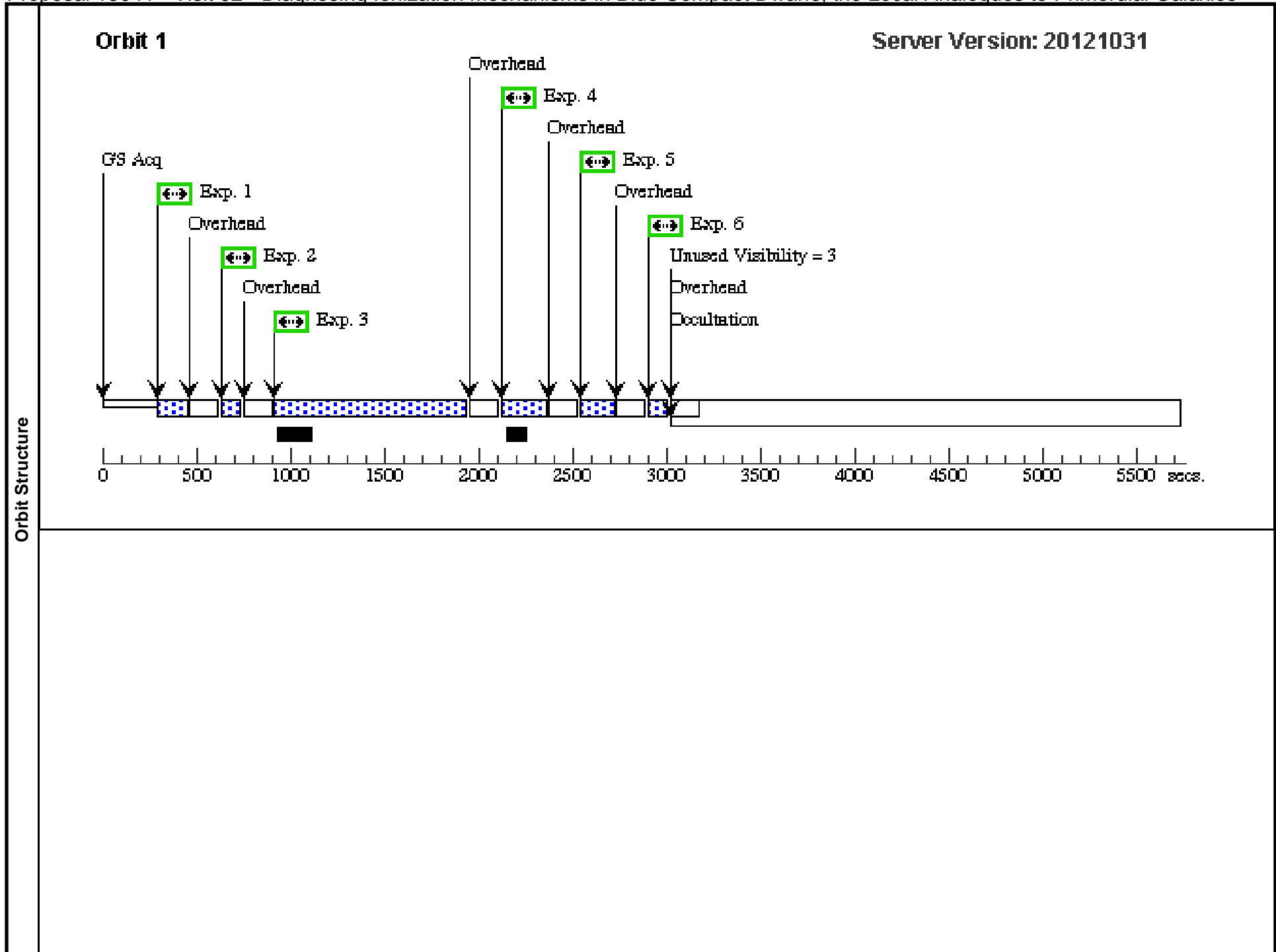
Proposal 13041 - Visit 02 - Diagnosing Ionization Mechanisms in Blue Compact Dwarfs, the Local Analogues to Primordial Galaxies

