# 12301 - Precision Age-Dating of Star Clusters in Stephan's Quintet

Cycle: 18, Proposal Category: GO

(Availability Mode: SUPPORTED)


**INVESTIGATORS**

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|---|---|---|
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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) HCG92 | WFC3/UVIS | 5 | 07-Oct-2010 21:06:05.0 | yes |
| 02 | (1) HCG92 | WFC3/UVIS | 3 | 07-Oct-2010 21:06:12.0 | yes |

8 Total Orbits Used


**ABSTRACT**

The compact galaxy group Stephan's Quintet, showcased in the Early Release Observations of the newly refurbished Hubble, has experienced a complex series of gravitational interactions culminating in a ~50 kpc-long strong shock from the intruder NGC 7318B ploughing into NGC 7318A and the intragroup medium. Each major event within the past 500 Myrs has triggered star formation as demonstrated by the populations of massive

star clusters present. Within this single system, we have the opportunity to study star-formation in novel settings not otherwise accessible in the nearby universe. We propose to make the most of this chance by supplementing the multi-color WFC3 images of Stephan's Quintet with 8 additional orbits of WFC3 imaging to obtain critical F336W (necessary for breaking the age-reddening degeneracy) and F547M (replacing F606W observations that are badly polluted by strong emission lines) observations. The combination of broad and narrow-band photometry will enable unprecedented precision in obtaining ages and masses for the <500 Myr-old star clusters within this system. With this information in hand, these clusters can be used as tracers of the gross galaxy interactions over time, and probes of the physics of star formation within the large-scale shock in particular.

**OBSERVING DESCRIPTION**

We plan to have 6 orbits with F336W filter and 2 orbits with F547M filter. For each orbit we use WFC3-UVIS-MOS-DITH-LINE pattern (with 3 point secondary pattern for dithering separated by 0.119 arcsec), which will provide good sampling of the PSF, as well as minimize the readout noise. In the first visit, which consists of 5 orbits (all with F336W filter), we use 5 primary dither pointings. Each primary point is separated by 2.4 arcsec in order to cover the gap between the CCDs. In the second visit we have one orbit with F336W filter and 2 orbits with F547M filter. For the first orbit of the second visit we use WFC3-UVIS-MOS-DITH-LINE pattern with 3 point primary pattern separated by 2.4 arcsec in order to cover the interchip gap but no secondary pattern. For the last two orbits we use same pattern with 3 secondary dither pointings separated by 0.119 arcsec and 2 primary pointings, with the same separation as before.

## Visit

**Proposal 12301, Visit 01, implementation** Fri Oct 08 01:06:16 GMT 2010

**Diagnostic Status: No Diagnostics**

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 72D TO 82 D; ORIENT 252D TO 262 D

*Comments: 5 orbits U(336) band*

## Patterns

| # | Primary Pattern | | Secondary Pattern | | Exposures |
|---|---|---|---|---|---|
| (3) | Pattern Type=WFC3-UVIS-MOS-DITH-LINE<br>Purpose=MOSAIC<br>Number Of Points=5<br>Point Spacing=2.4<br>Line Spacing= | Coordinate Frame=POS-TARG<br>Pattern Orientation=85.754<br>Angle Between Sides=<br>Center Pattern=true | Pattern Type=WFC3-UVIS-MOS-DITH-LINE<br>Purpose=DITHER<br>Number Of Points=2<br>Point Spacing=0.119<br>Line Spacing= | Coordinate Frame=POS-TARG<br>Pattern Orientation=33.606<br>Angle Between Sides=<br>Center Pattern=false | (1) |

## Fixed Targets

| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | HCG92 | RA: 22 36 0.7161 (339.0029838d)<br>Dec: +33 57 40.96 (33.96138d)<br>Equinox: J2000 | | V=14.9 | Reference Frame: ICRS |

*Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.*

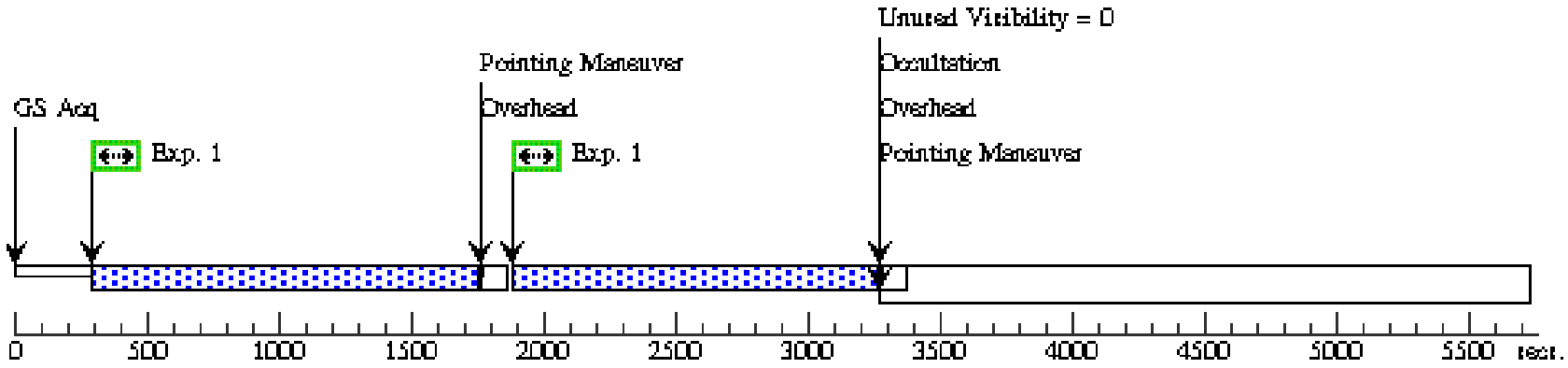
## Exposures

| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | F336W | (1) HCG92 | WFC3/UVIS, ACCUM, UVIS-CENTER | F336W | | | Pattern 3, Exps 1-1 ( 3) | 892 Secs | |
| | | | | | | | | *[==>1428.0 Secs (Pattern 1,1)]*<br>*[==>1378.0 Secs (Pattern 1,2)]* | ***[1]*** |
| | | | | | | | | *[==>1458.0 Secs (Pattern 2,1)]*<br>*[==>1459.0 Secs (Pattern 2,2)]* | ***[2]*** |
| | | | | | | | | *[==>1458.0 Secs (Pattern 3,1)]*<br>*[==>1459.0 Secs (Pattern 3,2)]* | ***[3]*** |
| | | | | | | | | *[==>1458.0 Secs (Pattern 4,1)]*<br>*[==>1459.0 Secs (Pattern 4,2)]* | ***[4]*** |
| | | | | | | | | *[==>1458.0 Secs (Pattern 5,1)]*<br>*[==>1459.0 Secs (Pattern 5,2)]* | ***[5]*** |

