



## 13401 - A 3D view of the SN 1987A Ejecta

Cycle: 21, Proposal Category: GO

(Availability Mode: SUPPORTED)

### INVESTIGATORS

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| <i>Name</i>                    | <i>Institution</i>            | <i>E-Mail</i>             |
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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) SN1987A-POINT<br>(2) SN1987A-STIS1<br>ANY<br>CCDFLAT | ACS/WFC<br>STIS/CCD<br>WFC3/UVIS                  | 3                  | 10-Jul-2014 21:01:46.0        | yes                           |
| 02           | (1) SN1987A-POINT<br>(3) SN1987A-STIS2<br>ANY<br>CCDFLAT | ACS/WFC<br>STIS/CCD<br>WFC3/UVIS                  | 3                  | 10-Jul-2014 21:01:55.0        | yes                           |
| 03           | (1) SN1987A-POINT<br>(4) SN1987A-STIS3<br>ANY<br>CCDFLAT | ACS/WFC<br>STIS/CCD<br>WFC3/UVIS                  | 3                  | 10-Jul-2014 21:02:04.0        | yes                           |
| 04           | (1) SN1987A-POINT<br>(5) SN1987A-STIS4<br>ANY<br>CCDFLAT | ACS/WFC<br>STIS/CCD<br>WFC3/UVIS                  | 3                  | 10-Jul-2014 21:02:11.0        | yes                           |
| 05           | (1) SN1987A-POINT<br>(6) SN1987A-STIS5<br>ANY<br>CCDFLAT | ACS/WFC<br>STIS/CCD<br>WFC3/UVIS                  | 3                  | 10-Jul-2014 21:02:18.0        | yes                           |
| 06           | (1) SN1987A-POINT<br>(4) SN1987A-STIS3<br>ANY            | ACS/WFC<br>STIS/CCD<br>STIS/FUV-MAMA<br>WFC3/UVIS | 2                  | 10-Jul-2014 21:02:22.0        | yes                           |

17 Total Orbits Used

## **ABSTRACT**

SN 1987A represents the most important source of information about the explosion physics of any SN. For this the morphology of the ejecta is together with the radioactive isotopes the best diagnostics. From HST imaging in H-alpha and NIR AO imaging in Si/Fe at 1.64  $\mu$  one finds completely different morphologies, with the 1.64  $\mu$  image dominated by the processed core and H-alpha by the surrounding H envelope. Besides Cas A (Type IIb), this is the only core collapse SN where we have this information. We propose to use STIS to map the debris in SN 1987A in 3D with the best possible angular resolution. There has been no such STIS map since 2004, while the physics of the emission has undergone some profound changes. From being powered by radioactivity the energy input is now dominated by X-rays from the collision with the circumstellar ring. Compared to 2004 the 3D structure can be determined with a factor of  $\sim 3$  better spatial resolution and also better spectral resolution. The 3D structure in H-alpha can also give independent clues to where the large mass of dust detected by Herschel is located as well as its properties. It also gives a complementary view of the ejecta to the future ALMA imaging in CO which will have similar spatial resolution. Besides the debris we will be able to probe the  $\sim 10,000$  km/s reverse shock close to the ring in H-alpha. By observing this also in Ly-alpha one may test different emission processes which have been proposed, as well as probing the region producing the synchrotron emission observed by ALMA. The opportunity to observe the SN in this stage will never come back!

## **OBSERVING DESCRIPTION**

We are proposing for 17 orbits with STIS. The spectroscopic observations will provide 3-D maps of the complete debris and of the N and S sides of the reverse shock and equatorial ring. We propose to use 5 adjacent 0.1 slit positions for 3 orbits each to map SN 1987A (as shown in figure 1) for a total of 15 orbits. The G750L grating provides adequate spectral resolution to separate the emission from the reverse shock, collision hotspots, and debris. Figure 5 shows a previous STIS/G750L observation from 2010 using the 0.2 slit with an exposure of 3 orbits. The proposed STIS observations will be dithered in the spatial direction with 6-12 exposures to remove the Cosmic Rays, and the many hot and dead STIS pixels. Based on the large increase in flux from the ejecta, We expect the proposed observations to yield a S/N ratio of about 10/pixel in the debris emission, 100 for the collision emission, and 20/pixel in the brightest parts of the reverse shock. We can detect the reverse shock out to

Proposal 13401 (STScI Edit Number: 2, Created: Thursday, July 10, 2014 8:02:24 PM EST) - Overview

10,000 km/sec (S/N 3/pixel).

Proposal 13401 - Visit 01 - A 3D view of the SN 1987A Ejecta

Fri Jul 11 01:02:24 GMT 2014

| <b>Visit</b>         | <b>Proposal 13401, Visit 01, scheduling</b><br><b>Diagnostic Status: Warning</b><br>Scientific Instruments: STIS/CCD, WFC3/UVIS, ACS/WFC<br>Special Requirements: ORIENT 45D TO 45 D; ORIENT 225D TO 225 D; BETWEEN 01-AUG-2014:00:00:00 AND 30-AUG-2014:00:00:00; SEQ 01,02,03,04,05,06 WITHIN 30 D  |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |     |               |   |  |        |                                 |  |  |  |  |
|----------------------|---|---|--------------------|--------------------------|---------------------------------|---------------|---------------|-----|---------------|---|--|---------------|-----------------------|-----|---------------|---|--|--------|---------------------------------|--|--|--|--|
|                      | (Visit 01) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN<br>(Visit 01) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN<br>(Visit 01) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN  |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |     |               |   |  |        |                                 |  |  |  |  |
| <b>Diagnosics</b>    |   |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |     |               |   |  |        |                                 |  |  |  |  |
|                      |   |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |     |               |   |  |        |                                 |  |  |  |  |
| <b>Fixed Targets</b> | <table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Target Coordinates</th> <th>Targ. Coord. Corrections</th> <th>Fluxes</th> <th>Miscellaneous</th> </tr> </thead> <tbody> <tr> <td>(1)</td> <td>SN1987A-POINT</td> <td>                     RA: 05 35 30.5170 (83.8771542d)<br/>                     Dec: -69 16 18.52 (-69.27181d)<br/>                     Equinox: J2000<br/><br/> <i>Comments: position is measured from both STIS and UVIS images<br/>                     Also on PLATE A298 position is 5:35:30.484 -69:16:18.36<br/>                     so all these positions agree to about 0.1 arcsecond</i> </td> <td></td> <td>V=16.07+/-0.1</td> <td>Reference Frame: ICRS</td> </tr> <tr> <td>(2)</td> <td>SN1987A-STIS1</td> <td>                     Offset from SN1987A-POINT<br/>                     RA Offset: -2.4435 Secs<br/>                     Dec Offset: 7.32 Arcsec<br/><br/> <i>Comments: OFFSET measured on recent WFC3/UVIS image</i> </td> <td></td> <td>V=21.0</td> <td>Offset Position (SN1987A-STIS1)</td> </tr> </tbody> </table> | #   | Name               | Target Coordinates       | Targ. Coord. Corrections        | Fluxes        | Miscellaneous | (1) | SN1987A-POINT | RA: 05 35 30.5170 (83.8771542d)<br>Dec: -69 16 18.52 (-69.27181d)<br>Equinox: J2000<br><br><i>Comments: position is measured from both STIS and UVIS images<br/>                     Also on PLATE A298 position is 5:35:30.484 -69:16:18.36<br/>                     so all these positions agree to about 0.1 arcsecond</i> |  | V=16.07+/-0.1 | Reference Frame: ICRS | (2) | SN1987A-STIS1 | Offset from SN1987A-POINT<br>RA Offset: -2.4435 Secs<br>Dec Offset: 7.32 Arcsec<br><br><i>Comments: OFFSET measured on recent WFC3/UVIS image</i> |  | V=21.0 | Offset Position (SN1987A-STIS1) |  |  |  |  |
|                      | #   | Name  | Target Coordinates | Targ. Coord. Corrections | Fluxes                          | Miscellaneous |               |     |               |   |  |               |                       |     |               |   |  |        |                                 |  |  |  |  |
| (1)                  | SN1987A-POINT   | RA: 05 35 30.5170 (83.8771542d)<br>Dec: -69 16 18.52 (-69.27181d)<br>Equinox: J2000<br><br><i>Comments: position is measured from both STIS and UVIS images<br/>                     Also on PLATE A298 position is 5:35:30.484 -69:16:18.36<br/>                     so all these positions agree to about 0.1 arcsecond</i> |                    | V=16.07+/-0.1            | Reference Frame: ICRS           |               |               |     |               |   |  |               |                       |     |               |   |  |        |                                 |  |  |  |  |
| (2)                  | SN1987A-STIS1   | Offset from SN1987A-POINT<br>RA Offset: -2.4435 Secs<br>Dec Offset: 7.32 Arcsec<br><br><i>Comments: OFFSET measured on recent WFC3/UVIS image</i>   |                    | V=21.0                   | Offset Position (SN1987A-STIS1) |               |               |     |               |   |  |               |                       |     |               |   |  |        |                                 |  |  |  |  |
|                      |   |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |     |               |   |  |        |                                 |  |  |  |  |

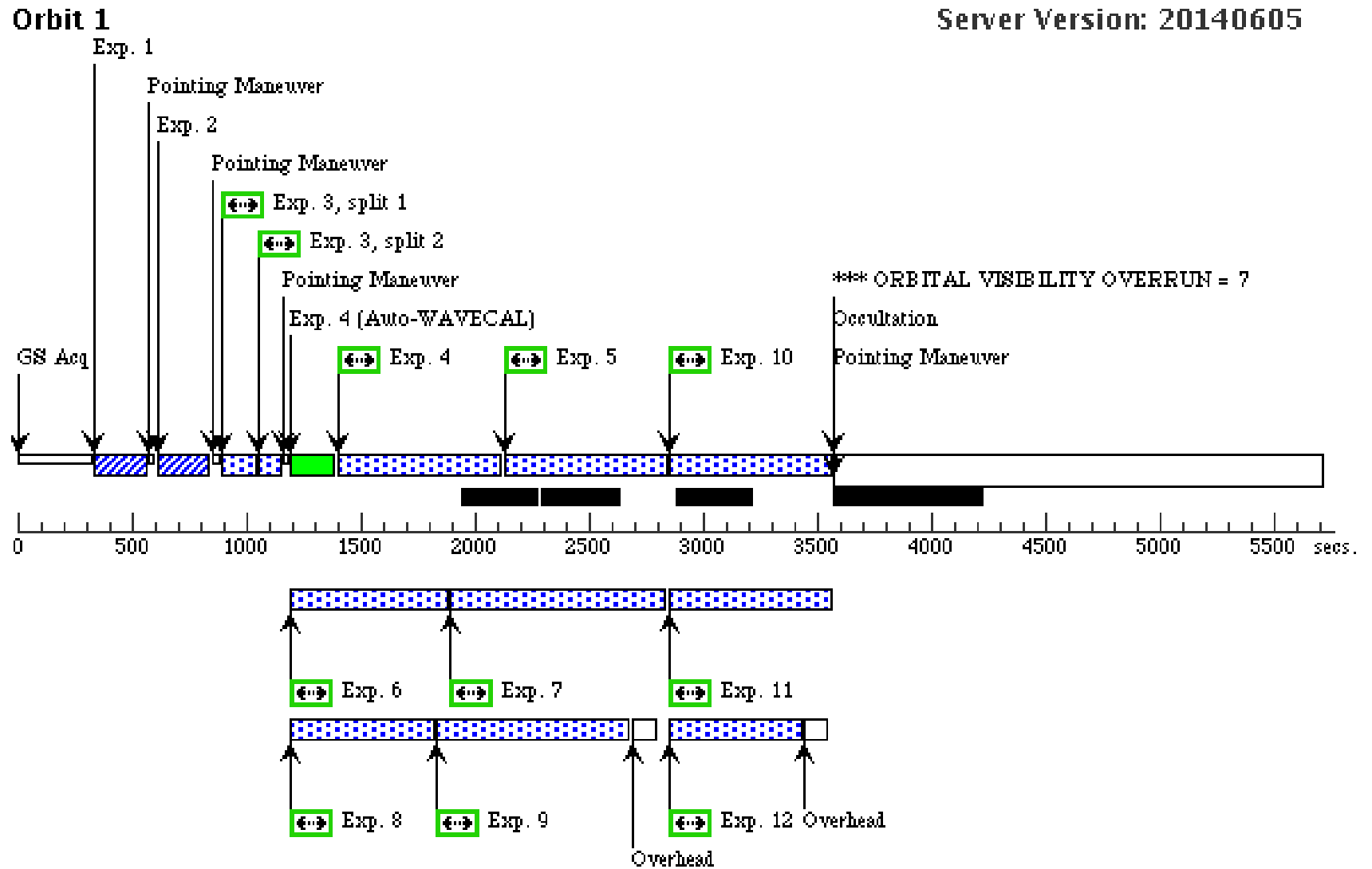
Proposal 13401 - Visit 01 - A 3D view of the SN 1987A Ejecta