Tue Dec 18 02:12:34 GMT 2012

Visit	Proposal 13041, Visit 02, implementation Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: SCHED 100%					
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Diagnosics						
Patterns	#	Primary Pattern	Secondary Pattern	Exposures		
	(1)	Pattern Type=WFC3-UVIS-DITHER- LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing= Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1-9), (10-11)		
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(2)	MRK-209	RA: 12 26 15.6814 (186.5653392d) Dec: +48 29 37.55 (48.49376d) Equinox: J2000	Redshift: 0.000937	V=15.08	Reference Frame: ICRS
<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>						

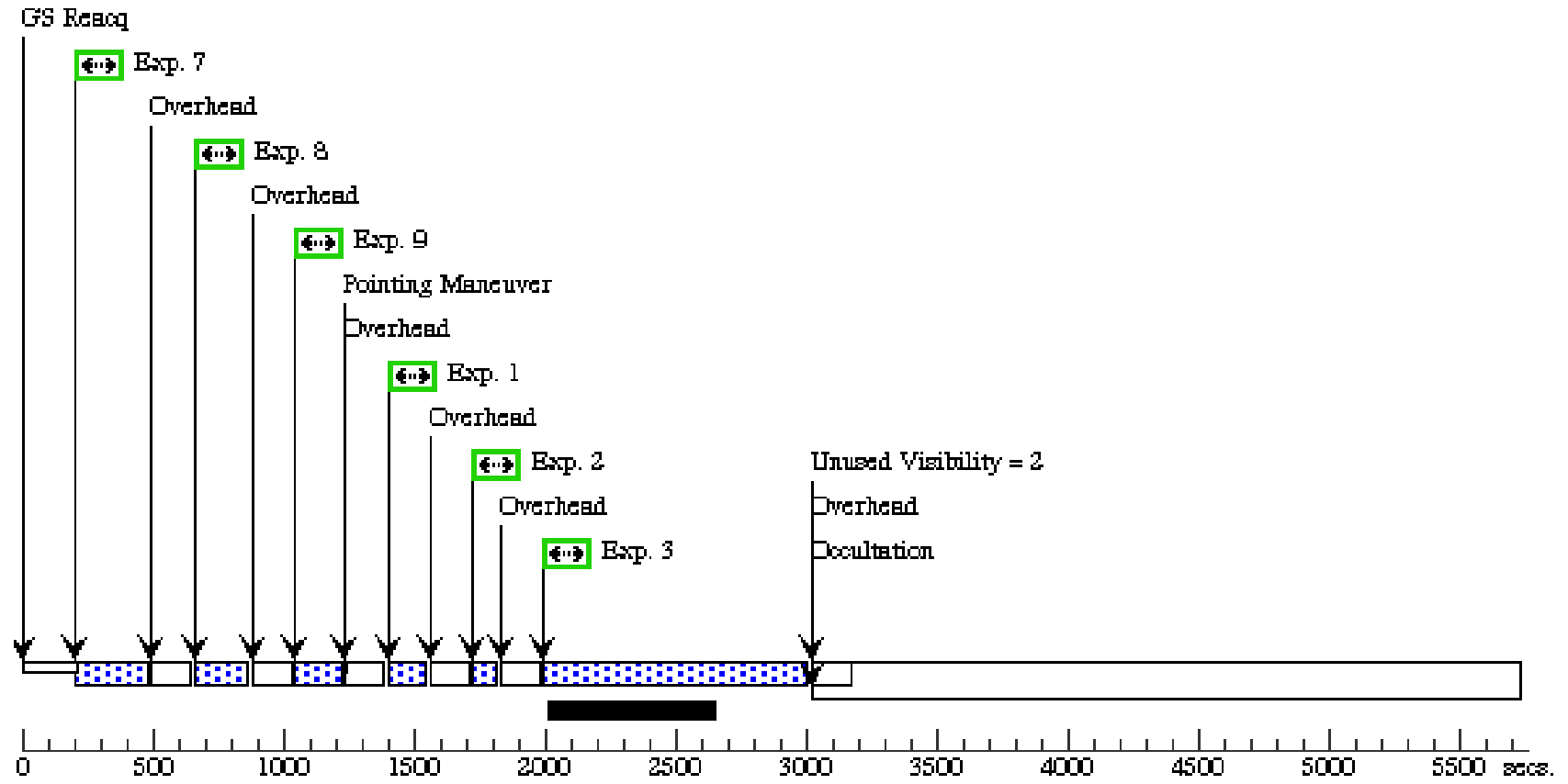
Proposal 13041 - Visit 02 - Diagnosing Ionization Mechanisms in Blue Compact Dwarfs, the Local Analogues to Primordial Galaxies