Orbit Structure

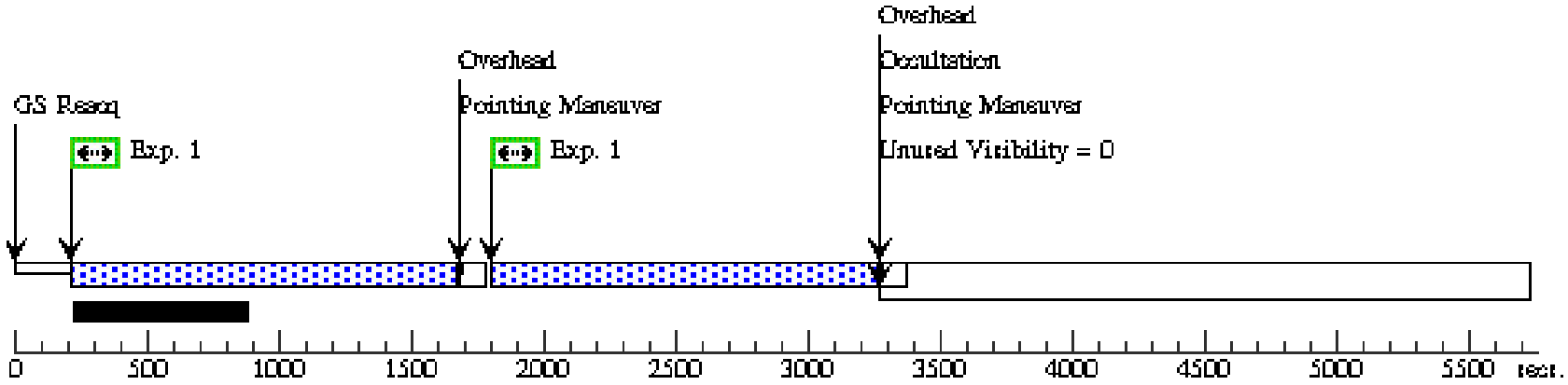
## Orbit 1

Server Version: 20100505



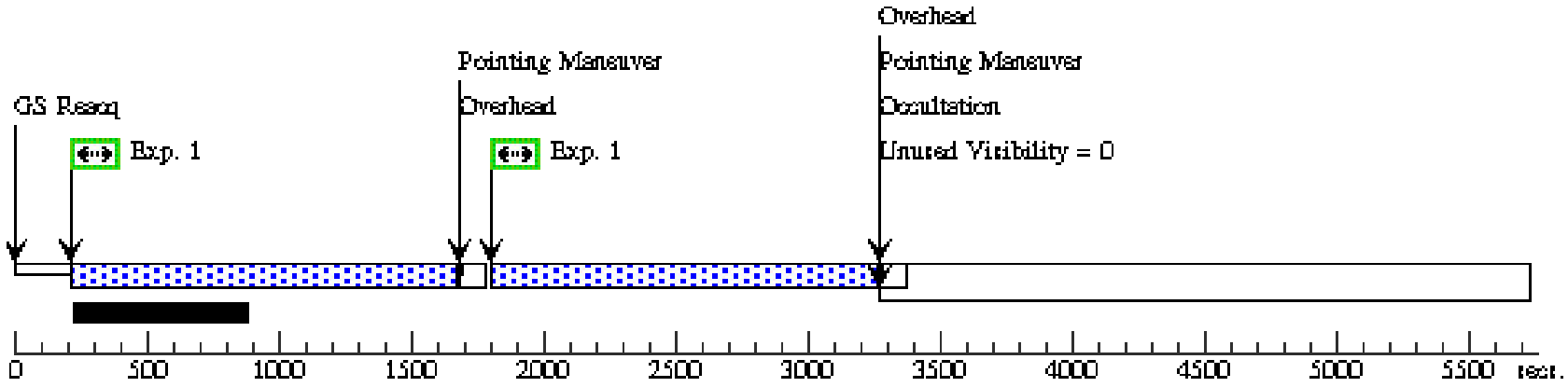

## Orbit 2

Server Version: 20100505



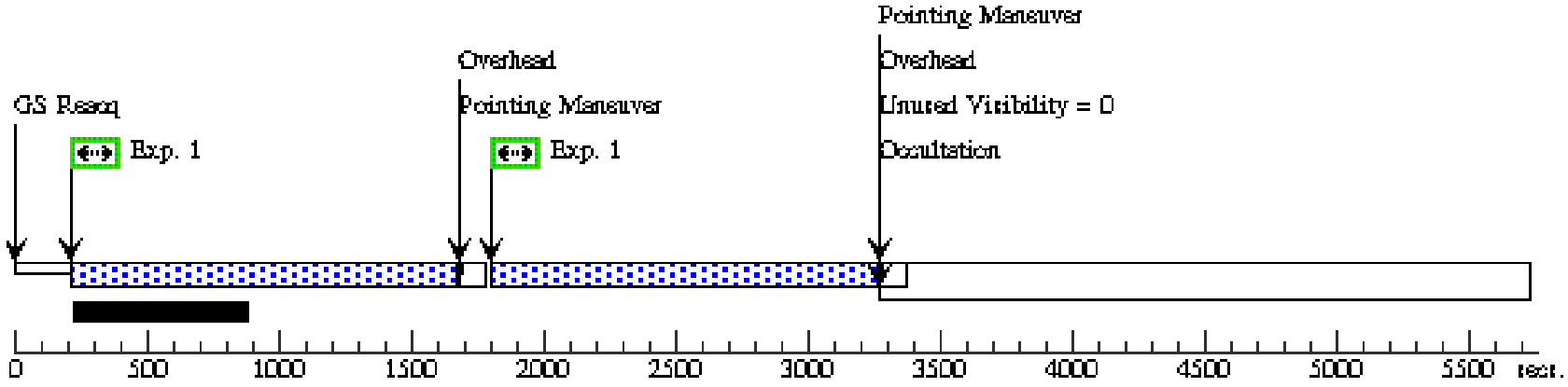
## Orbit 3

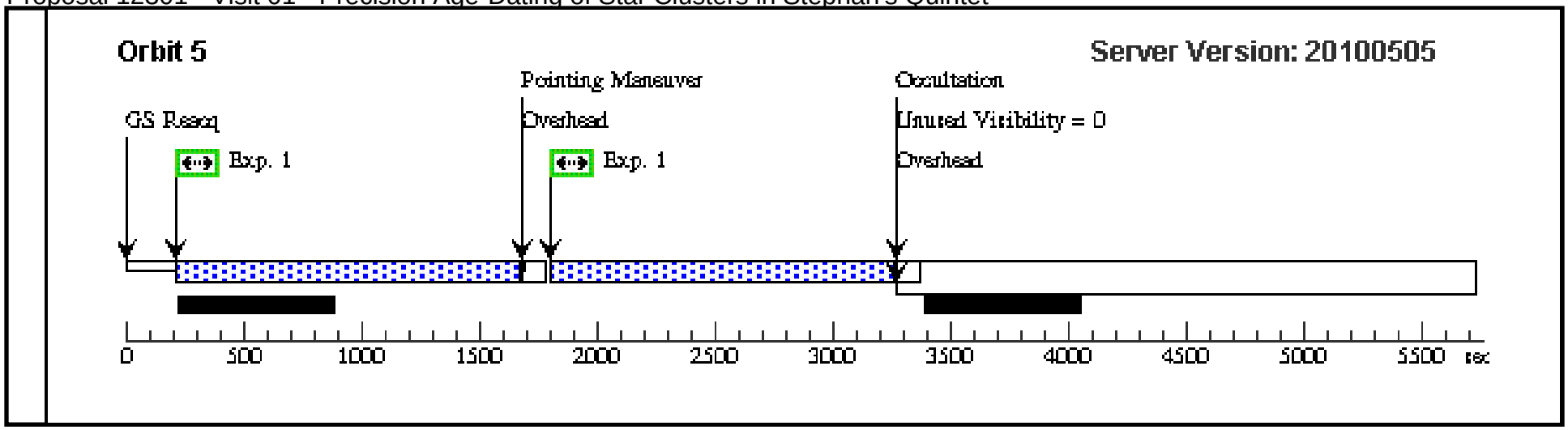
Server Version: 20100505




## Orbit 4

Server Version: 20100505




Orbit 5
Server Version: 20100505
GS Reacq
Exp. 1
Pointing Maneuver
Overhead
Exp. 1
Occultation
Unused Visibility = 0
Overhead
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

