



## 10887 - Stellar Populations in a $z=4$ Lensed Galaxy with NICMOS

Cycle: 15, Proposal Category: GO

(Availability Mode: SUPPORTED)

### INVESTIGATORS

<i>Name</i>	<i>Institution</i>	<i>E-Mail</i>
<b>Dr. Andrew Bunker (PI) (ESA Member)</b>	<b>University of Exeter</b>	<b>bunker@astro.ex.ac.uk</b>
Dr. Leonidas Moustakas (CoI) (AdminUSPI)	Jet Propulsion Laboratory	leonidas@jpl.nasa.gov

### 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) ABELL-2390LENS-Z4.04	NIC1 NIC2 WFPC2	4	06-Mar-2007 21:10:56.0	yes
02	(1) ABELL-2390LENS-Z4.04	NIC1 NIC2 WFPC2	4	06-Mar-2007 21:11:17.0	yes

8 Total Orbits Used

### ABSTRACT

We propose to use NICMOS on HST to undertake deep high-resolution H-band imaging of a  $z=4$  galaxy, lensed by a rich foreground cluster into highly-magnified arcs 3-5arcsec in length. By combining this with

existing deep K-band imaging from Keck and high-quality archival WFPC2 and ACS data, we can spatially resolve stellar populations along the arcs. The WFPC2 images clearly reveal several bright knots, which may correspond to sites of active star formation. Indeed, our Keck/LRIS spectra (Bunker, Moustakas & Davis 2000) are consistent with OB-star spectral energy distributions in the rest-ultraviolet. However, there are considerable portions of the arcs which appear redder with no Ly-alpha emission, consistent with being post-starburst regions. The sensitivity and resolution afforded by NIC2 is crucial to study the inter-knot flux in H-band (F160W), a goal unachievable from the ground. In conjunction with our deep Keck K' data, NIC2 imaging will straddle the 4000Ang+Balmer break and thus allow us to 'age-date' the stellar populations by the inferred amplitude of the break along the transverse extent of the arcs. We can achieve this in 8 orbits, and address whether this star-forming galaxy at  $z=4$  has had extended formation histories - vital for the interpretation of the Lyman Break Galaxies, and their relation to the evolved Extremely Red Objects.

#### **OBSERVING DESCRIPTION**

16 half-orbit NIC2 images with the F160W filter, comprising two visits each of 4 orbits (8 pointings) dithered in a spiral pattern. ORIENT set such that WFPC2 parallels cover some of cluster. Visit 1 has F606W R-band imaging and visit 2 has F814W I-band. Default NIC1 parallels in F160W (visit 1) and F110W (visit 2) included.