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	(2) MRK-209	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F336W				Pattern 1, Exps 1-9 in Visit 02 (1)	115 Secs [=>127.0 Secs (Pattern 1)] [=>114.0 Secs (Pattern 2)] [=>136.0 Secs (Pattern 3)]	[1] [2] [3]
	2	(2) MRK-209	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F438W				Pattern 1, Exps 1-9 in Visit 02 (1)	67 Secs [=>79.0 Secs (Pattern 1)] [=>66.0 Secs (Pattern 2)] [=>88.0 Secs (Pattern 3)]	[1] [2] [3]
	3	(2) MRK-209	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F469N				Pattern 1, Exps 1-9 in Visit 02 (1)	1000 Secs [=>1012.0 Secs (Pattern 1)] [=>999.0 Secs (Pattern 2)] [=>1059.0 Secs (Pattern 3)]	[1] [2] [4]
	4	(2) MRK-209	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F487N				Pattern 1, Exps 1-9 in Visit 02 (1)	200 Secs [=>212.0 Secs (Pattern 1)] [=>221.0 Secs (Pattern 2)] [=>259.0 Secs (Pattern 3)]	[1] [3] [4]
	5	(2) MRK-209	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F502N				Pattern 1, Exps 1-9 in Visit 02 (1)	150 Secs [=>162.0 Secs (Pattern 1)] [=>171.0 Secs (Pattern 2)] [=>209.0 Secs (Pattern 3)]	[1] [3] [4]
	6	(2) MRK-209	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F547M				Pattern 1, Exps 1-9 in Visit 02 (1)	70 Secs [=>82.0 Secs (Pattern 1)] [=>91.0 Secs (Pattern 2)] [=>129.0 Secs (Pattern 3)]	[1] [3] [4]
	7	(2) MRK-209	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F373N				Pattern 1, Exps 1-9 in Visit 02 (1)	270 Secs [=>269.0 Secs (Pattern 1)] [=>291.0 Secs (Pattern 2)] [=>329.0 Secs (Pattern 3)]	[2] [3] [4]
	8	(2) MRK-209	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F656N				Pattern 1, Exps 1-9 in Visit 02 (1)	180 Secs [=>179.0 Secs (Pattern 1)] [=>201.0 Secs (Pattern 2)] [=>253.0 Secs (Pattern 3)]	[2] [3] [5]
	9	(2) MRK-209	WFC3/UVIS, ACCUM, UVIS1-2K2A-SUB	F814W				Pattern 1, Exps 1-9 in Visit 02 (1)	150 Secs [=>149.0 Secs (Pattern 1)] [=>171.0 Secs (Pattern 2)] [=>223.0 Secs (Pattern 3)]	[2] [3] [5]
	10	(2) MRK-209	WFC3/UVIS, ACCUM, UVIS-QUAD	FQ672N				Pattern 1, Exps 10-11 in Visit 02 (1)	520 Secs [=>593.0 Secs (Pattern 1)] [=>537.0 Secs (Pattern 2)] [=>537.0 Secs (Pattern 3)]	[5] [6] [6]
11	(2) MRK-209	WFC3/UVIS, ACCUM, UVIS-QUAD	FQ674N				Pattern 1, Exps 10-11 in Visit 02 (1)	650 Secs [=>723.0 Secs (Pattern 1)] [=>667.0 Secs (Pattern 2)] [=>667.0 Secs (Pattern 3)]	[5] [6] [6]	