## Visit

**Proposal 12301, Visit 02, implementation** Fri Oct 08 01:06:17 GMT 2010

**Diagnostic Status: No Diagnostics**

Scientific Instruments: WFC3/UVIS

Special Requirements: SAME ORIENT AS 01

*Comments: 3 orbits: 1 of U(336) + 2 of V(547) band*

## Patterns

| # | Primary Pattern | | Secondary Pattern | | Exposures |
|---|---|---|---|---|---|
| (1) | Pattern Type=WFC3-UVIS-MOS-DITH-LINE<br>Purpose=DITHER<br>Number Of Points=2<br>Point Spacing=2.4<br>Line Spacing= | Coordinate Frame=POS-TARG<br>Pattern Orientation=85.754<br>Angle Between Sides=<br>Center Pattern=true | | | (1) |
| (4) | Pattern Type=WFC3-UVIS-MOS-DITH-LINE<br>Purpose=MOSAIC<br>Number Of Points=2<br>Point Spacing=2.4<br>Line Spacing= | Coordinate Frame=POS-TARG<br>Pattern Orientation=85.754<br>Angle Between Sides=<br>Center Pattern=true | Pattern Type=WFC3-UVIS-MOS-DITH-LINE<br>Purpose=DITHER<br>Number Of Points=2<br>Point Spacing=0.119<br>Line Spacing= | Coordinate Frame=POS-TARG<br>Pattern Orientation=33.606<br>Angle Between Sides=<br>Center Pattern=false | (2) |

## Fixed Targets

| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
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*Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.*

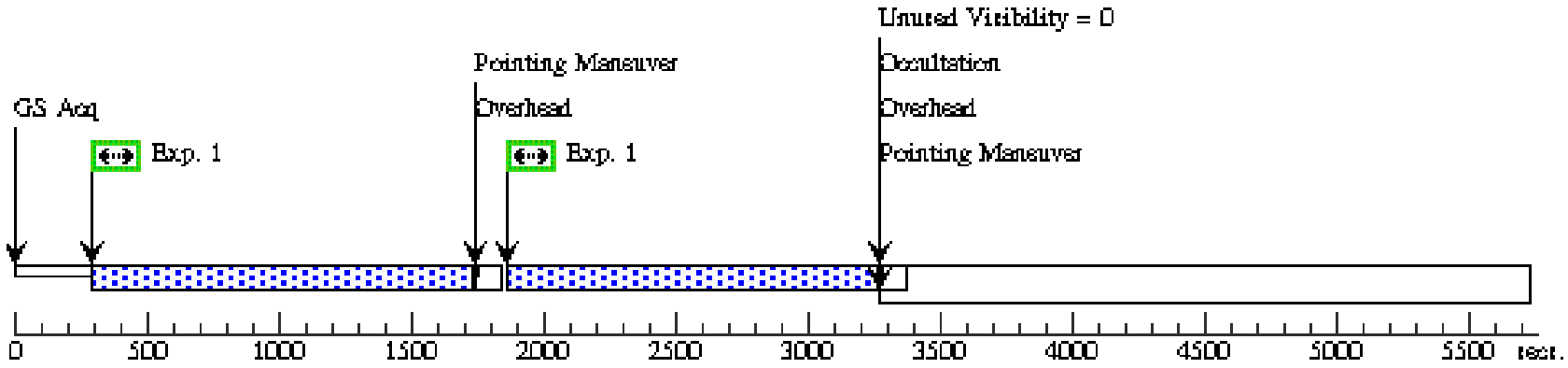
## Exposures

| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | F336W | (1) HCG92 | WFC3/UVIS, ACCUM, UVIS-CENTER | F336W | | | Pattern 1, Exps 1-1 ( 1) | 637 Secs<br>*[==>1408.0 Secs (Pattern 1)]*<br>*[==>1398.0 Secs (Pattern 2)]* | ***[1]*** |
| 2 | F457M | (1) HCG92 | WFC3/UVIS, ACCUM, UVIS-CENTER | F547M | | | Pattern 4, Exps 2-2 ( 4) | 637 Secs<br>*[==>1459.0 Secs (Pattern 1,1)]*<br>*[==>1458.0 Secs (Pattern 1,2)]*<br>*[==>1458.0 Secs (Pattern 2,1)]*<br>*[==>1459.0 Secs (Pattern 2,2)]* | ***[2]***<br>***[3]*** |