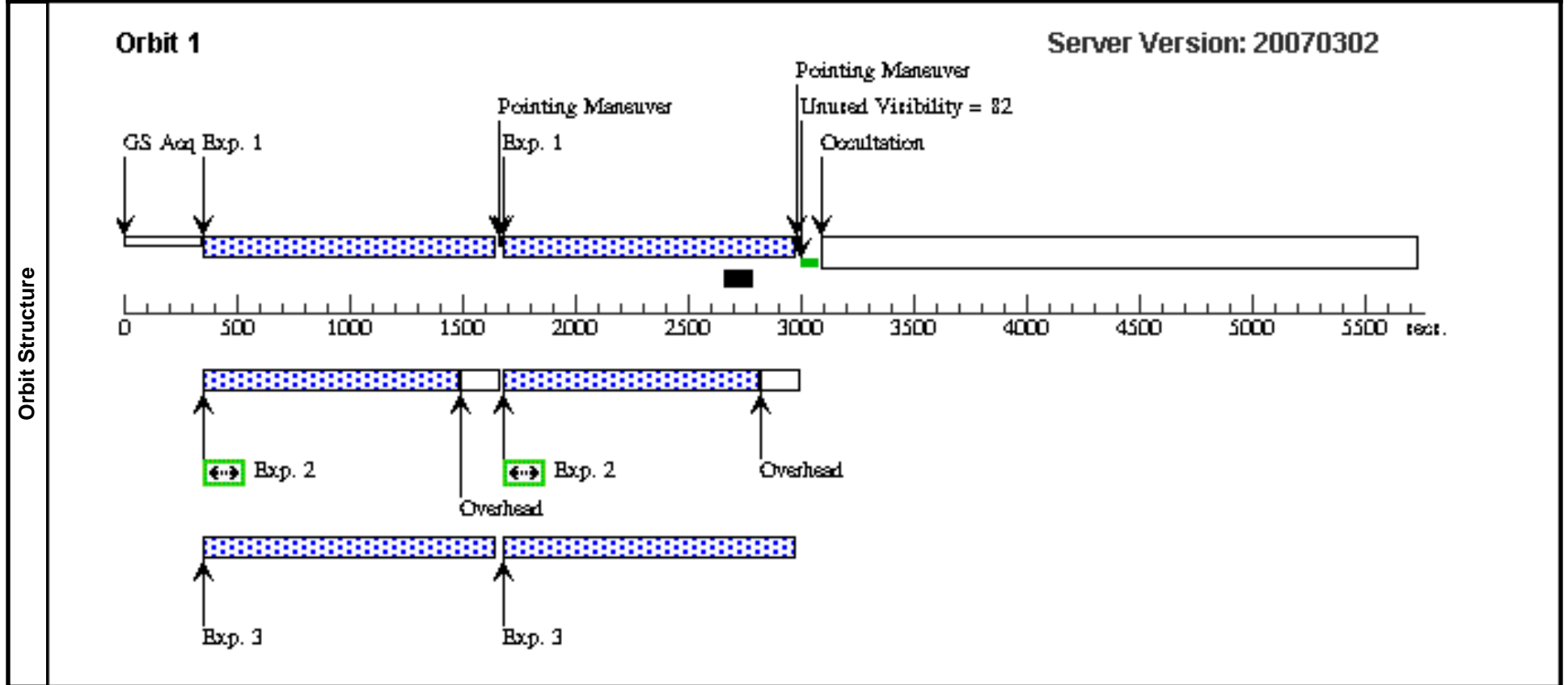
Proposal 10887 - Visit 01 - Stellar Populations in a z=4 Lensed Galaxy with NICMOS

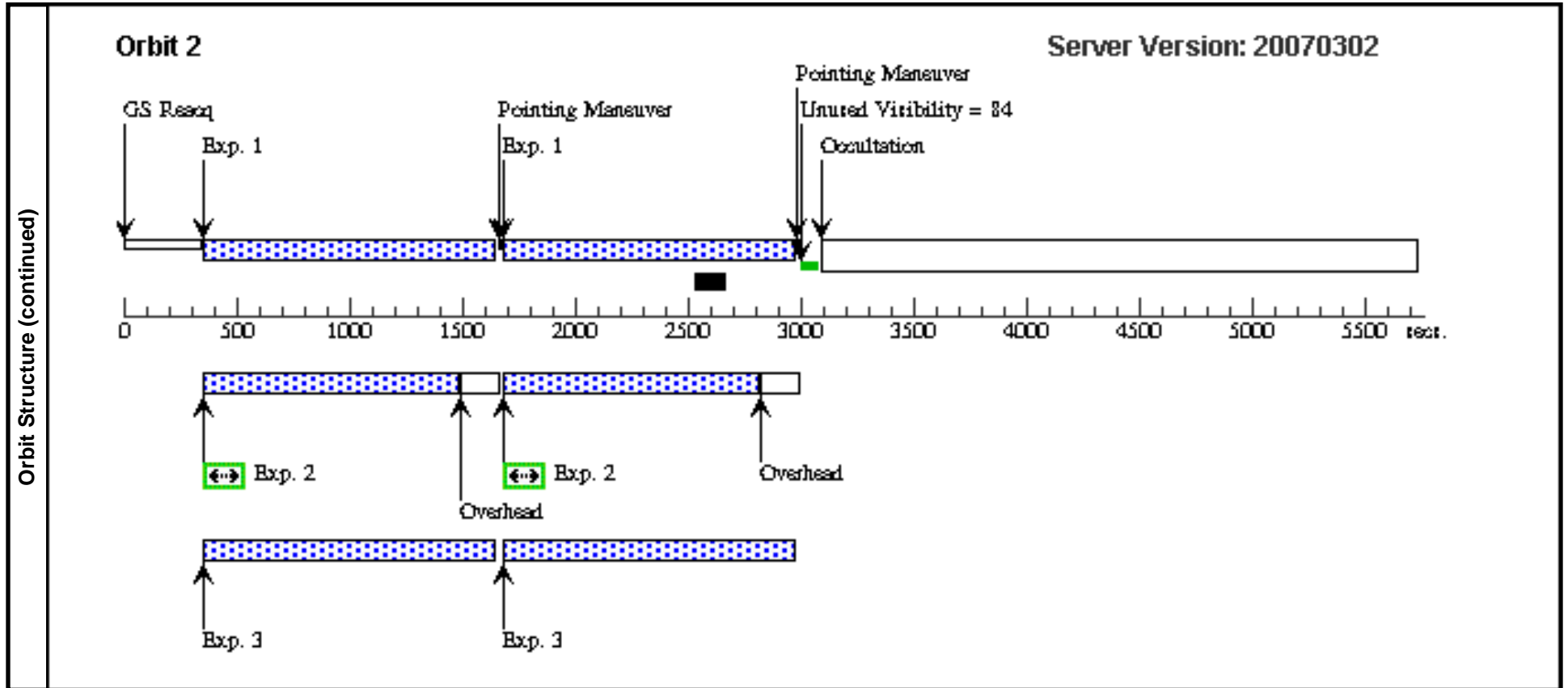
Wed Mar 07 02:11:24 GMT 2007

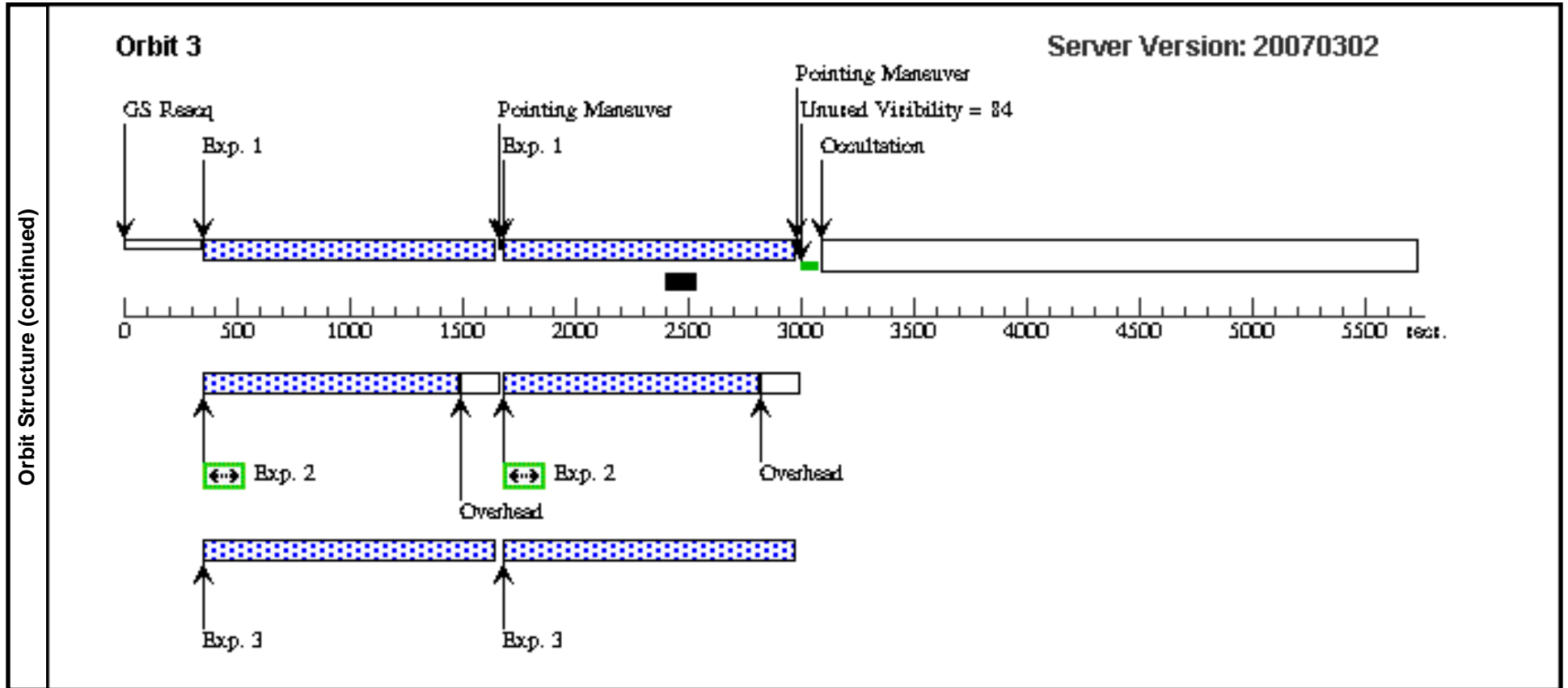
Visit	<b>Proposal 10887, Visit 01, scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: NIC2, WFPC2, NIC1 Special Requirements: SCHED 80%; ORIENT 100.0D TO 240.0 D									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
		(1)	Pattern Type=NIC-SPIRAL-DITH      Coordinate Frame=POS-TARG Purpose=DITHER                      Pattern Orientation=0 Number Of Points=8                  Angle Between Sides= Point Spacing=1                      Center Pattern=false Line Spacing=		(1-3)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	ABELL-2390LENS-Z4.04	RA: 21 53 33.5200 (328.3896667d) Dec: +17 41 58.40 (17.69956d) Equinox: J2000	Redshift: 4.04	V=24.3+/-0.3	Reference Frame: ICRS				
<i>Comments: This object was generated by the targetselector and retrieved from the NED database.</i>										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(1) ABELL-2390LE NS-Z4.04	NIC2, MULTIACCUM, NIC2-FIX	F160W	NSAMP=22; SAMP-SEQ=SPARS 64		Pattern 1-3 (1) Prime + Parallel Gro up 1-3	[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)] [==>(Pattern 5)] [==>(Pattern 6)] [==>(Pattern 7)] [==>(Pattern 8)]	[1] [2] [3] [4]
	2		(1) ABELL-2390LE NS-Z4.04	WFPC2, IMAGE, WFALL-FIX	F606W	CR-SPLIT=NO		Pattern 1-3 (1) Prime + Parallel Gro up 1-3	1000.0 Secs [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)] [==>(Pattern 5)] [==>(Pattern 6)] [==>(Pattern 7)] [==>(Pattern 8)]	[1] [2] [3] [4]

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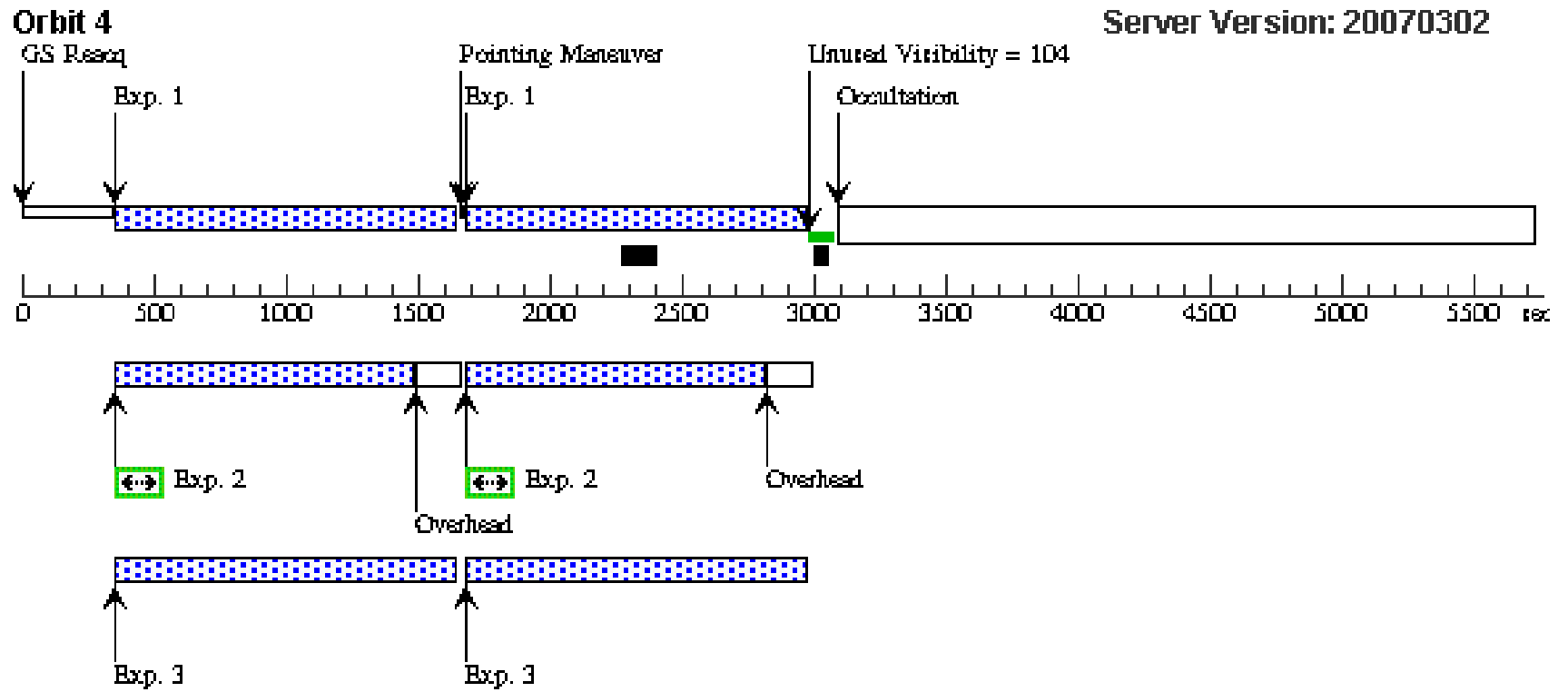
Exposures (continued)	#	Label	Target	Config, Mode, Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	3		(1) ABELL-2390LE NS-Z4.04	NIC1, MULTIACCUM, NIC1-FIX	F160W	NSAMP=22; SAMP-SEQ=SPARS 64		Pattern 1-3 (1) Prime + Parallel Group 1-3	[=>(Pattern 1)]	[1]
									[=>(Pattern 2)]	[2]
									[=>(Pattern 3)]	[3]
									[=>(Pattern 4)]	[3]
									[=>(Pattern 5)]	[3]
									[=>(Pattern 6)]	[3]
									[=>(Pattern 7)]	[4]
									[=>(Pattern 8)]	[4]







Orbit Structure (continued)



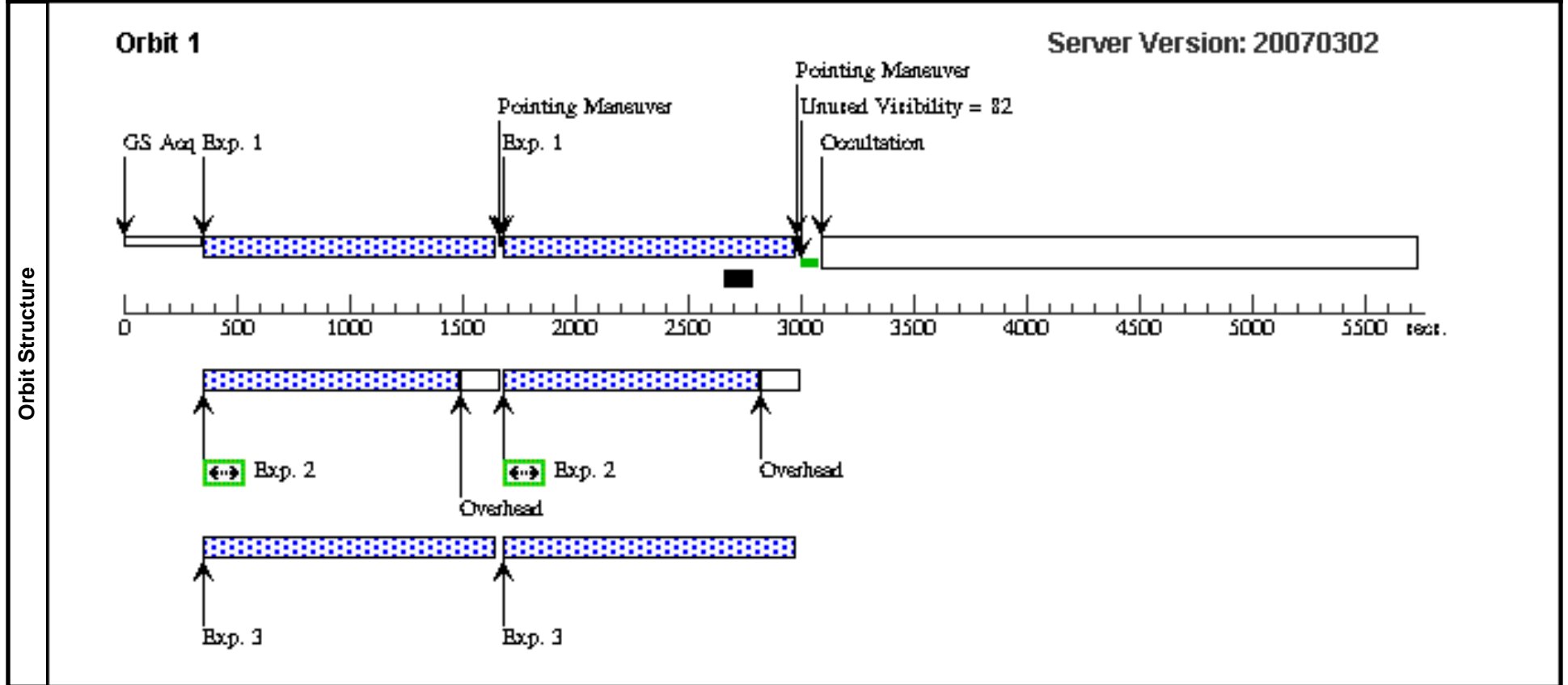
Proposal 10887 - Visit 02 - Stellar Populations in a z=4 Lensed Galaxy with NICMOS

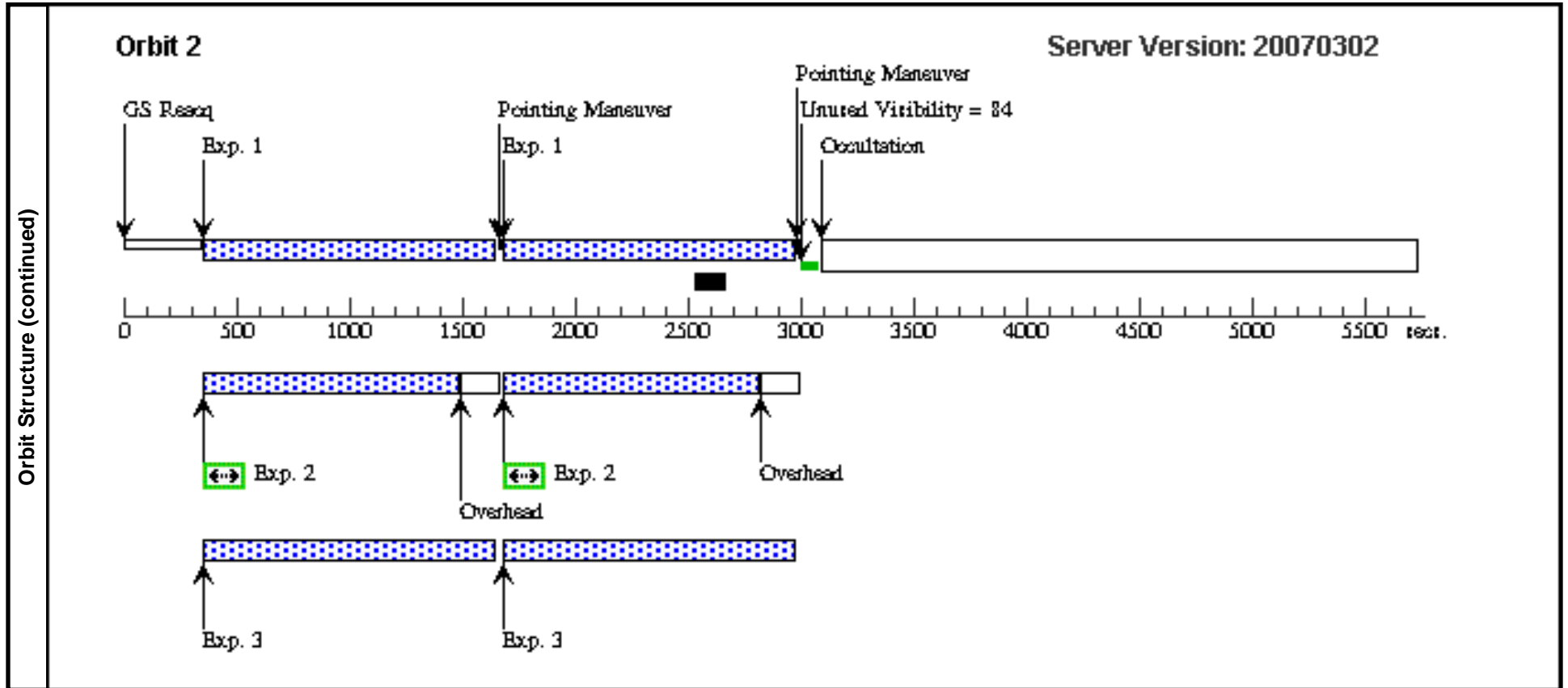
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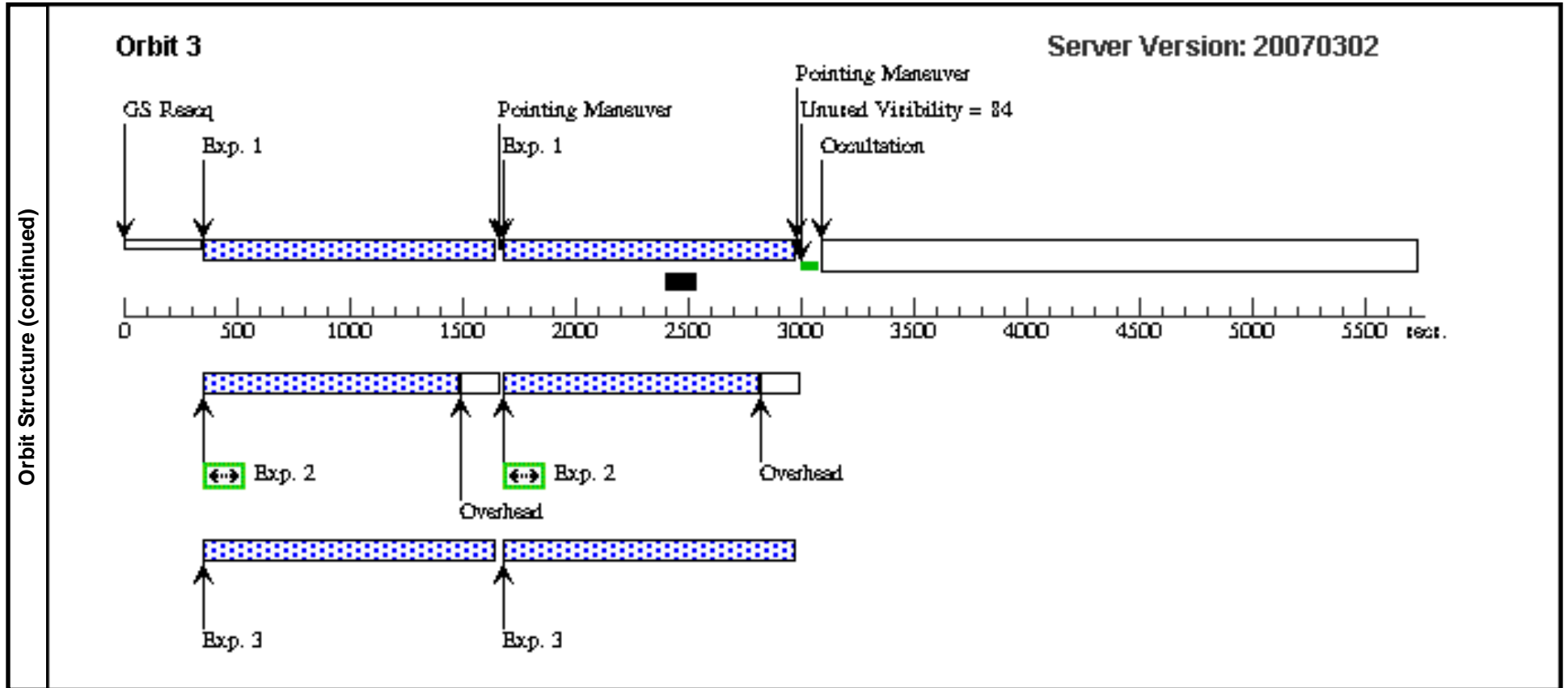
Visit	<b>Proposal 10887, Visit 02, scheduling</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: NIC2, WFPC2, NIC1 Special Requirements: SCHED 80%; SAME ORIENT AS 01									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
	(1)	Pattern Type=NIC-SPIRAL-DITH      Coordinate Frame=POS-TARG Purpose=DITHER                      Pattern Orientation=0 Number Of Points=8                  Angle Between Sides= Point Spacing=1                      Center Pattern=false Line Spacing=		(1-3)						
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	ABELL-2390LENS-Z4.04	RA: 21 53 33.5200 (328.3896667d) Dec: +17 41 58.40 (17.69956d) Equinox: J2000	Redshift: 4.04	V=24.3+/-0.3	Reference Frame: ICRS				
<i>Comments: This object was generated by the targetselector and retrieved from the NED database.</i>										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(1) ABELL-2390LE NS-Z4.04	NIC2, MULTIACCUM, NIC2-FIX	F160W	NSAMP=22; SAMP-SEQ=SPARS 64		Pattern 1-3 (1) Prime + Parallel Gro up 1-3	[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)] [==>(Pattern 5)] [==>(Pattern 6)] [==>(Pattern 7)] [==>(Pattern 8)]	[1] [2] [3] [4]
	2		(1) ABELL-2390LE NS-Z4.04	WFPC2, IMAGE, WFALL-FIX	F814W	CR-SPLIT=NO		Pattern 1-3 (1) Prime + Parallel Gro up 1-3	1000.0 Secs [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)] [==>(Pattern 5)] [==>(Pattern 6)] [==>(Pattern 7)] [==>(Pattern 8)]	[1] [2] [3] [4]

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Exposures (continued)	#	Label	Target	Config, Mode, Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	3		(1) ABELL-2390LE NS-Z4.04	NIC1, MULTIACCUM, NIC1-FIX	F110W	NSAMP=22; SAMP-SEQ=SPARS 64		Pattern 1-3 (1) Prime + Parallel Gro up 1-3	[=>(Pattern 1)]	[1]
	[=>(Pattern 2)]	[2]								
	[=>(Pattern 3)]	[3]								
	[=>(Pattern 4)]	[4]								
	[=>(Pattern 5)]									
	[=>(Pattern 6)]									
	[=>(Pattern 7)]									
[=>(Pattern 8)]										







Orbit Structure (continued)