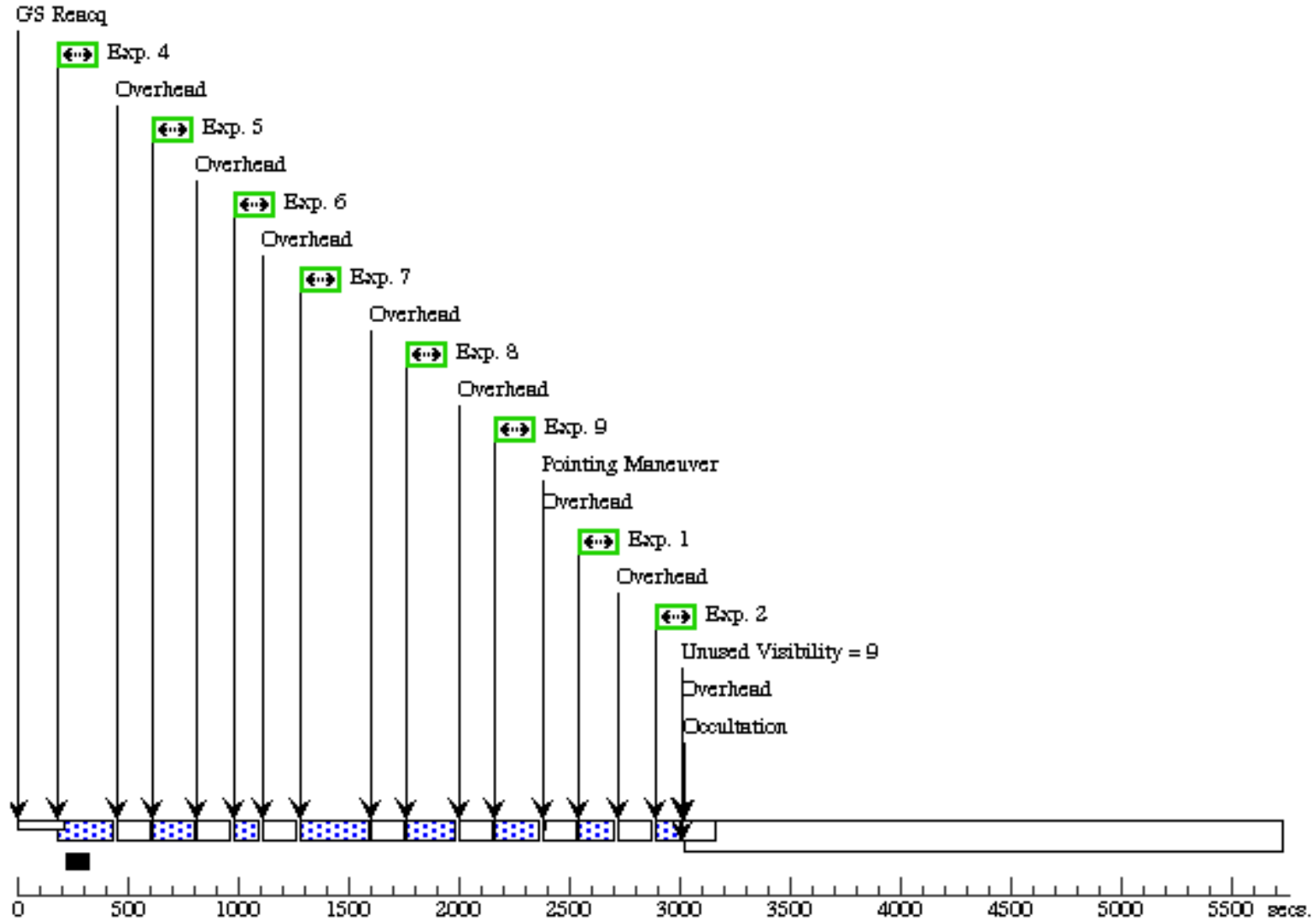
Orbit 2

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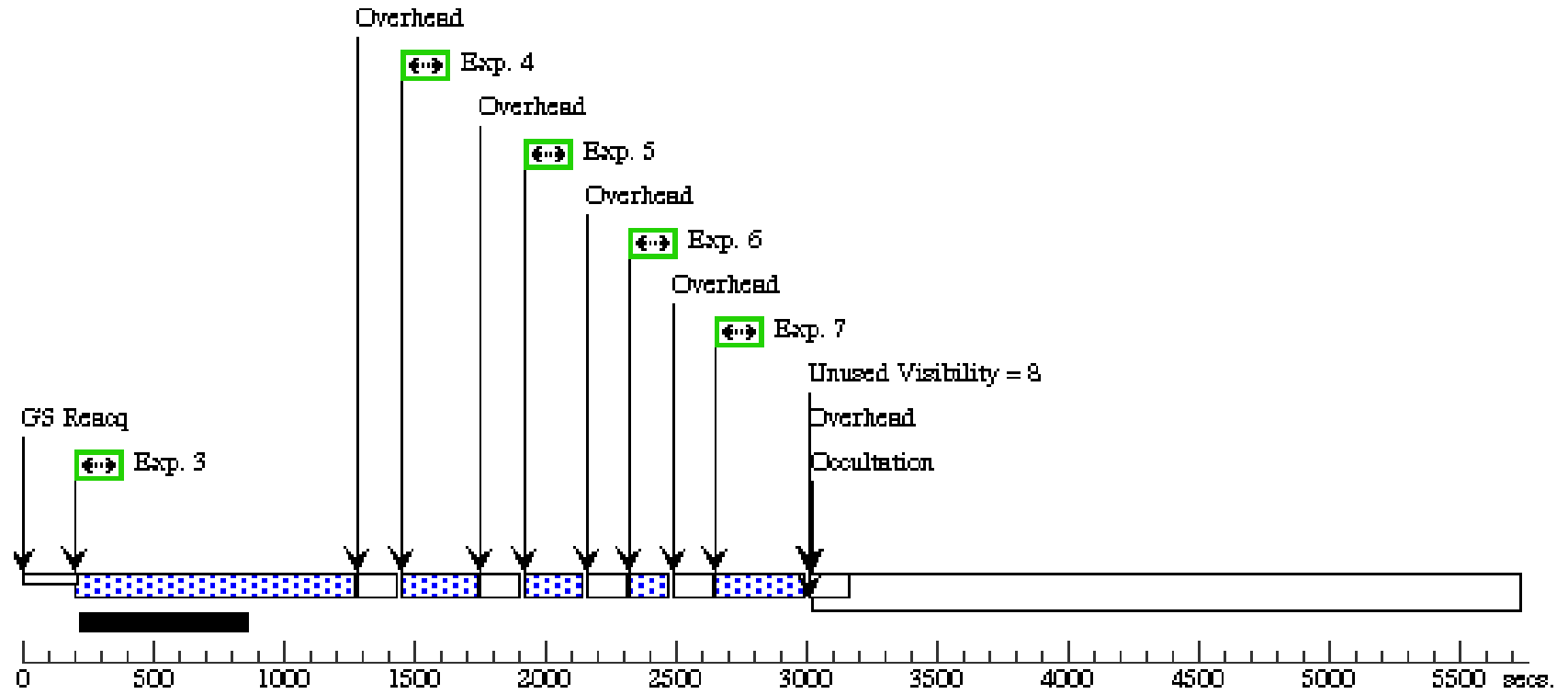
Orbit 3

Server Version: 20121031



Orbit 4

Server Version: 20121031



Orbit 5

Server Version: 20121031