Orbit Structure

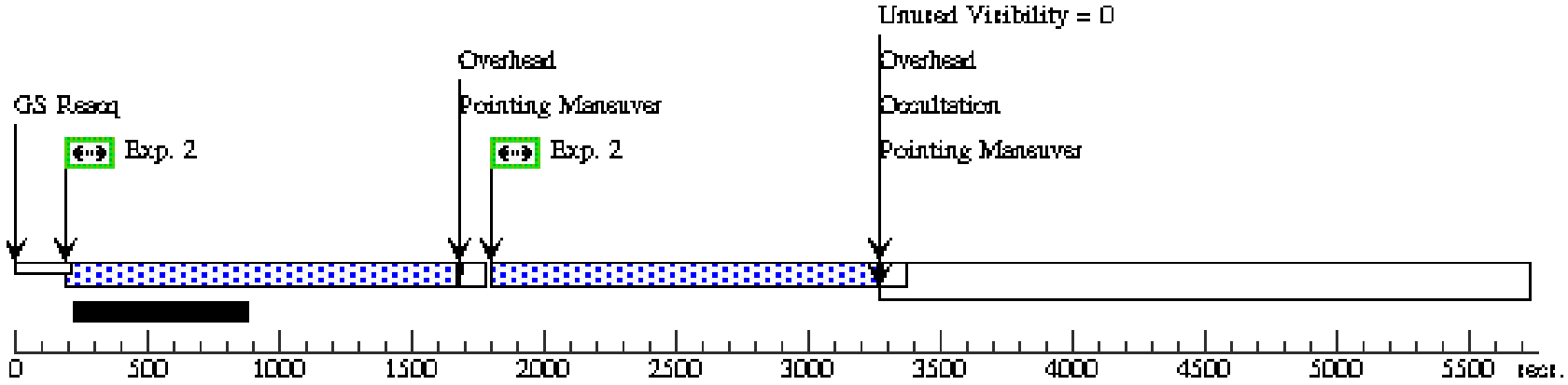
## Orbit 1

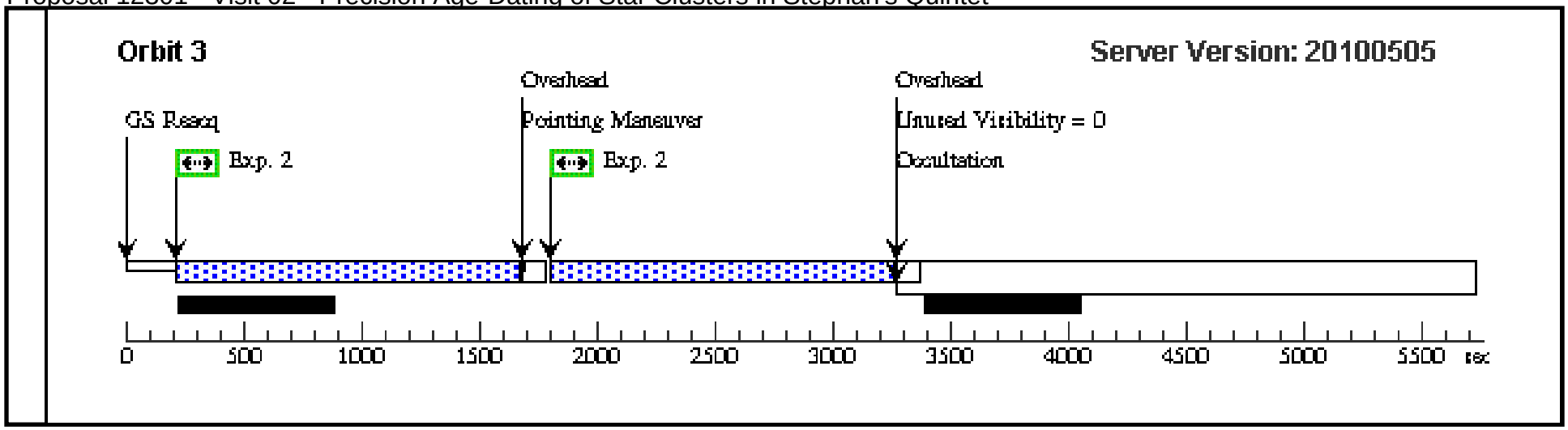
Server Version: 20100505




## Orbit 2

Server Version: 20100505




Orbit 3
Server Version: 20100505
GS Reacq
Exp. 2
Overhead
Pointing Maneuver
Exp. 2
Overhead
Unused Visibility = 0
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec