12180 - The Holistic Evolution of Dwarf Galaxies: Internal and External Processes in NGC 6822

Cycle: 18, Proposal Category: GO

(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) NGC6822-GRID1 (2) NGC6822-GRID2 (3) NGC6822-GRID3	ACS/WFC WFC3/UVIS	3	01-Oct-2010 21:26:25.0	yes
02	(4) NGC6822-GRID4 (5) NGC6822-GRID5 (6) NGC6822-GRID6	ACS/WFC WFC3/UVIS	3	01-Oct-2010 21:26:39.0	yes

6 Total Orbits Used

ABSTRACT

Low-mass galaxy evolution is driven by both internal (e.g., star formation and feedback) and external (e.g., tidal interaction) processes; however, few nearby systems show evidence of both mechanisms operating in tandem. The Local Group dwarf galaxy NGC 6822 presents a unique opportunity to study important evolutionary processes because of proximity and timing: it harbors one of the largest known holes in its neutral ISM (a signpost of violent stellar feedback), and it appears to be undergoing a tidal interaction with a very low mass companion dwarf galaxy. To capitalize on this opportunity, we propose to undertake an ACS and WFC3 imaging study of the stellar populations throughout NGC 6822. We will study the role of both internal and external processes by sampling the stellar populations associated with the main body (using archival WFPC2 data), the giant HI hole, the companion dwarf galaxy, and the tidal material at the ends of the disk. From these data we will extract precise color magnitude diagrams; we will measure the full 13 Gyr star formation history of each field, with high time resolution (20-250 Myr) over the past 1 Gyr, and quantify the relative contributions of internal and external drivers of dwarf galaxy evolution. Specifically, we will study: 1) the nature of the companion object (differentiating between infalling gas and a genuine low-mass galaxy); 2) the energetics of giant HI hole creation; 3) the role of interactions in the system's evolution; 4) the nature of feedback in governing the star formation process; and 5) the patterns of star formation over time. We have optimized our field placements to extract the most information possible about the competing forces that drive galaxy evolution; in only six orbits, we will gain fundamental insights into the contributions of both internal and external processes that bear on the evolution of low-mass galaxies.

OBSERVING DESCRIPTION

To obtain detailed SFHs back to 1 Gyr, we need photometry deep enough to reach M_V = +2.5. The distance of NGC 6822 allows us to reach our requisite photometric depth quickly and eciently. A single 52-minute orbit per pointing will be used to obtain imaging in the F475W and F814W filters (ACS - all fields; WFC3 - non-overlapping fields) and in the F336W filter (WFC3 - overlapping fields). This provides exceptional quality photometry to the depth we require (e.g., S/N > 8, 13 for a star of M_V = +2.5 in the G and I bands, respectively, using either ACS or WFC3; S/N ~ 7 for a star of M_V +1 in the WFC3 U band). We request 6 pointings (3 each at two dierent roll angles), for a total of 6 orbits.

NGC 6822 is close enough to allow efficient photometry, but yet distant enough that the
ACS and WFC3 detectors can image a significant fraction of the galaxy in a modest number of orbits. We are interested in the nature of multiple stellar populations in various regions of the galaxy, and in how these populations are related. We will combine suciently deep archival WFPC2 pointings with these proposed ACS and WFC3 observations

in order to study all regions of interest.

Visit

Proposal 12180, Visit 01, scheduling Sat Oct 02 01:26:45 GMT 2010

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC, WFC3/UVIS

Special Requirements: ORIENT 257.8D TO 257.85 D

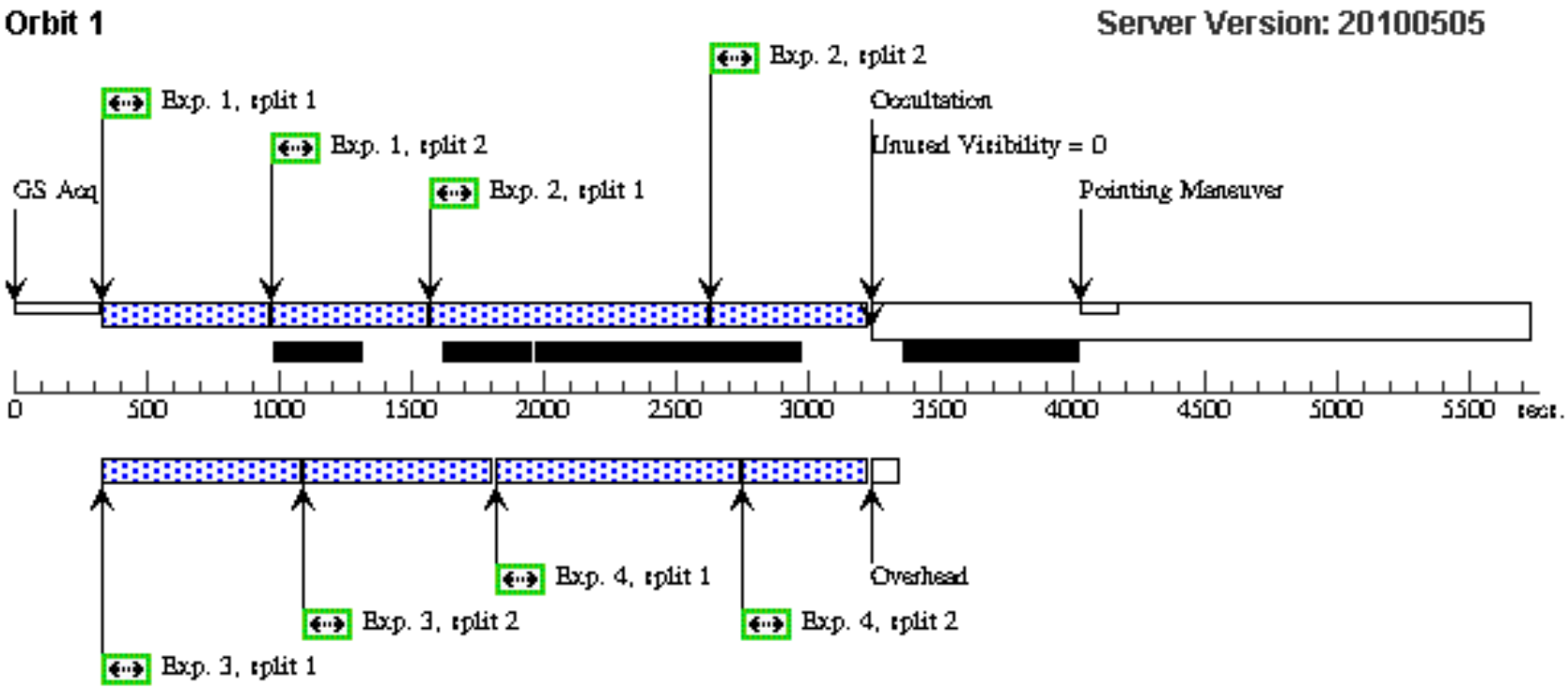
Fixed Targets

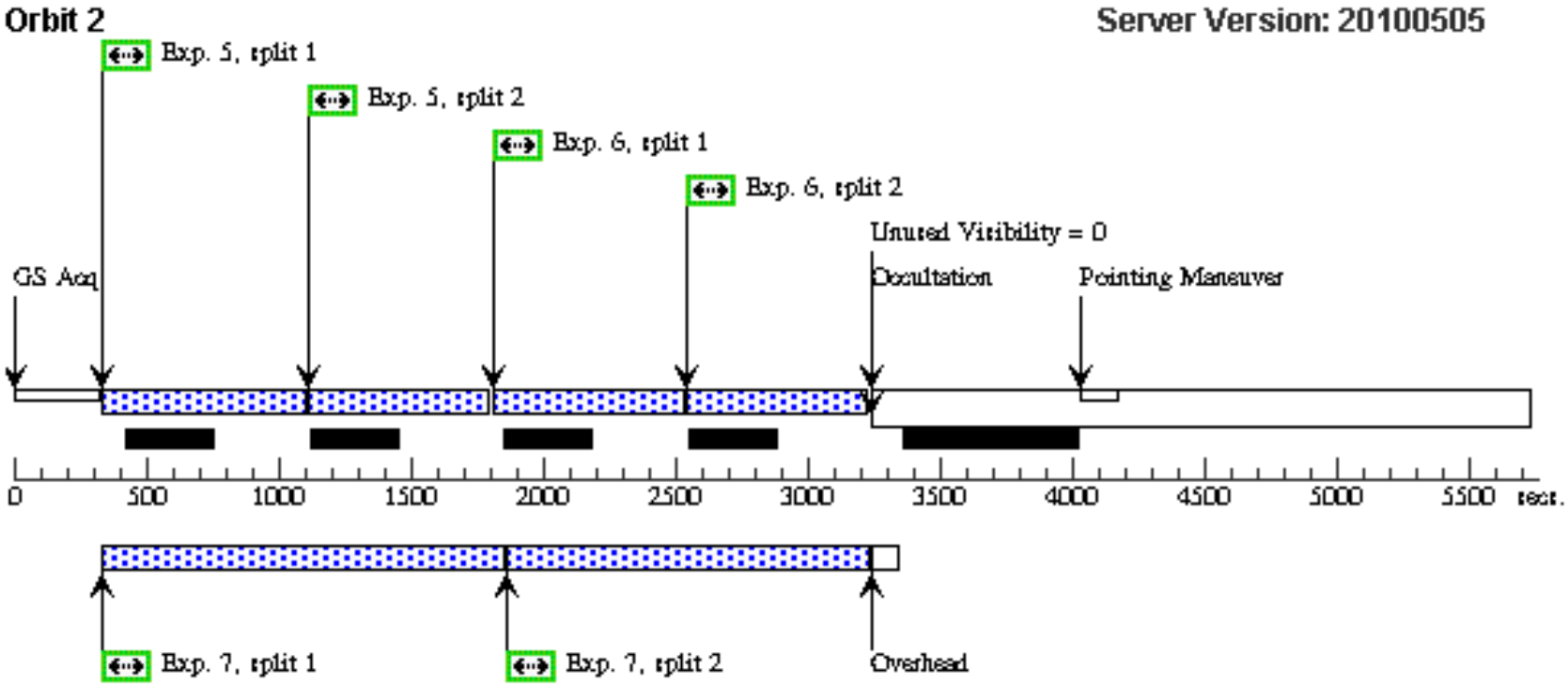
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC6822-GRID1	RA: 19 43 33.5007 (295.8895862d) Dec: -14 33 41.00 (-14.56139d) Equinox: J2000		V=26+/-1	Reference Frame: ICRS
(2)	NGC6822-GRID2	RA: 19 43 54.0219 (295.9750912d) Dec: -14 37 9.62 (-14.61934d) Equinox: J2000		V=26+/-1	Reference Frame: ICRS
(3)	NGC6822-GRID3	RA: 19 44 14.8717 (296.0619654d) Dec: -14 40 39.74 (-14.67771d) Equinox: J2000		V=26+/-1	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	GRID1: ACS F475W	(1) NGC6822-GRID 1	ACS/WFC, ACCUM, WFC	F475W	CR-SPLIT=2		Prime + Parallel Group 1-4	1119 Secs *[==>423.0 Secs (Split 1)]* *[==>463 Secs (Split 2)]*	***[1]***
2	GRID1: ACS/F814W	(1) NGC6822-GRID 1	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=2		Prime + Parallel Group 1-4	1118 Secs *[==>883 Secs (Split 1)]* *[==>463 Secs (Split 2)]*	***[1]***
3	GRID1: WFC3/F475W	(1) NGC6822-GRID 1	WFC3/UVIS, ACCUM, UVIS	F475W	CR-SPLIT=2		Prime + Parallel Group 1-4	400 Secs *[==>600.0 Secs (Split 1)]* *[==>600.0 Secs (Split 2)]*	***[1]***
4	GRID1: WFC3/F814W	(1) NGC6822-GRID 1	WFC3/UVIS, ACCUM, UVIS	F814W	CR-SPLIT=2		Prime + Parallel Group 1-4	300 Secs *[==>790.0 Secs (Split 1)]* *[==>474 Secs (Split 2)]*	***[1]***
5	GRID2: ACS F475W	(2) NGC6822-GRID 2	ACS/WFC, ACCUM, WFC	F475W	CR-SPLIT=2		Prime + Parallel Group 5-7	1119 Secs *[==>559.5 Secs (Split 1)]* *[==>559.5 Secs (Split 2)]*	***[2]***
6	GRID2: ACS/F814W	(2) NGC6822-GRID 2	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=2		Prime + Parallel Group 5-7	1118 Secs *[==>559 Secs (Split 1)]* *[==>559 Secs (Split 2)]*	***[2]***
7	GRID2: WFC3/F336W	(2) NGC6822-GRID 2	WFC3/UVIS, ACCUM, UVIS	F336W	CR-SPLIT=2		Prime + Parallel Group 5-7	2740 Secs *[==>1370 Secs (Split 1)]* *[==>1370 Secs (Split 2)]*	***[2]***
8	GRID3: ACS F475W	(3) NGC6822-GRID 3	ACS/WFC, ACCUM, WFC	F475W	CR-SPLIT=2		Prime + Parallel Group 8-10	1119 Secs *[==>559.5 Secs (Split 1)]* *[==>559.5 Secs (Split 2)]*	***[3]***
9	GRID3: ACS/F814W	(3) NGC6822-GRID 3	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=2		Prime + Parallel Group 8-10	1118 Secs *[==>559 Secs (Split 1)]* *[==>559 Secs (Split 2)]*	***[3]***
10	GRID3: WFC3/F336W	(3) NGC6822-GRID 3	WFC3/UVIS, ACCUM, UVIS	F336W	CR-SPLIT=2		Prime + Parallel Group 8-10	2740 Secs *[==>1370 Secs (Split 1)]* *[==>1370 Secs (Split 2)]*	***[3]***

Orbit Structure

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Exp. 6, split 1
Exp. 6, split 2
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Occultation
Pointing Maneuver
0
500
1000
1500
2000
2500
3000
3500
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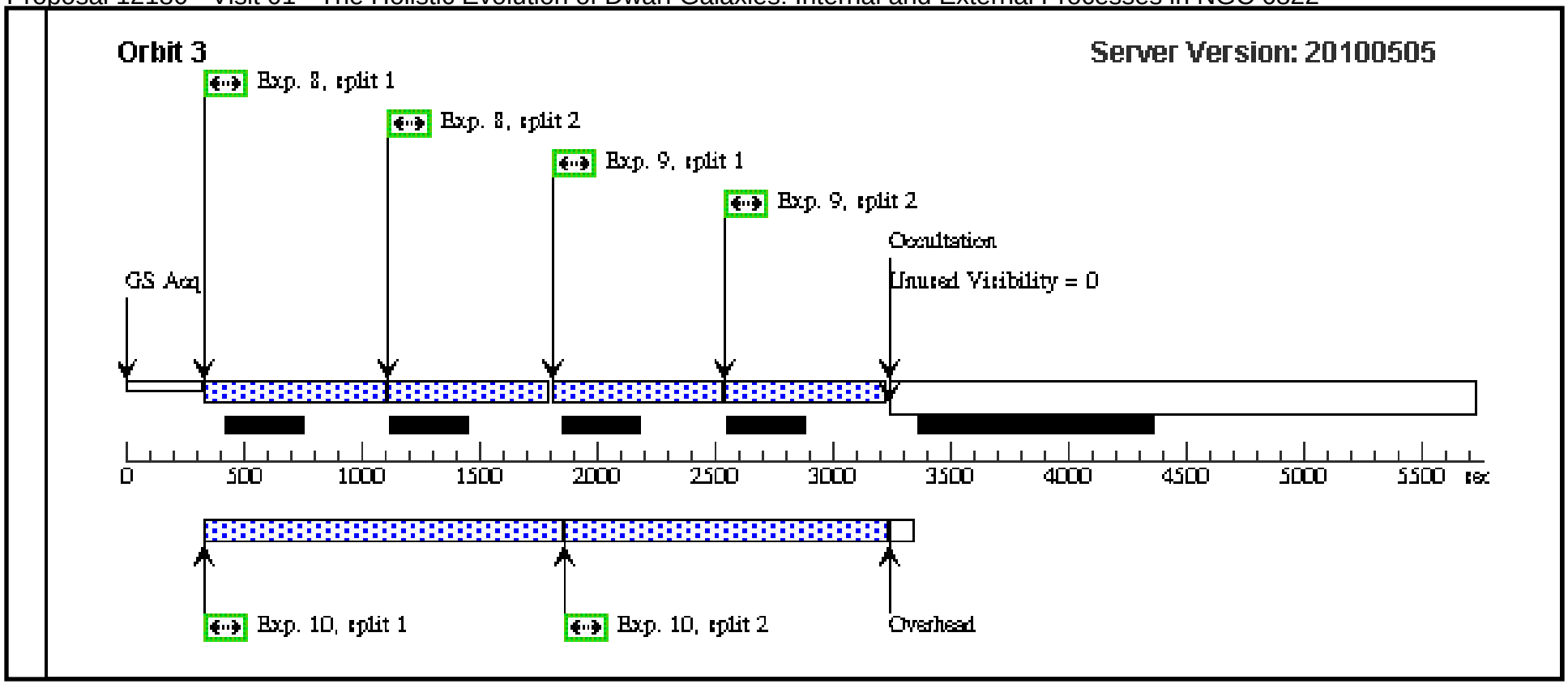
4500
5000
5500
sec.
Exp. 7, split 1
Exp. 7, split 2
Overhead


Orbit 3
Server Version: 20100505
Exp. 8, split 1
Exp. 8, split 2
Exp. 9, split 1
Exp. 9, split 2
Occultation
GS Acq
Unused Visibility = 0
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec
Exp. 10, split 1
Exp. 10, split 2
Overhead

Visit

Proposal 12180, Visit 02, scheduling Sat Oct 02 01:26:47 GMT 2010

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC, WFC3/UVIS

Special Requirements: ORIENT 77.8D TO 77.85 D

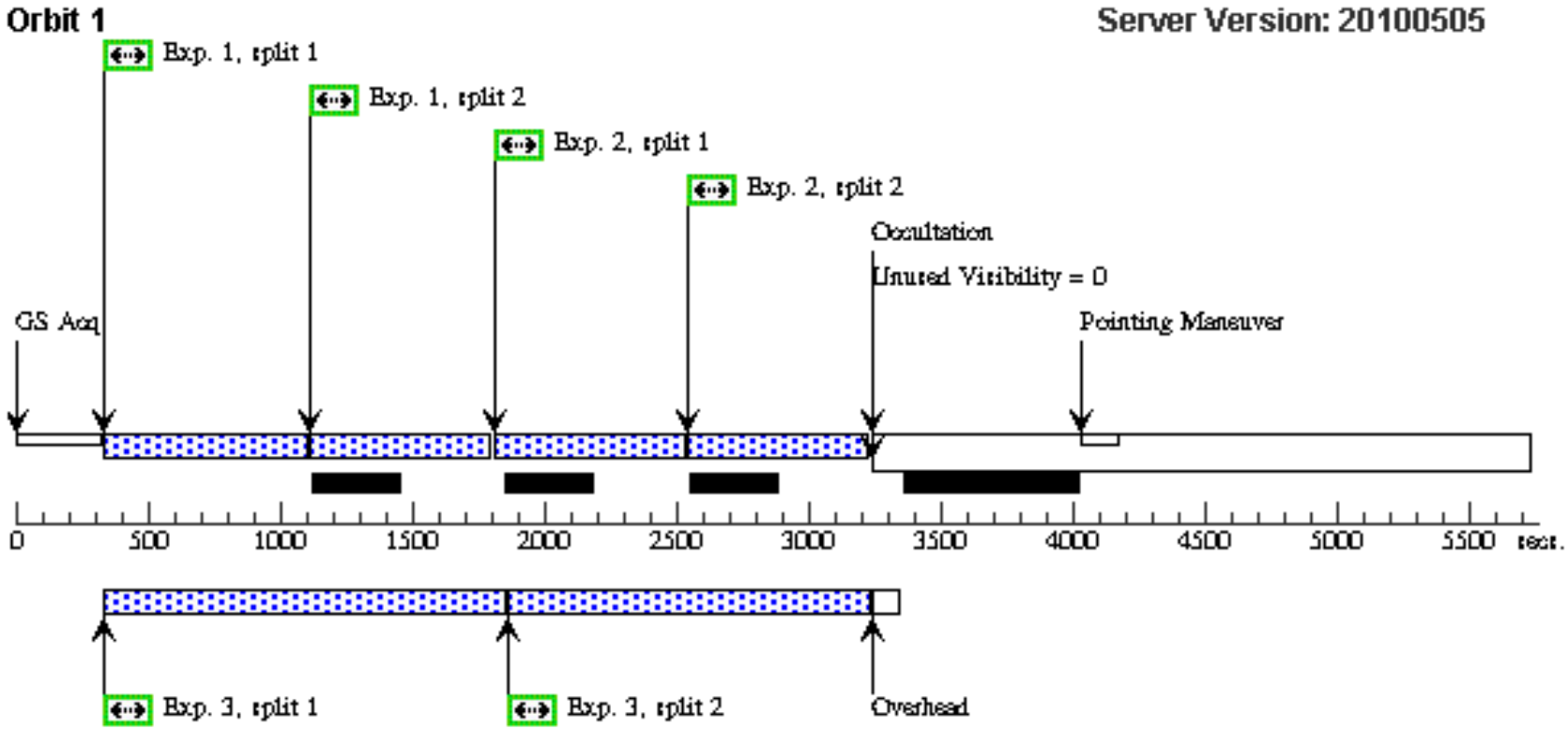
Fixed Targets

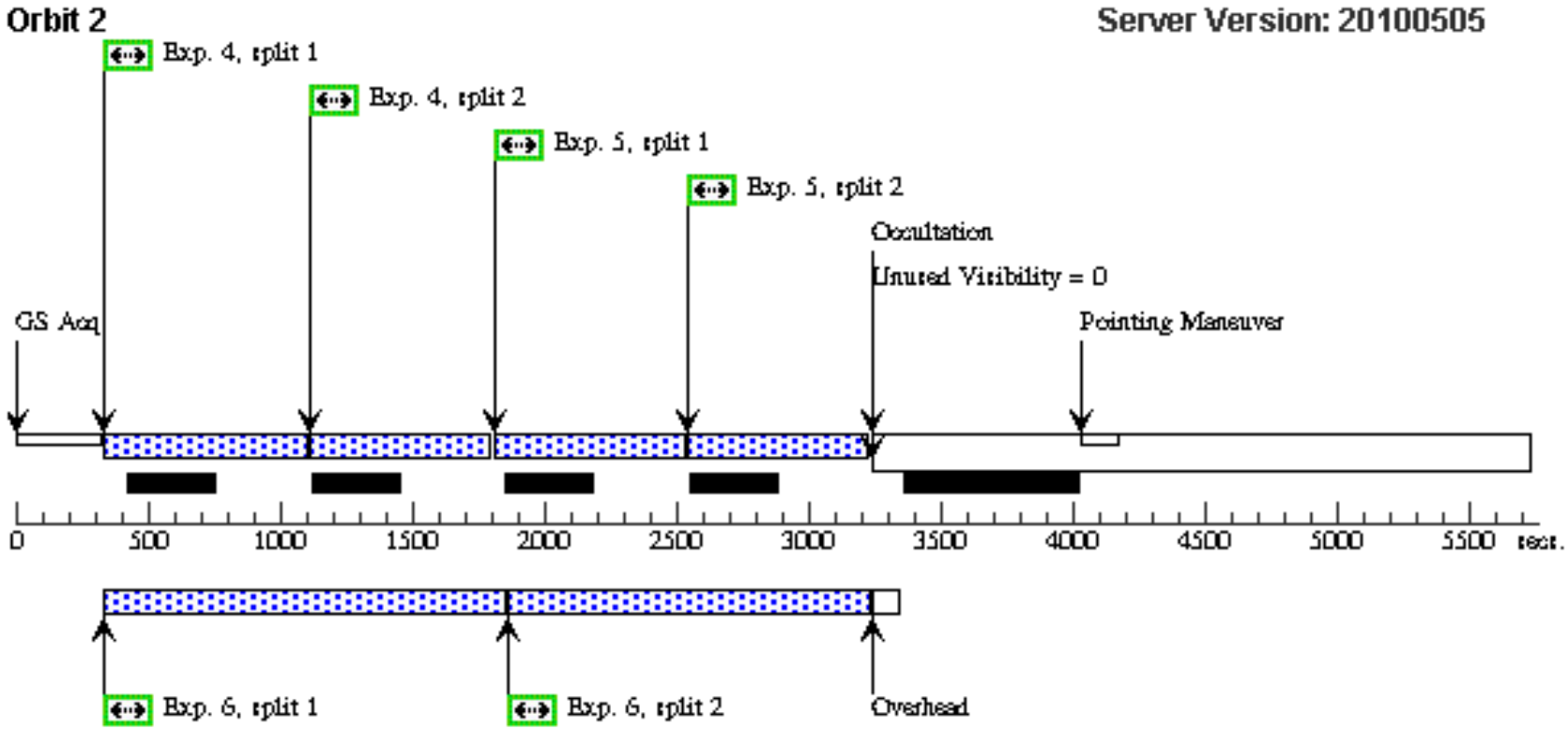
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(4)	NGC6822-GRID4	RA: 19 45 10.2455 (296.2926896d) Dec: -14 49 46.42 (-14.82956d) Equinox: J2000		V=26+/-1	Reference Frame: ICRS
(5)	NGC6822-GRID5	RA: 19 45 30.2646 (296.3761025d) Dec: -14 53 14.32 (-14.88731d) Equinox: J2000		V=26+/-1	Reference Frame: ICRS
(6)	NGC6822-GRID6	RA: 19 45 51.1279 (296.4630329d) Dec: -14 56 36.66 (-14.94352d) Equinox: J2000		V=26+/-1	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	GRID4: ACS F475W	(4) NGC6822-GRID4	ACS/WFC, ACCUM, WFC	F475W	CR-SPLIT=2		Prime + Parallel Group 1-3	1119 Secs *[==>559.5 Secs (Split 1)]* *[==>559.5 Secs (Split 2)]*	***[1]***
2	GRID4: ACS/F814W	(4) NGC6822-GRID4	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=2		Prime + Parallel Group 1-3	1118 Secs *[==>559 Secs (Split 1)]* *[==>559 Secs (Split 2)]*	***[1]***
3	GRID4: WFC3/F336W	(4) NGC6822-GRID4	WFC3/UVIS, ACCUM, UVIS	F336W	CR-SPLIT=2		Prime + Parallel Group 1-3	2740 Secs *[==>1370 Secs (Split 1)]* *[==>1370 Secs (Split 2)]*	***[1]***
4	GRID5: ACS F475W	(5) NGC6822-GRID5	ACS/WFC, ACCUM, WFC	F475W	CR-SPLIT=2		Prime + Parallel Group 4-6	1119 Secs *[==>559.5 Secs (Split 1)]* *[==>559.5 Secs (Split 2)]*	***[2]***
5	GRID5: ACS/F814W	(5) NGC6822-GRID5	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=2		Prime + Parallel Group 4-6	1118 Secs *[==>559 Secs (Split 1)]* *[==>559 Secs (Split 2)]*	***[2]***
6	GRID5: WFC3/F336W	(5) NGC6822-GRID5	WFC3/UVIS, ACCUM, UVIS	F336W	CR-SPLIT=2		Prime + Parallel Group 4-6	2740 Secs *[==>1370 Secs (Split 1)]* *[==>1370 Secs (Split 2)]*	***[2]***
7	GRID6: ACS F475W	(6) NGC6822-GRID6	ACS/WFC, ACCUM, WFC	F475W	CR-SPLIT=2		Prime + Parallel Group 7-10	1119 Secs *[==>423 Secs (Split 1)]* *[==>463 Secs (Split 2)]*	***[3]***
8	GRID6: ACS/F814W	(6) NGC6822-GRID6	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=2		Prime + Parallel Group 7-10	1118 Secs *[==>883 Secs (Split 1)]* *[==>463 Secs (Split 2)]*	***[3]***
9	GRID6: WFC3/F475W	(6) NGC6822-GRID6	WFC3/UVIS, ACCUM, UVIS	F336W	CR-SPLIT=2		Prime + Parallel Group 7-10	400 Secs *[==>600 Secs (Split 1)]* *[==>600 Secs (Split 2)]*	***[3]***
10	GRID6: WFC3/F814W	(6) NGC6822-GRID6	WFC3/UVIS, ACCUM, UVIS	F814W	CR-SPLIT=2		Prime + Parallel Group 7-10	300 Secs *[==>790 Secs (Split 1)]* *[==>474.0 Secs (Split 2)]*	***[3]***

Orbit Structure

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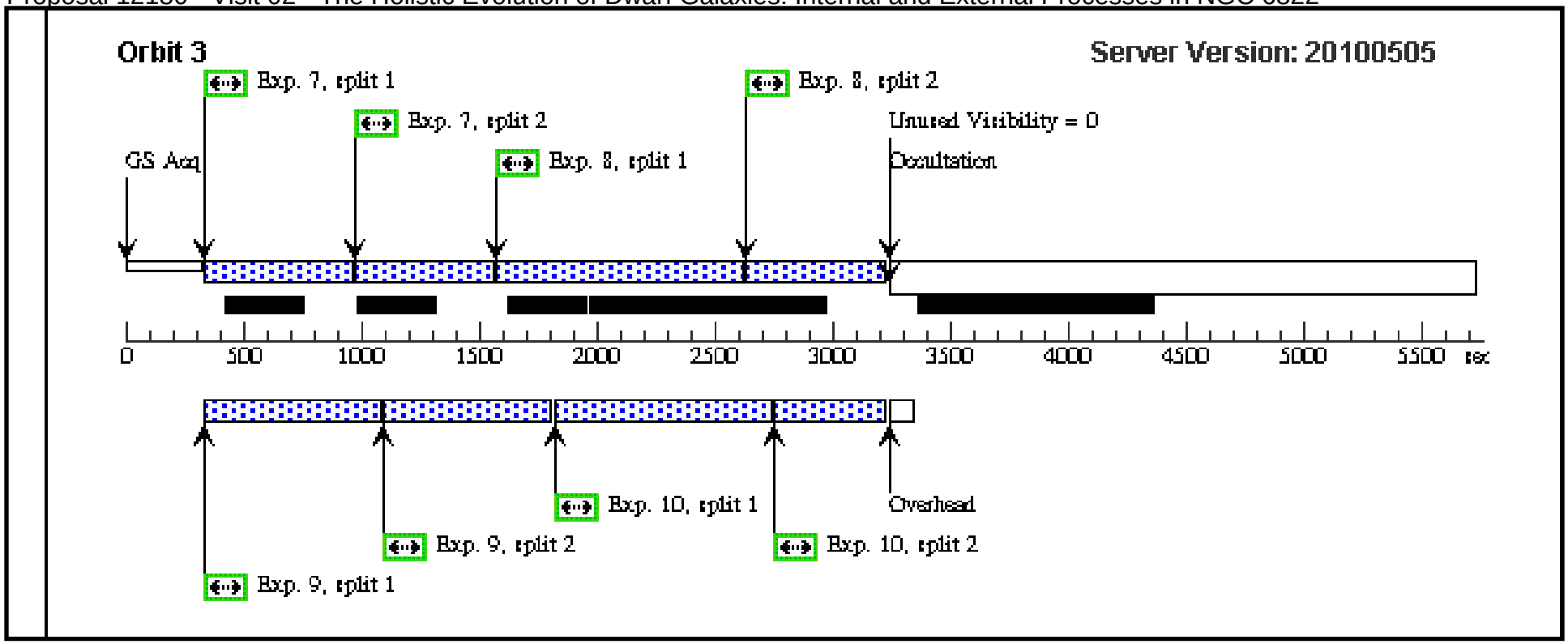
Exp. 4, split 2
Exp. 5, split 1
Exp. 5, split 2
Occultation
Unused Visibility = 0
GS Acq
Pointing Maneuver
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec.
Exp. 6, split 1
Exp. 6, split 2
Overhead


Orbit 3
Server Version: 20100505
Exp. 7, split 1
Exp. 7, split 2
Exp. 8, split 1
Exp. 8, split 2
GS Acq
Unused Visibility = 0
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec
Exp. 10, split 1
Overhead
Exp. 9, split 2
Exp. 10, split 2
Exp. 9, split 1