| #         | Label | Target                | Config,Mode,Aperture         | Spectral Els.   | Opt. Params.             | Special Reqs.               | Groups                                       | Exp. Time (Total)/[Actual Dur.]                         | Orbit |
|-----------|-------|-----------------------|------------------------------|-----------------|--------------------------|-----------------------------|--|---|-------|
| Exposures | 1     | (1) SN1987A-POIN<br>T | STIS/CCD, ACQ, F28X50LP      | MIRROR          |                          | GS ACQ SCENARI<br>O BASE1B3 |  | 1 Secs (1 Secs)<br>[==>]                                | [1]   |
|           | 2     | (1) SN1987A-POIN<br>T | STIS/CCD, ACQ/PEAK, 52X0.1E1 | MIRROR          |                          |                             |  | 1 Secs (1 Secs)<br>[==>]                                | [1]   |
|           | 3     | (2) SN1987A-STIS1     | STIS/CCD, ACCUM, F28X50LP    | MIRROR          | CR-SPLIT=2               | POS TARG 0,0.5              |  | 120 Secs (120 Secs)<br>[==>(Split 1)]<br>[==>(Split 2)] | [1]   |
|           | 4     | (2) SN1987A-STIS1     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0                | Prime + Parallel Gro<br>up 4-9 in Visit 01   | 676 Secs (676 Secs)<br>[==>]                            | [1]   |
|           | 5     | (2) SN1987A-STIS1     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0                | Prime + Parallel Gro<br>up 4-9 in Visit 01   | 676 Secs (676 Secs)<br>[==>]                            | [1]   |
|           | 6     | ANY                   | ACS/WFC, ACCUM, WFC          | F814W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 4-9 in Visit 01   | 480 Secs (480 Secs)<br>[==>]                            | [1]   |
|           | 7     | ANY                   | ACS/WFC, ACCUM, WFC          | F658N           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 4-9 in Visit 01   | 770 Secs (770 Secs)<br>[==>]                            | [1]   |
|           | 8     | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F606W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 4-9 in Visit 01   | 480 Secs (480 Secs)<br>[==>]                            | [1]   |
|           | 9     | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F656N           | CR-SPLIT=NO;<br>FLASH=15 |                             | Prime + Parallel Gro<br>up 4-9 in Visit 01   | 830 Secs (830 Secs)<br>[==>]                            | [1]   |
|           | 10    | (2) SN1987A-STIS1     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0                | Prime + Parallel Gro<br>up 10-12 in Visit 01 | 676 Secs (676 Secs)<br>[==>]                            | [1]   |
|           | 11    | ANY                   | ACS/WFC, ACCUM, WFC          | F606W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 10-12 in Visit 01 | 560 Secs (560 Secs)<br>[==>]                            | [1]   |
|           | 12    | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F814W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 10-12 in Visit 01 | 550 Secs (550 Secs)<br>[==>]                            | [1]   |
|           | 13    | (2) SN1987A-STIS1     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0.5              | Prime + Parallel Gro<br>up 13-18 in Visit 01 | 760 Secs (760 Secs)<br>[==>]                            | [2]   |
|           | 14    | (2) SN1987A-STIS1     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0.5              | Prime + Parallel Gro<br>up 13-18 in Visit 01 | 760 Secs (760 Secs)<br>[==>]                            | [2]   |
|           | 15    | ANY                   | ACS/WFC, ACCUM, WFC          | F475W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 13-18 in Visit 01 | 600 Secs (600 Secs)<br>[==>]                            | [2]   |
|           | 16    | ANY                   | ACS/WFC, ACCUM, WFC          | F606W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 13-18 in Visit 01 | 400 Secs (400 Secs)<br>[==>]                            | [2]   |
|           | 17    | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F475W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 13-18 in Visit 01 | 600 Secs (600 Secs)<br>[==>]                            | [2]   |
|           | 18    | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F336W           | CR-SPLIT=NO;<br>FLASH=12 |                             | Prime + Parallel Gro<br>up 13-18 in Visit 01 | 700 Secs (700 Secs)<br>[==>]                            | [2]   |
|           | 19    | (2) SN1987A-STIS1     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0.25             | Prime + Parallel Gro<br>up 19-21 in Visit 01 | 760 Secs (760 Secs)<br>[==>]                            | [2]   |
|           | 20    | ANY                   | ACS/WFC, ACCUM, WFC          | F502N           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 19-21 in Visit 01 | 671 Secs (671 Secs)<br>[==>]                            | [2]   |
|           | 21    | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F656N           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 19-21 in Visit 01 | 670 Secs (670 Secs)<br>[==>]                            | [2]   |

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|    |                   |                           |                 |                          |                  |  |                                |     |
|----|-------------------|---------------------------|-----------------|--------------------------|------------------|--|--------------------------------|-----|
| 22 | (2) SN1987A-STIS1 | STIS/CCD, ACCUM, 52X0.1E1 | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0.25  | Prime + Parallel Group 22-24 in Visit 01 | 760 Secs (760 Secs)            | [2] |
| 23 | ANY               | ACS/WFC, ACCUM, WFC       | F658N           | CR-SPLIT=NO              |                  | Prime + Parallel Group 22-24 in Visit 01 | 660 Secs (660 Secs)            | [2] |
| 24 | ANY               | WFC3/UVIS, ACCUM, UVIS    | F502N           | CR-SPLIT=NO;<br>FLASH=15 |                  | Prime + Parallel Group 22-24 in Visit 01 | 671 Secs (671 Secs)            | [2] |
| 25 | (2) SN1987A-STIS1 | STIS/CCD, ACCUM, 52X0.1E1 | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,-0.25 | Prime + Parallel Group 25-30 in Visit 01 | 770 Secs (770 Secs)            | [3] |
| 26 | (2) SN1987A-STIS1 | STIS/CCD, ACCUM, 52X0.1E1 | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,-0.25 | Prime + Parallel Group 25-30 in Visit 01 | 770 Secs (770 Secs)            | [3] |
| 27 | ANY               | ACS/WFC, ACCUM, WFC       | F475W           | CR-SPLIT=NO              |                  | Prime + Parallel Group 25-30 in Visit 01 | 500 Secs (500 Secs)            | [3] |
| 28 | ANY               | ACS/WFC, ACCUM, WFC       | F814W           | CR-SPLIT=NO              |                  | Prime + Parallel Group 25-30 in Visit 01 | 400 Secs (400 Secs)            | [3] |
| 29 | ANY               | WFC3/UVIS, ACCUM, UVIS    | F606W           | CR-SPLIT=NO              |                  | Prime + Parallel Group 25-30 in Visit 01 | 500 Secs (500 Secs)            | [3] |
| 30 | ANY               | WFC3/UVIS, ACCUM, UVIS    | F502N           | CR-SPLIT=NO;<br>FLASH=15 |                  | Prime + Parallel Group 25-30 in Visit 01 | 750 Secs (750 Secs)            | [3] |
| 31 | (2) SN1987A-STIS1 | STIS/CCD, ACCUM, 52X0.1E1 | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,-0.5  | Prime + Parallel Group 31-33 in Visit 01 | 770 Secs (770 Secs)            | [3] |
| 32 | ANY               | ACS/WFC, ACCUM, WFC       | F502N           | CR-SPLIT=NO              |                  | Prime + Parallel Group 31-33 in Visit 01 | 680 Secs (680 Secs)            | [3] |
| 33 | ANY               | WFC3/UVIS, ACCUM, UVIS    | F814W           | CR-SPLIT=NO              |                  | Prime + Parallel Group 31-33 in Visit 01 | 680 Secs (680 Secs)            | [3] |
| 34 | (2) SN1987A-STIS1 | STIS/CCD, ACCUM, 52X0.1E1 | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,-0.5  | Prime + Parallel Group 34-36 in Visit 01 | 720 Secs (720 Secs)            | [3] |
| 35 | ANY               | ACS/WFC, ACCUM, WFC       | F658N           | CR-SPLIT=NO              |                  | Prime + Parallel Group 34-36 in Visit 01 | 650 Secs (650 Secs)            | [3] |
| 36 | ANY               | WFC3/UVIS, ACCUM, UVIS    | F658N           | CR-SPLIT=NO;<br>FLASH=15 |                  | Prime + Parallel Group 34-36 in Visit 01 | 775 Secs (775 Secs)            | [3] |
| 37 | CCDFLAT           | STIS/CCD, ACCUM, 52X0.1   | G750L<br>7751 A |                          |                  |  | [==>(Copy 1)]<br>[==>(Copy 2)] | [3] |

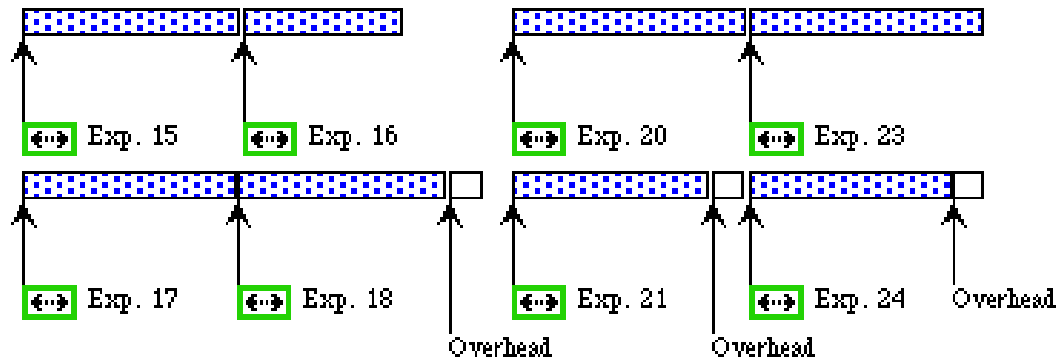
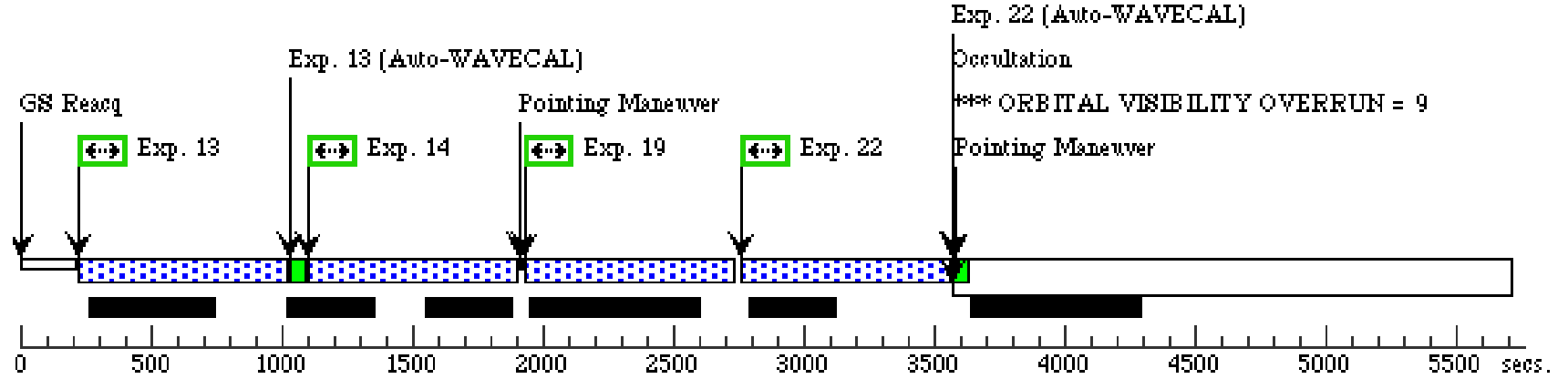
Orbit Structure

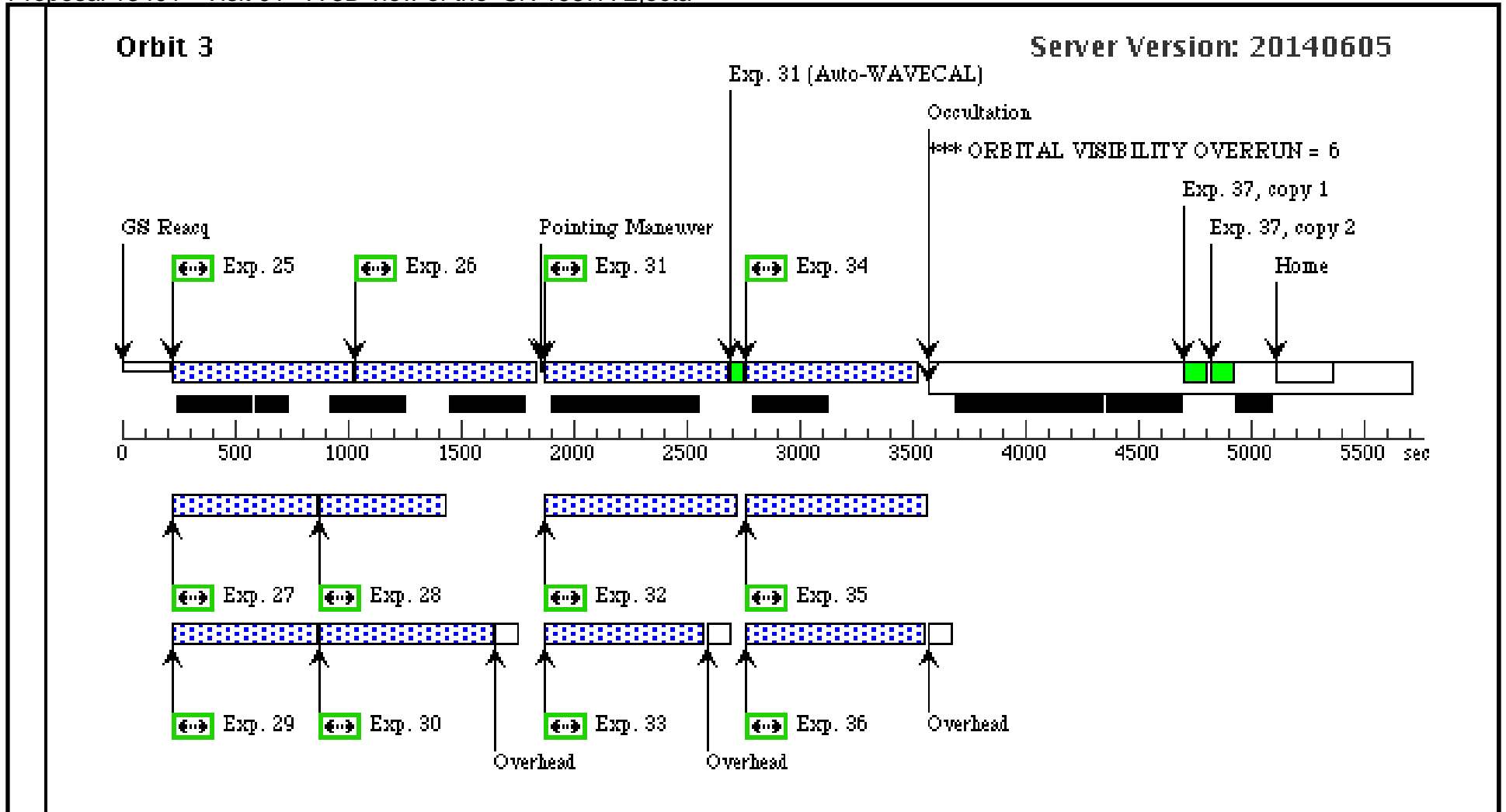




**Orbit 2**

**Server Version: 20140605**





Proposal 13401 - Visit 02 - A 3D view of the SN 1987A Ejecta

Fri Jul 11 01:02:25 GMT 2014

| <b>Visit</b>   | <b>Proposal 13401, Visit 02, scheduling</b><br><b>Diagnostic Status: Warning</b><br>Scientific Instruments: STIS/CCD, WFC3/UVIS, ACS/WFC<br>Special Requirements: ORIENT 45D TO 45 D; ORIENT 225D TO 225 D  |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |  |  |  |  |  |  |     |               |   |  |        |                                 |  |  |  |  |  |  |  |  |  |  |  |
|--|---|---|--------------------|--------------------------|---------------------------------|---------------|---------------|-----|---------------|---|--|---------------|-----------------------|--|--|--|--|--|--|-----|---------------|---|--|--------|---------------------------------|--|--|--|--|--|--|--|--|--|--|--|
|  | (Visit 02) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN<br>(Visit 02) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN<br>(Visit 02) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN  |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |  |  |  |  |  |  |     |               |   |  |        |                                 |  |  |  |  |  |  |  |  |  |  |  |
| <b>Diagnosics</b>  |   |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |  |  |  |  |  |  |     |               |   |  |        |                                 |  |  |  |  |  |  |  |  |  |  |  |
|  |   |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |  |  |  |  |  |  |     |               |   |  |        |                                 |  |  |  |  |  |  |  |  |  |  |  |
| <b>Fixed Targets</b>   | <table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Target Coordinates</th> <th>Targ. Coord. Corrections</th> <th>Fluxes</th> <th>Miscellaneous</th> </tr> </thead> <tbody> <tr> <td>(1)</td> <td>SN1987A-POINT</td> <td>RA: 05 35 30.5170 (83.8771542d)<br/>Dec: -69 16 18.52 (-69.27181d)<br/>Equinox: J2000</td> <td></td> <td>V=16.07+/-0.1</td> <td>Reference Frame: ICRS</td> </tr> <tr> <td colspan="6"> <i>Comments: position is measured from both STIS and UVIS images<br/>                     Also on PLATE A298 position is 5:35:30.484 -69:16:18.36<br/>                     so all these positions agree to about 0.1 arcsecond</i> </td> </tr> <tr> <td>(3)</td> <td>SN1987A-STIS2</td> <td>Offset from SN1987A-POINT<br/>RA Offset: -2.4625 Secs<br/>Dec Offset: 7.32 Arcsec</td> <td></td> <td>V=21.0</td> <td>Offset Position (SN1987A-STIS2)</td> </tr> <tr> <td colspan="6"> <i>Comments: OFFSET measured on recent WFC3/UVIS image</i> </td> </tr> </tbody> </table> | #   | Name               | Target Coordinates       | Targ. Coord. Corrections        | Fluxes        | Miscellaneous | (1) | SN1987A-POINT | RA: 05 35 30.5170 (83.8771542d)<br>Dec: -69 16 18.52 (-69.27181d)<br>Equinox: J2000 |  | V=16.07+/-0.1 | Reference Frame: ICRS | <i>Comments: position is measured from both STIS and UVIS images<br/>                     Also on PLATE A298 position is 5:35:30.484 -69:16:18.36<br/>                     so all these positions agree to about 0.1 arcsecond</i> |  |  |  |  |  | (3) | SN1987A-STIS2 | Offset from SN1987A-POINT<br>RA Offset: -2.4625 Secs<br>Dec Offset: 7.32 Arcsec |  | V=21.0 | Offset Position (SN1987A-STIS2) | <i>Comments: OFFSET measured on recent WFC3/UVIS image</i> |  |  |  |  |  |  |  |  |  |  |
|  | #   | Name  | Target Coordinates | Targ. Coord. Corrections | Fluxes                          | Miscellaneous |               |     |               |   |  |               |                       |  |  |  |  |  |  |     |               |   |  |        |                                 |  |  |  |  |  |  |  |  |  |  |  |
| (1)  | SN1987A-POINT   | RA: 05 35 30.5170 (83.8771542d)<br>Dec: -69 16 18.52 (-69.27181d)<br>Equinox: J2000 |                    | V=16.07+/-0.1            | Reference Frame: ICRS           |               |               |     |               |   |  |               |                       |  |  |  |  |  |  |     |               |   |  |        |                                 |  |  |  |  |  |  |  |  |  |  |  |
| <i>Comments: position is measured from both STIS and UVIS images<br/>                     Also on PLATE A298 position is 5:35:30.484 -69:16:18.36<br/>                     so all these positions agree to about 0.1 arcsecond</i> |   |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |  |  |  |  |  |  |     |               |   |  |        |                                 |  |  |  |  |  |  |  |  |  |  |  |
| (3)  | SN1987A-STIS2   | Offset from SN1987A-POINT<br>RA Offset: -2.4625 Secs<br>Dec Offset: 7.32 Arcsec     |                    | V=21.0                   | Offset Position (SN1987A-STIS2) |               |               |     |               |   |  |               |                       |  |  |  |  |  |  |     |               |   |  |        |                                 |  |  |  |  |  |  |  |  |  |  |  |
| <i>Comments: OFFSET measured on recent WFC3/UVIS image</i>   |   |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |  |  |  |  |  |  |     |               |   |  |        |                                 |  |  |  |  |  |  |  |  |  |  |  |
|  |   |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |  |  |  |  |  |  |     |               |   |  |        |                                 |  |  |  |  |  |  |  |  |  |  |  |

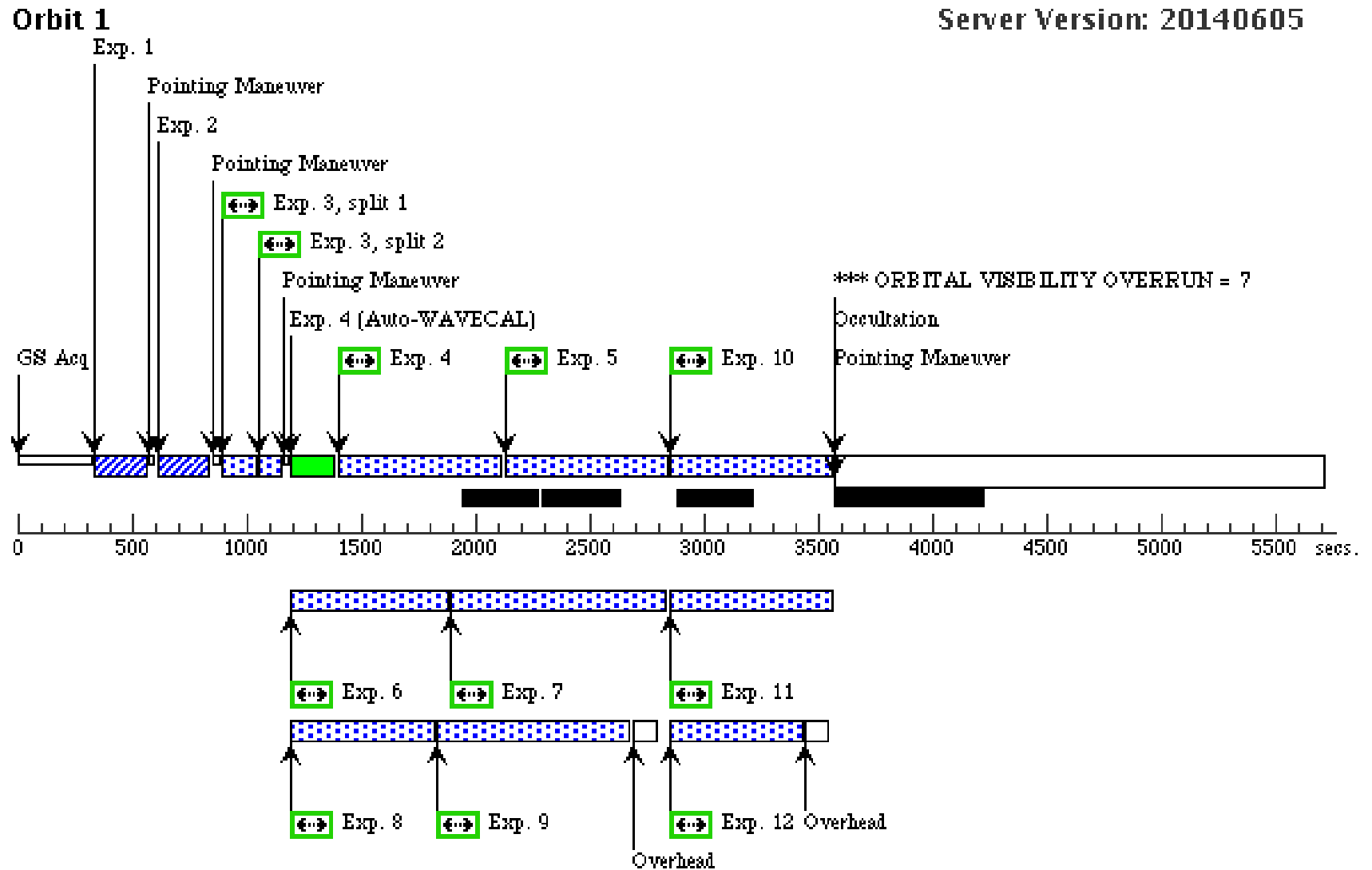
Proposal 13401 - Visit 02 - A 3D view of the SN 1987A Ejecta

| #  | Label     | Target                | Config,Mode,Aperture         | Spectral Els.   | Opt. Params.             | Special Reqs.               | Groups                                       | Exp. Time (Total)/[Actual Dur.]                         | Orbit |
|----|-----------|-----------------------|------------------------------|-----------------|--------------------------|-----------------------------|--|---|-------|
| 1  |           | (1) SN1987A-POIN<br>T | STIS/CCD, ACQ, F28X50LP      | MIRROR          |                          | GS ACQ SCENARI<br>O BASE1B3 |  | 1 Secs (1 Secs)<br>[==>]                                | [1]   |
| 2  |           | (1) SN1987A-POIN<br>T | STIS/CCD, ACQ/PEAK, 52X0.1E1 | MIRROR          |                          |                             |  | 1 Secs (1 Secs)<br>[==>]                                | [1]   |
| 3  |           | (3) SN1987A-STIS2     | STIS/CCD, ACCUM, F28X50LP    | MIRROR          | CR-SPLIT=2               | POS TARG 0,0.5              |  | 120 Secs (120 Secs)<br>[==>(Split 1)]<br>[==>(Split 2)] | [1]   |
| 4  |           | (3) SN1987A-STIS2     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0                | Prime + Parallel Gro<br>up 4-9 in Visit 02   | 676 Secs (676 Secs)<br>[==>]                            | [1]   |
| 5  |           | (3) SN1987A-STIS2     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0                | Prime + Parallel Gro<br>up 4-9 in Visit 02   | 676 Secs (676 Secs)<br>[==>]                            | [1]   |
| 6  |           | ANY                   | ACS/WFC, ACCUM, WFC          | F814W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 4-9 in Visit 02   | 480 Secs (480 Secs)<br>[==>]                            | [1]   |
| 7  |           | ANY                   | ACS/WFC, ACCUM, WFC          | F658N           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 4-9 in Visit 02   | 770 Secs (770 Secs)<br>[==>]                            | [1]   |
| 8  |           | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F606W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 4-9 in Visit 02   | 480 Secs (480 Secs)<br>[==>]                            | [1]   |
| 9  |           | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F656N           | CR-SPLIT=NO;<br>FLASH=15 |                             | Prime + Parallel Gro<br>up 4-9 in Visit 02   | 830 Secs (830 Secs)<br>[==>]                            | [1]   |
| 10 | Exposures | (3) SN1987A-STIS2     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0                | Prime + Parallel Gro<br>up 10-12 in Visit 02 | 676 Secs (676 Secs)<br>[==>]                            | [1]   |
| 11 |           | ANY                   | ACS/WFC, ACCUM, WFC          | F606W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 10-12 in Visit 02 | 560 Secs (560 Secs)<br>[==>]                            | [1]   |
| 12 |           | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F814W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 10-12 in Visit 02 | 550 Secs (550 Secs)<br>[==>]                            | [1]   |
| 13 |           | (3) SN1987A-STIS2     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0.5              | Prime + Parallel Gro<br>up 13-18 in Visit 02 | 760 Secs (760 Secs)<br>[==>]                            | [2]   |
| 14 |           | (3) SN1987A-STIS2     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0.5              | Prime + Parallel Gro<br>up 13-18 in Visit 02 | 760 Secs (760 Secs)<br>[==>]                            | [2]   |
| 15 |           | ANY                   | ACS/WFC, ACCUM, WFC          | F475W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 13-18 in Visit 02 | 600 Secs (600 Secs)<br>[==>]                            | [2]   |
| 16 |           | ANY                   | ACS/WFC, ACCUM, WFC          | F606W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 13-18 in Visit 02 | 400 Secs (400 Secs)<br>[==>]                            | [2]   |
| 17 |           | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F475W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 13-18 in Visit 02 | 600 Secs (600 Secs)<br>[==>]                            | [2]   |
| 18 |           | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F336W           | CR-SPLIT=NO;<br>FLASH=12 |                             | Prime + Parallel Gro<br>up 13-18 in Visit 02 | 700 Secs (700 Secs)<br>[==>]                            | [2]   |
| 19 |           | (3) SN1987A-STIS2     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0.25             | Prime + Parallel Gro<br>up 19-21 in Visit 02 | 760 Secs (760 Secs)<br>[==>]                            | [2]   |
| 20 |           | ANY                   | ACS/WFC, ACCUM, WFC          | F502N           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 19-21 in Visit 02 | 671 Secs (671 Secs)<br>[==>]                            | [2]   |
| 21 |           | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F656N           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 19-21 in Visit 02 | 670 Secs (670 Secs)<br>[==>]                            | [2]   |

Proposal 13401 - Visit 02 - A 3D view of the SN 1987A Ejecta

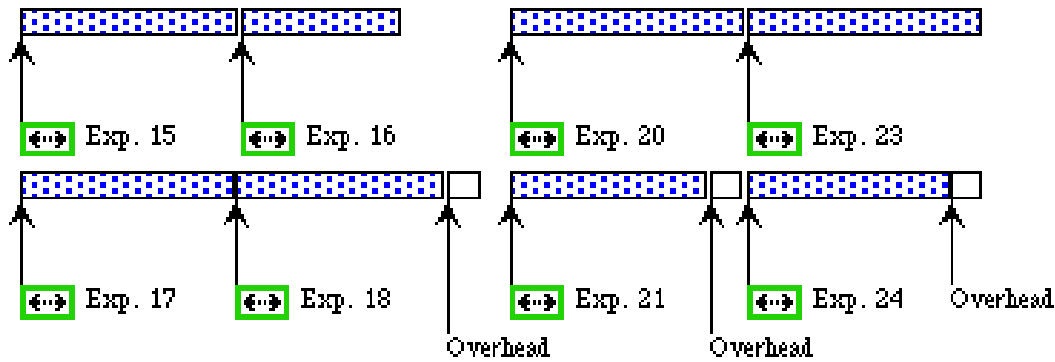
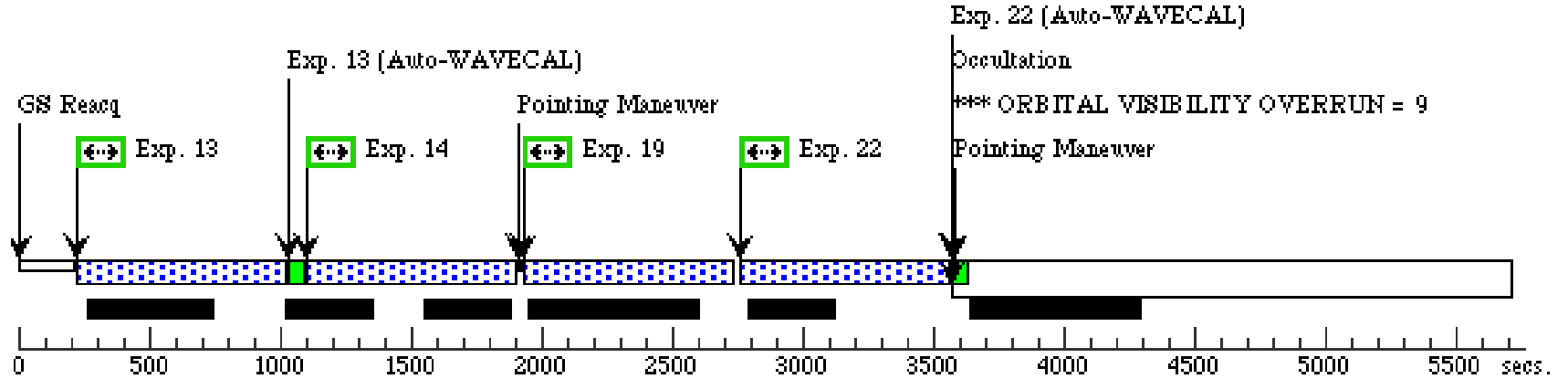
|    |                   |                           |                 |                          |                  |  |                                |     |
|----|-------------------|---------------------------|-----------------|--------------------------|------------------|--|--------------------------------|-----|
| 22 | (3) SN1987A-STIS2 | STIS/CCD, ACCUM, 52X0.1E1 | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0.25  | Prime + Parallel Group 22-24 in Visit 02 | 760 Secs (760 Secs)            | [2] |
| 23 | ANY               | ACS/WFC, ACCUM, WFC       | F658N           | CR-SPLIT=NO              |                  | Prime + Parallel Group 22-24 in Visit 02 | 660 Secs (660 Secs)            | [2] |
| 24 | ANY               | WFC3/UVIS, ACCUM, UVIS    | F502N           | CR-SPLIT=NO;<br>FLASH=15 |                  | Prime + Parallel Group 22-24 in Visit 02 | 671 Secs (671 Secs)            | [2] |
| 25 | (3) SN1987A-STIS2 | STIS/CCD, ACCUM, 52X0.1E1 | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,-0.25 | Prime + Parallel Group 25-30 in Visit 02 | 770 Secs (770 Secs)            | [3] |
| 26 | (3) SN1987A-STIS2 | STIS/CCD, ACCUM, 52X0.1E1 | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,-0.25 | Prime + Parallel Group 25-30 in Visit 02 | 770 Secs (770 Secs)            | [3] |
| 27 | ANY               | ACS/WFC, ACCUM, WFC       | F475W           | CR-SPLIT=NO              |                  | Prime + Parallel Group 25-30 in Visit 02 | 500 Secs (500 Secs)            | [3] |
| 28 | ANY               | ACS/WFC, ACCUM, WFC       | F814W           | CR-SPLIT=NO              |                  | Prime + Parallel Group 25-30 in Visit 02 | 400 Secs (400 Secs)            | [3] |
| 29 | ANY               | WFC3/UVIS, ACCUM, UVIS    | F606W           | CR-SPLIT=NO              |                  | Prime + Parallel Group 25-30 in Visit 02 | 500 Secs (500 Secs)            | [3] |
| 30 | ANY               | WFC3/UVIS, ACCUM, UVIS    | F502N           | CR-SPLIT=NO;<br>FLASH=15 |                  | Prime + Parallel Group 25-30 in Visit 02 | 750 Secs (750 Secs)            | [3] |
| 31 | (3) SN1987A-STIS2 | STIS/CCD, ACCUM, 52X0.1E1 | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,-0.5  | Prime + Parallel Group 31-33 in Visit 02 | 770 Secs (770 Secs)            | [3] |
| 32 | ANY               | ACS/WFC, ACCUM, WFC       | F502N           | CR-SPLIT=NO              |                  | Prime + Parallel Group 31-33 in Visit 02 | 680 Secs (680 Secs)            | [3] |
| 33 | ANY               | WFC3/UVIS, ACCUM, UVIS    | F814W           | CR-SPLIT=NO              |                  | Prime + Parallel Group 31-33 in Visit 02 | 680 Secs (680 Secs)            | [3] |
| 34 | (3) SN1987A-STIS2 | STIS/CCD, ACCUM, 52X0.1E1 | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,-0.5  | Prime + Parallel Group 34-36 in Visit 02 | 720 Secs (720 Secs)            | [3] |
| 35 | ANY               | ACS/WFC, ACCUM, WFC       | F658N           | CR-SPLIT=NO              |                  | Prime + Parallel Group 34-36 in Visit 02 | 650 Secs (650 Secs)            | [3] |
| 36 | ANY               | WFC3/UVIS, ACCUM, UVIS    | F658N           | CR-SPLIT=NO;<br>FLASH=15 |                  | Prime + Parallel Group 34-36 in Visit 02 | 775 Secs (775 Secs)            | [3] |
| 37 | CCDFLAT           | STIS/CCD, ACCUM, 52X0.1   | G750L<br>7751 A |                          |                  |  | [==>(Copy 1)]<br>[==>(Copy 2)] | [3] |

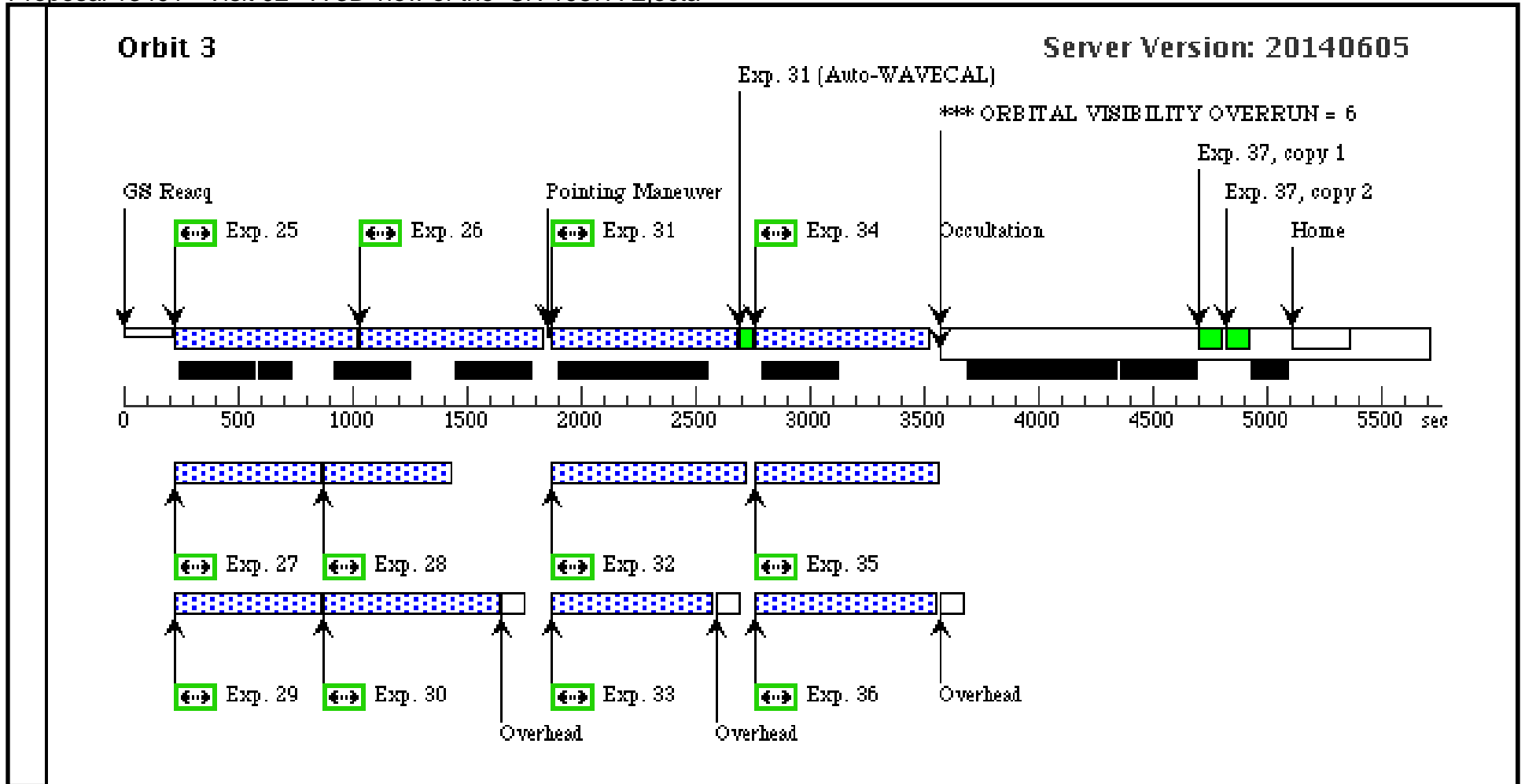
Orbit Structure



**Orbit 2**

Server Version: 20140605







Proposal 13401 - Visit 03 - A 3D view of the SN 1987A Ejecta

Fri Jul 11 01:02:26 GMT 2014

| <b>Visit</b>         | <b>Proposal 13401, Visit 03, scheduling</b><br><b>Diagnostic Status: Warning</b><br>Scientific Instruments: STIS/CCD, WFC3/UVIS, ACS/WFC<br>Special Requirements: ORIENT 45D TO 45 D; ORIENT 225D TO 225 D  |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |     |               |   |  |        |                                 |  |  |  |  |
|----------------------|---|---|--------------------|--------------------------|---------------------------------|---------------|---------------|-----|---------------|---|--|---------------|-----------------------|-----|---------------|---|--|--------|---------------------------------|--|--|--|--|
|                      | (Visit 03) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN<br>(Visit 03) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN<br>(Visit 03) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN  |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |     |               |   |  |        |                                 |  |  |  |  |
| <b>Diagnosics</b>    |   |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |     |               |   |  |        |                                 |  |  |  |  |
|                      |   |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |     |               |   |  |        |                                 |  |  |  |  |
| <b>Fixed Targets</b> | <table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Target Coordinates</th> <th>Targ. Coord. Corrections</th> <th>Fluxes</th> <th>Miscellaneous</th> </tr> </thead> <tbody> <tr> <td>(1)</td> <td>SN1987A-POINT</td> <td>                     RA: 05 35 30.5170 (83.8771542d)<br/>                     Dec: -69 16 18.52 (-69.27181d)<br/>                     Equinox: J2000<br/><br/> <i>Comments: position is measured from both STIS and UVIS images<br/>                     Also on PLATE A298 position is 5:35:30.484 -69:16:18.36<br/>                     so all these positions agree to about 0.1 arcsecond</i> </td> <td></td> <td>V=16.07+/-0.1</td> <td>Reference Frame: ICRS</td> </tr> <tr> <td>(4)</td> <td>SN1987A-STIS3</td> <td>                     Offset from SN1987A-POINT<br/>                     RA Offset: -2.4815 Secs<br/>                     Dec Offset: 7.32 Arcsec<br/><br/> <i>Comments: OFFSET measured on recent WFC3/UVIS image</i> </td> <td></td> <td>V=21.0</td> <td>Offset Position (SN1987A-STIS3)</td> </tr> </tbody> </table> | #   | Name               | Target Coordinates       | Targ. Coord. Corrections        | Fluxes        | Miscellaneous | (1) | SN1987A-POINT | RA: 05 35 30.5170 (83.8771542d)<br>Dec: -69 16 18.52 (-69.27181d)<br>Equinox: J2000<br><br><i>Comments: position is measured from both STIS and UVIS images<br/>                     Also on PLATE A298 position is 5:35:30.484 -69:16:18.36<br/>                     so all these positions agree to about 0.1 arcsecond</i> |  | V=16.07+/-0.1 | Reference Frame: ICRS | (4) | SN1987A-STIS3 | Offset from SN1987A-POINT<br>RA Offset: -2.4815 Secs<br>Dec Offset: 7.32 Arcsec<br><br><i>Comments: OFFSET measured on recent WFC3/UVIS image</i> |  | V=21.0 | Offset Position (SN1987A-STIS3) |  |  |  |  |
|                      | #   | Name  | Target Coordinates | Targ. Coord. Corrections | Fluxes                          | Miscellaneous |               |     |               |   |  |               |                       |     |               |   |  |        |                                 |  |  |  |  |
| (1)                  | SN1987A-POINT   | RA: 05 35 30.5170 (83.8771542d)<br>Dec: -69 16 18.52 (-69.27181d)<br>Equinox: J2000<br><br><i>Comments: position is measured from both STIS and UVIS images<br/>                     Also on PLATE A298 position is 5:35:30.484 -69:16:18.36<br/>                     so all these positions agree to about 0.1 arcsecond</i> |                    | V=16.07+/-0.1            | Reference Frame: ICRS           |               |               |     |               |   |  |               |                       |     |               |   |  |        |                                 |  |  |  |  |
| (4)                  | SN1987A-STIS3   | Offset from SN1987A-POINT<br>RA Offset: -2.4815 Secs<br>Dec Offset: 7.32 Arcsec<br><br><i>Comments: OFFSET measured on recent WFC3/UVIS image</i>   |                    | V=21.0                   | Offset Position (SN1987A-STIS3) |               |               |     |               |   |  |               |                       |     |               |   |  |        |                                 |  |  |  |  |
|                      |   |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |     |               |   |  |        |                                 |  |  |  |  |

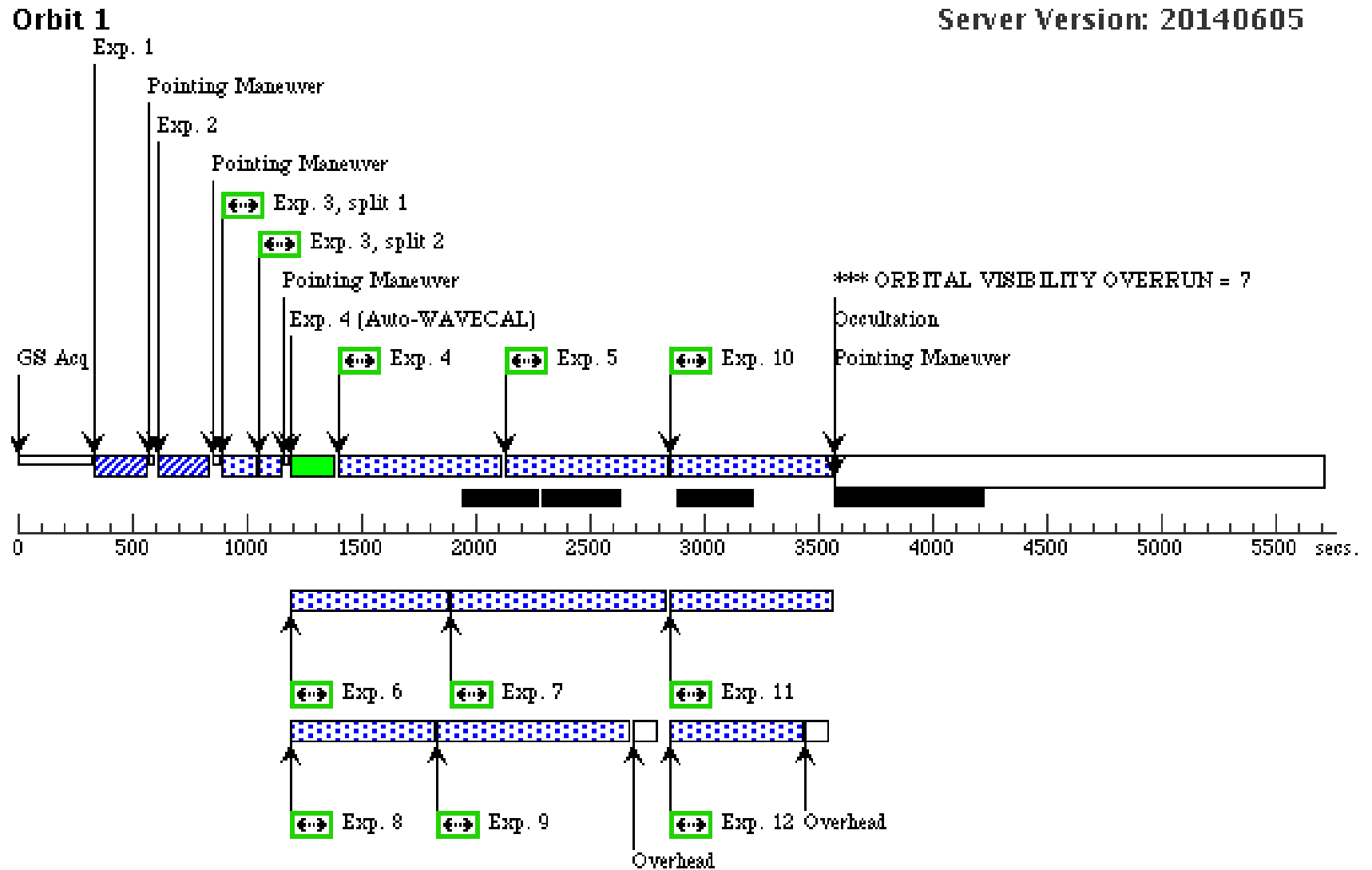
Proposal 13401 - Visit 03 - A 3D view of the SN 1987A Ejecta

| #  | Label     | Target                | Config,Mode,Aperture         | Spectral Els.   | Opt. Params.             | Special Reqs.               | Groups                                       | Exp. Time (Total)/[Actual Dur.]                         | Orbit |
|----|-----------|-----------------------|------------------------------|-----------------|--------------------------|-----------------------------|--|---|-------|
| 1  |           | (1) SN1987A-POIN<br>T | STIS/CCD, ACQ, F28X50LP      | MIRROR          |                          | GS ACQ SCENARI<br>O BASE1B3 |  | 1 Secs (1 Secs)<br>[==>]                                | [1]   |
| 2  |           | (1) SN1987A-POIN<br>T | STIS/CCD, ACQ/PEAK, 52X0.1E1 | MIRROR          |                          |                             |  | 1 Secs (1 Secs)<br>[==>]                                | [1]   |
| 3  |           | (4) SN1987A-STIS3     | STIS/CCD, ACCUM, F28X50LP    | MIRROR          | CR-SPLIT=2               | POS TARG 0,0.5              |  | 120 Secs (120 Secs)<br>[==>(Split 1)]<br>[==>(Split 2)] | [1]   |
| 4  |           | (4) SN1987A-STIS3     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0                | Prime + Parallel Gro<br>up 4-9 in Visit 03   | 676 Secs (676 Secs)<br>[==>]                            | [1]   |
| 5  |           | (4) SN1987A-STIS3     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0                | Prime + Parallel Gro<br>up 4-9 in Visit 03   | 676 Secs (676 Secs)<br>[==>]                            | [1]   |
| 6  |           | ANY                   | ACS/WFC, ACCUM, WFC          | F814W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 4-9 in Visit 03   | 480 Secs (480 Secs)<br>[==>]                            | [1]   |
| 7  |           | ANY                   | ACS/WFC, ACCUM, WFC          | F658N           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 4-9 in Visit 03   | 770 Secs (770 Secs)<br>[==>]                            | [1]   |
| 8  |           | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F606W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 4-9 in Visit 03   | 480 Secs (480 Secs)<br>[==>]                            | [1]   |
| 9  |           | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F656N           | CR-SPLIT=NO;<br>FLASH=15 |                             | Prime + Parallel Gro<br>up 4-9 in Visit 03   | 830 Secs (830 Secs)<br>[==>]                            | [1]   |
| 10 | Exposures | (4) SN1987A-STIS3     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0                | Prime + Parallel Gro<br>up 10-12 in Visit 03 | 676 Secs (676 Secs)<br>[==>]                            | [1]   |
| 11 |           | ANY                   | ACS/WFC, ACCUM, WFC          | F606W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 10-12 in Visit 03 | 560 Secs (560 Secs)<br>[==>]                            | [1]   |
| 12 |           | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F814W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 10-12 in Visit 03 | 550 Secs (550 Secs)<br>[==>]                            | [1]   |
| 13 |           | (4) SN1987A-STIS3     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0.5              | Prime + Parallel Gro<br>up 13-18 in Visit 03 | 760 Secs (760 Secs)<br>[==>]                            | [2]   |
| 14 |           | (4) SN1987A-STIS3     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0.5              | Prime + Parallel Gro<br>up 13-18 in Visit 03 | 760 Secs (760 Secs)<br>[==>]                            | [2]   |
| 15 |           | ANY                   | ACS/WFC, ACCUM, WFC          | F475W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 13-18 in Visit 03 | 600 Secs (600 Secs)<br>[==>]                            | [2]   |
| 16 |           | ANY                   | ACS/WFC, ACCUM, WFC          | F606W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 13-18 in Visit 03 | 400 Secs (400 Secs)<br>[==>]                            | [2]   |
| 17 |           | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F475W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 13-18 in Visit 03 | 600 Secs (600 Secs)<br>[==>]                            | [2]   |
| 18 |           | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F336W           | CR-SPLIT=NO;<br>FLASH=12 |                             | Prime + Parallel Gro<br>up 13-18 in Visit 03 | 700 Secs (700 Secs)<br>[==>]                            | [2]   |
| 19 |           | (4) SN1987A-STIS3     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0.25             | Prime + Parallel Gro<br>up 19-21 in Visit 03 | 760 Secs (760 Secs)<br>[==>]                            | [2]   |
| 20 |           | ANY                   | ACS/WFC, ACCUM, WFC          | F502N           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 19-21 in Visit 03 | 671 Secs (671 Secs)<br>[==>]                            | [2]   |
| 21 |           | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F656N           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 19-21 in Visit 03 | 670 Secs (670 Secs)<br>[==>]                            | [2]   |

Proposal 13401 - Visit 03 - A 3D view of the SN 1987A Ejecta

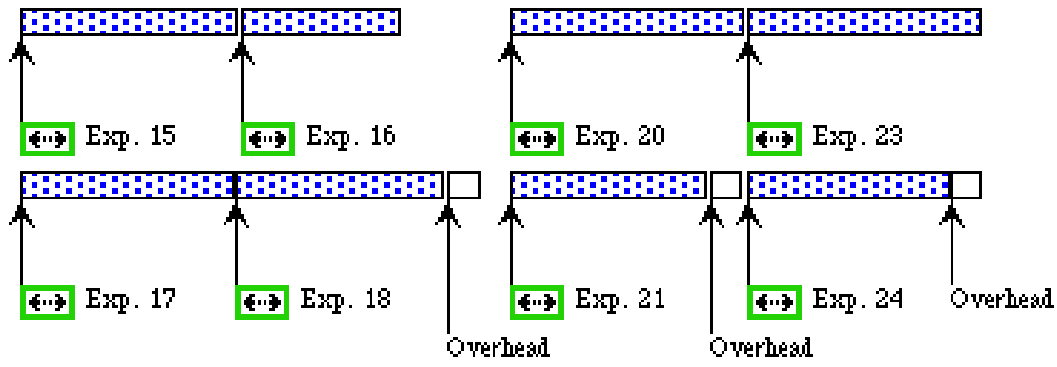
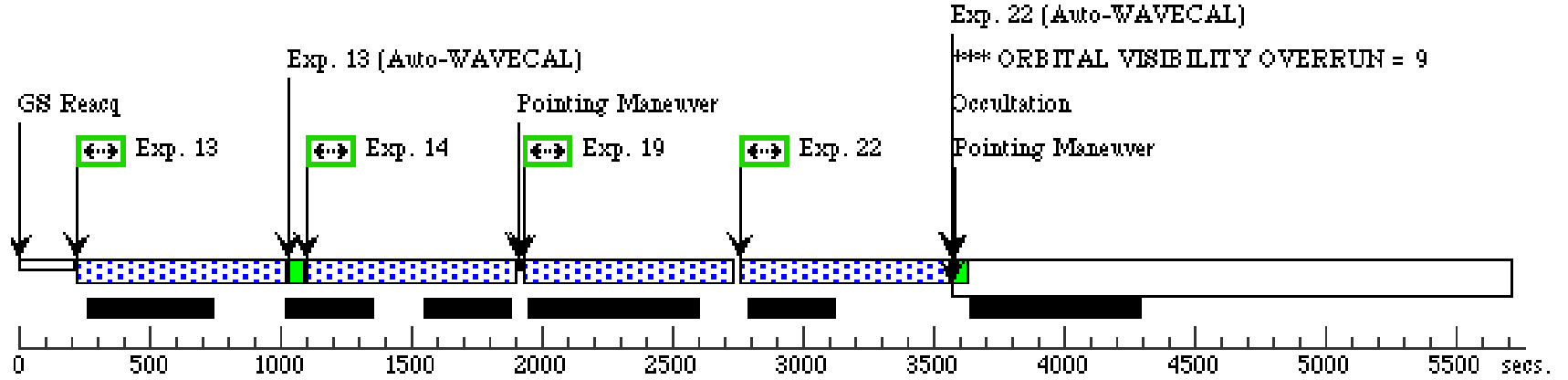
|    |                   |                           |                 |                          |                  |  |                                |     |
|----|-------------------|---------------------------|-----------------|--------------------------|------------------|--|--------------------------------|-----|
| 22 | (4) SN1987A-STIS3 | STIS/CCD, ACCUM, 52X0.1E1 | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0.25  | Prime + Parallel Group 22-24 in Visit 03 | 760 Secs (760 Secs)            | [2] |
| 23 | ANY               | ACS/WFC, ACCUM, WFC       | F658N           | CR-SPLIT=NO              |                  | Prime + Parallel Group 22-24 in Visit 03 | 660 Secs (660 Secs)            | [2] |
| 24 | ANY               | WFC3/UVIS, ACCUM, UVIS    | F502N           | CR-SPLIT=NO;<br>FLASH=15 |                  | Prime + Parallel Group 22-24 in Visit 03 | 671 Secs (671 Secs)            | [2] |
| 25 | (4) SN1987A-STIS3 | STIS/CCD, ACCUM, 52X0.1E1 | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,-0.25 | Prime + Parallel Group 25-30 in Visit 03 | 770 Secs (770 Secs)            | [3] |
| 26 | (4) SN1987A-STIS3 | STIS/CCD, ACCUM, 52X0.1E1 | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,-0.25 | Prime + Parallel Group 25-30 in Visit 03 | 770 Secs (770 Secs)            | [3] |
| 27 | ANY               | ACS/WFC, ACCUM, WFC       | F475W           | CR-SPLIT=NO              |                  | Prime + Parallel Group 25-30 in Visit 03 | 500 Secs (500 Secs)            | [3] |
| 28 | ANY               | ACS/WFC, ACCUM, WFC       | F814W           | CR-SPLIT=NO              |                  | Prime + Parallel Group 25-30 in Visit 03 | 400 Secs (400 Secs)            | [3] |
| 29 | ANY               | WFC3/UVIS, ACCUM, UVIS    | F606W           | CR-SPLIT=NO              |                  | Prime + Parallel Group 25-30 in Visit 03 | 500 Secs (500 Secs)            | [3] |
| 30 | ANY               | WFC3/UVIS, ACCUM, UVIS    | F502N           | CR-SPLIT=NO;<br>FLASH=15 |                  | Prime + Parallel Group 25-30 in Visit 03 | 750 Secs (750 Secs)            | [3] |
| 31 | (4) SN1987A-STIS3 | STIS/CCD, ACCUM, 52X0.1E1 | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,-0.5  | Prime + Parallel Group 31-33 in Visit 03 | 770 Secs (770 Secs)            | [3] |
| 32 | ANY               | ACS/WFC, ACCUM, WFC       | F502N           | CR-SPLIT=NO              |                  | Prime + Parallel Group 31-33 in Visit 03 | 680 Secs (680 Secs)            | [3] |
| 33 | ANY               | WFC3/UVIS, ACCUM, UVIS    | F814W           | CR-SPLIT=NO              |                  | Prime + Parallel Group 31-33 in Visit 03 | 680 Secs (680 Secs)            | [3] |
| 34 | (4) SN1987A-STIS3 | STIS/CCD, ACCUM, 52X0.1E1 | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,-0.5  | Prime + Parallel Group 34-36 in Visit 03 | 720 Secs (720 Secs)            | [3] |
| 35 | ANY               | ACS/WFC, ACCUM, WFC       | F658N           | CR-SPLIT=NO              |                  | Prime + Parallel Group 34-36 in Visit 03 | 650 Secs (650 Secs)            | [3] |
| 36 | ANY               | WFC3/UVIS, ACCUM, UVIS    | F658N           | CR-SPLIT=NO;<br>FLASH=15 |                  | Prime + Parallel Group 34-36 in Visit 03 | 775 Secs (775 Secs)            | [3] |
| 37 | CCDFLAT           | STIS/CCD, ACCUM, 52X0.1   | G750L<br>7751 A |                          |                  |  | [==>(Copy 1)]<br>[==>(Copy 2)] | [3] |

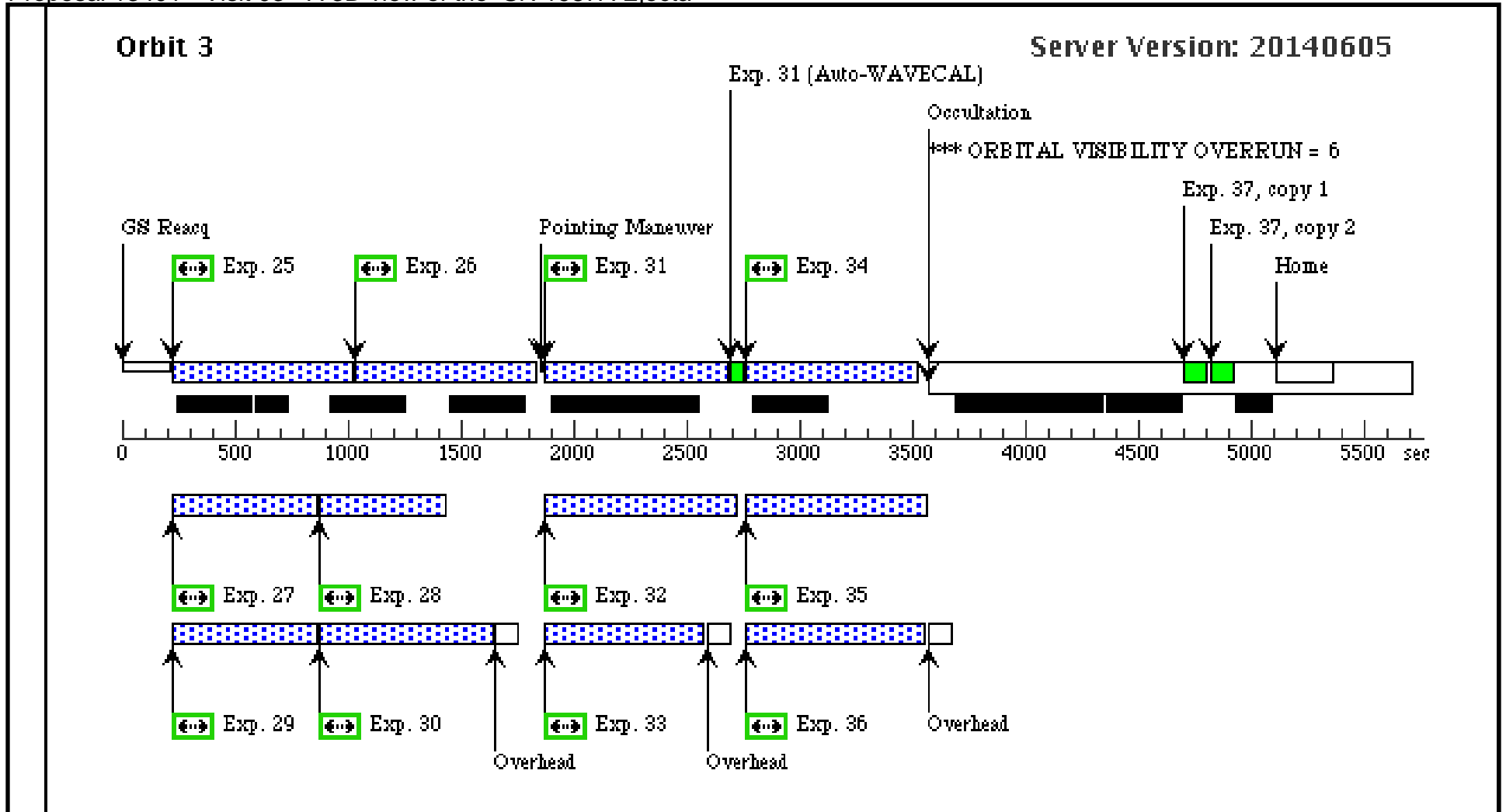
Orbit Structure



**Orbit 2**

Server Version: 20140605





Proposal 13401 - Visit 04 - A 3D view of the SN 1987A Ejecta

Fri Jul 11 01:02:26 GMT 2014

| <b>Visit</b>         | <b>Proposal 13401, Visit 04, scheduling</b><br><b>Diagnostic Status: Warning</b><br>Scientific Instruments: STIS/CCD, WFC3/UVIS, ACS/WFC<br>Special Requirements: ORIENT 45D TO 45 D; ORIENT 225D TO 225 D  |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |     |               |   |  |        |                                 |  |  |  |  |
|----------------------|---|---|--------------------|--------------------------|---------------------------------|---------------|---------------|-----|---------------|---|--|---------------|-----------------------|-----|---------------|---|--|--------|---------------------------------|--|--|--|--|
|                      | (Visit 04) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN<br>(Visit 04) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN<br>(Visit 04) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN  |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |     |               |   |  |        |                                 |  |  |  |  |
| <b>Diagnosics</b>    |   |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |     |               |   |  |        |                                 |  |  |  |  |
|                      |   |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |     |               |   |  |        |                                 |  |  |  |  |
| <b>Fixed Targets</b> | <table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Target Coordinates</th> <th>Targ. Coord. Corrections</th> <th>Fluxes</th> <th>Miscellaneous</th> </tr> </thead> <tbody> <tr> <td>(1)</td> <td>SN1987A-POINT</td> <td>                     RA: 05 35 30.5170 (83.8771542d)<br/>                     Dec: -69 16 18.52 (-69.27181d)<br/>                     Equinox: J2000<br/><br/> <i>Comments: position is measured from both STIS and UVIS images<br/>                     Also on PLATE A298 position is 5:35:30.484 -69:16:18.36<br/>                     so all these positions agree to about 0.1 arcsecond</i> </td> <td></td> <td>V=16.07+/-0.1</td> <td>Reference Frame: ICRS</td> </tr> <tr> <td>(5)</td> <td>SN1987A-STIS4</td> <td>                     Offset from SN1987A-POINT<br/>                     RA Offset: -2.5005 Secs<br/>                     Dec Offset: 7.32 Arcsec<br/><br/> <i>Comments: OFFSET measured on recent WFC3/UVIS image</i> </td> <td></td> <td>V=21.0</td> <td>Offset Position (SN1987A-STIS4)</td> </tr> </tbody> </table> | #   | Name               | Target Coordinates       | Targ. Coord. Corrections        | Fluxes        | Miscellaneous | (1) | SN1987A-POINT | RA: 05 35 30.5170 (83.8771542d)<br>Dec: -69 16 18.52 (-69.27181d)<br>Equinox: J2000<br><br><i>Comments: position is measured from both STIS and UVIS images<br/>                     Also on PLATE A298 position is 5:35:30.484 -69:16:18.36<br/>                     so all these positions agree to about 0.1 arcsecond</i> |  | V=16.07+/-0.1 | Reference Frame: ICRS | (5) | SN1987A-STIS4 | Offset from SN1987A-POINT<br>RA Offset: -2.5005 Secs<br>Dec Offset: 7.32 Arcsec<br><br><i>Comments: OFFSET measured on recent WFC3/UVIS image</i> |  | V=21.0 | Offset Position (SN1987A-STIS4) |  |  |  |  |
|                      | #   | Name  | Target Coordinates | Targ. Coord. Corrections | Fluxes                          | Miscellaneous |               |     |               |   |  |               |                       |     |               |   |  |        |                                 |  |  |  |  |
| (1)                  | SN1987A-POINT   | RA: 05 35 30.5170 (83.8771542d)<br>Dec: -69 16 18.52 (-69.27181d)<br>Equinox: J2000<br><br><i>Comments: position is measured from both STIS and UVIS images<br/>                     Also on PLATE A298 position is 5:35:30.484 -69:16:18.36<br/>                     so all these positions agree to about 0.1 arcsecond</i> |                    | V=16.07+/-0.1            | Reference Frame: ICRS           |               |               |     |               |   |  |               |                       |     |               |   |  |        |                                 |  |  |  |  |
| (5)                  | SN1987A-STIS4   | Offset from SN1987A-POINT<br>RA Offset: -2.5005 Secs<br>Dec Offset: 7.32 Arcsec<br><br><i>Comments: OFFSET measured on recent WFC3/UVIS image</i>   |                    | V=21.0                   | Offset Position (SN1987A-STIS4) |               |               |     |               |   |  |               |                       |     |               |   |  |        |                                 |  |  |  |  |
|                      |   |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |     |               |   |  |        |                                 |  |  |  |  |

Proposal 13401 - Visit 04 - A 3D view of the SN 1987A Ejecta

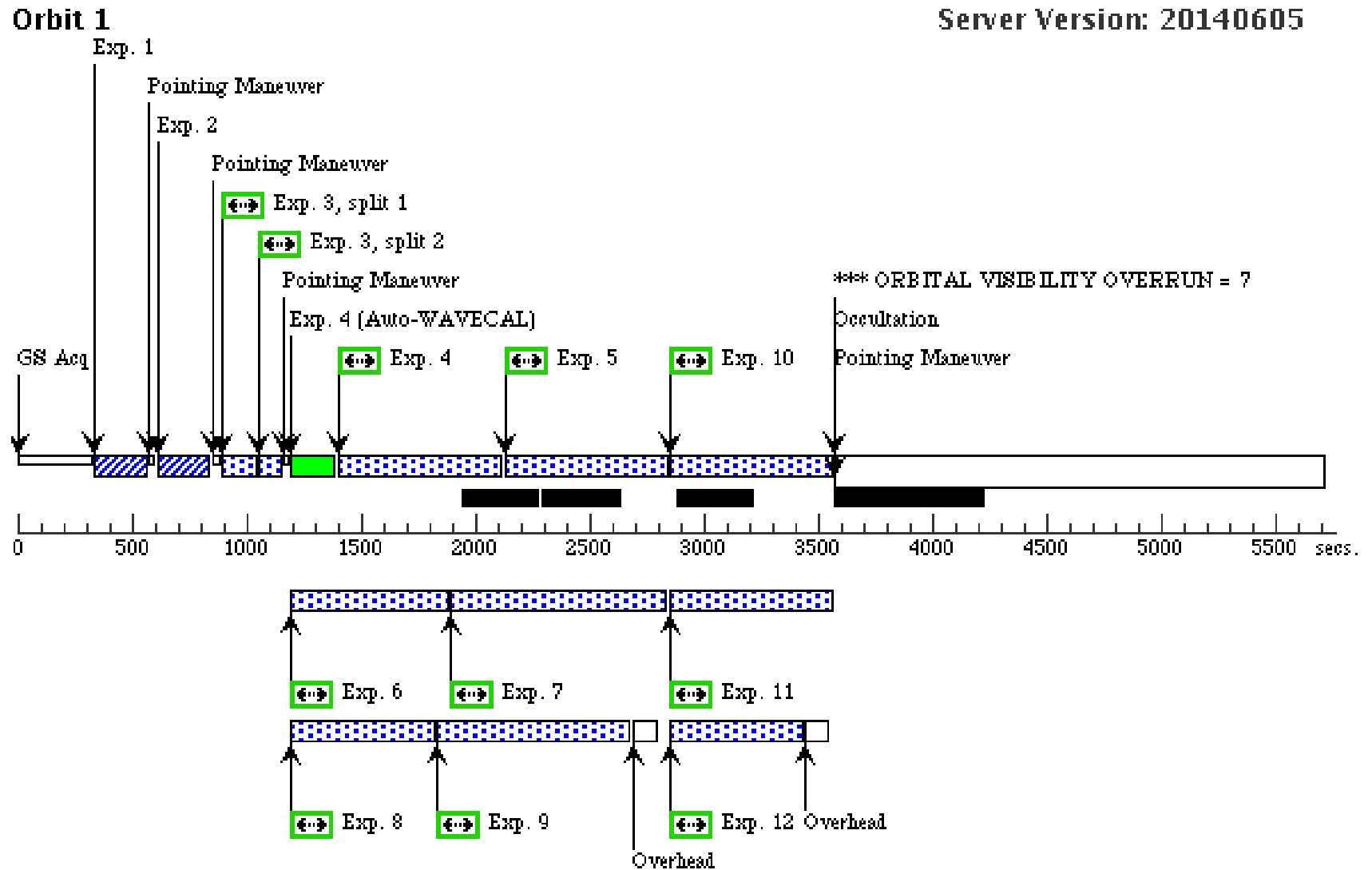
| #  | Label     | Target                | Config,Mode,Aperture         | Spectral Els.   | Opt. Params.             | Special Reqs.               | Groups                                       | Exp. Time (Total)/[Actual Dur.]                         | Orbit |
|----|-----------|-----------------------|------------------------------|-----------------|--------------------------|-----------------------------|--|---|-------|
| 1  |           | (1) SN1987A-POIN<br>T | STIS/CCD, ACQ, F28X50LP      | MIRROR          |                          | GS ACQ SCENARI<br>O BASE1B3 |  | 1 Secs (1 Secs)<br>[==>]                                | [1]   |
| 2  |           | (1) SN1987A-POIN<br>T | STIS/CCD, ACQ/PEAK, 52X0.1E1 | MIRROR          |                          |                             |  | 1 Secs (1 Secs)<br>[==>]                                | [1]   |
| 3  |           | (5) SN1987A-STIS4     | STIS/CCD, ACCUM, F28X50LP    | MIRROR          | CR-SPLIT=2               | POS TARG 0,0.5              |  | 120 Secs (120 Secs)<br>[==>(Split 1)]<br>[==>(Split 2)] | [1]   |
| 4  |           | (5) SN1987A-STIS4     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0                | Prime + Parallel Gro<br>up 4-9 in Visit 04   | 676 Secs (676 Secs)<br>[==>]                            | [1]   |
| 5  |           | (5) SN1987A-STIS4     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0                | Prime + Parallel Gro<br>up 4-9 in Visit 04   | 676 Secs (676 Secs)<br>[==>]                            | [1]   |
| 6  |           | ANY                   | ACS/WFC, ACCUM, WFC          | F814W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 4-9 in Visit 04   | 480 Secs (480 Secs)<br>[==>]                            | [1]   |
| 7  |           | ANY                   | ACS/WFC, ACCUM, WFC          | F658N           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 4-9 in Visit 04   | 770 Secs (770 Secs)<br>[==>]                            | [1]   |
| 8  |           | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F606W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 4-9 in Visit 04   | 480 Secs (480 Secs)<br>[==>]                            | [1]   |
| 9  |           | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F656N           | CR-SPLIT=NO;<br>FLASH=15 |                             | Prime + Parallel Gro<br>up 4-9 in Visit 04   | 830 Secs (830 Secs)<br>[==>]                            | [1]   |
| 10 | Exposures | (5) SN1987A-STIS4     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0                | Prime + Parallel Gro<br>up 10-12 in Visit 04 | 676 Secs (676 Secs)<br>[==>]                            | [1]   |
| 11 |           | ANY                   | ACS/WFC, ACCUM, WFC          | F606W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 10-12 in Visit 04 | 560 Secs (560 Secs)<br>[==>]                            | [1]   |
| 12 |           | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F814W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 10-12 in Visit 04 | 550 Secs (550 Secs)<br>[==>]                            | [1]   |
| 13 |           | (5) SN1987A-STIS4     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0.5              | Prime + Parallel Gro<br>up 13-18 in Visit 04 | 760 Secs (760 Secs)<br>[==>]                            | [2]   |
| 14 |           | (5) SN1987A-STIS4     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0.5              | Prime + Parallel Gro<br>up 13-18 in Visit 04 | 760 Secs (760 Secs)<br>[==>]                            | [2]   |
| 15 |           | ANY                   | ACS/WFC, ACCUM, WFC          | F475W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 13-18 in Visit 04 | 600 Secs (600 Secs)<br>[==>]                            | [2]   |
| 16 |           | ANY                   | ACS/WFC, ACCUM, WFC          | F606W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 13-18 in Visit 04 | 400 Secs (400 Secs)<br>[==>]                            | [2]   |
| 17 |           | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F475W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 13-18 in Visit 04 | 600 Secs (600 Secs)<br>[==>]                            | [2]   |
| 18 |           | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F336W           | CR-SPLIT=NO;<br>FLASH=12 |                             | Prime + Parallel Gro<br>up 13-18 in Visit 04 | 700 Secs (700 Secs)<br>[==>]                            | [2]   |
| 19 |           | (5) SN1987A-STIS4     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0.25             | Prime + Parallel Gro<br>up 19-21 in Visit 04 | 760 Secs (760 Secs)<br>[==>]                            | [2]   |
| 20 |           | ANY                   | ACS/WFC, ACCUM, WFC          | F502N           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 19-21 in Visit 04 | 671 Secs (671 Secs)<br>[==>]                            | [2]   |
| 21 |           | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F656N           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 19-21 in Visit 04 | 670 Secs (670 Secs)<br>[==>]                            | [2]   |



Proposal 13401 - Visit 04 - A 3D view of the SN 1987A Ejecta

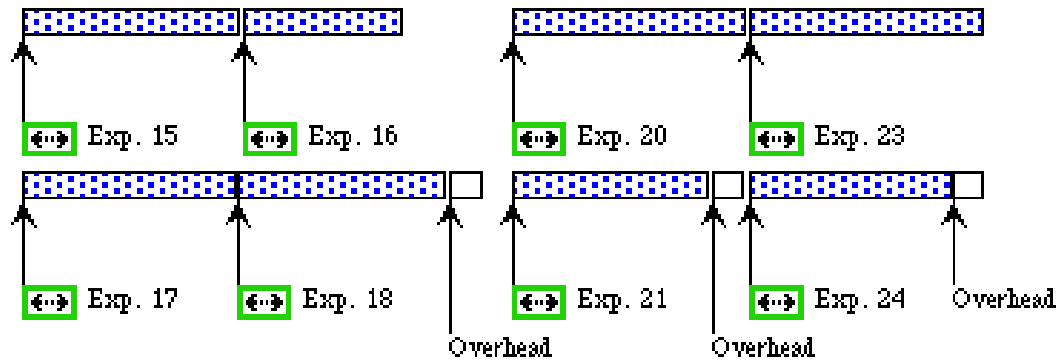
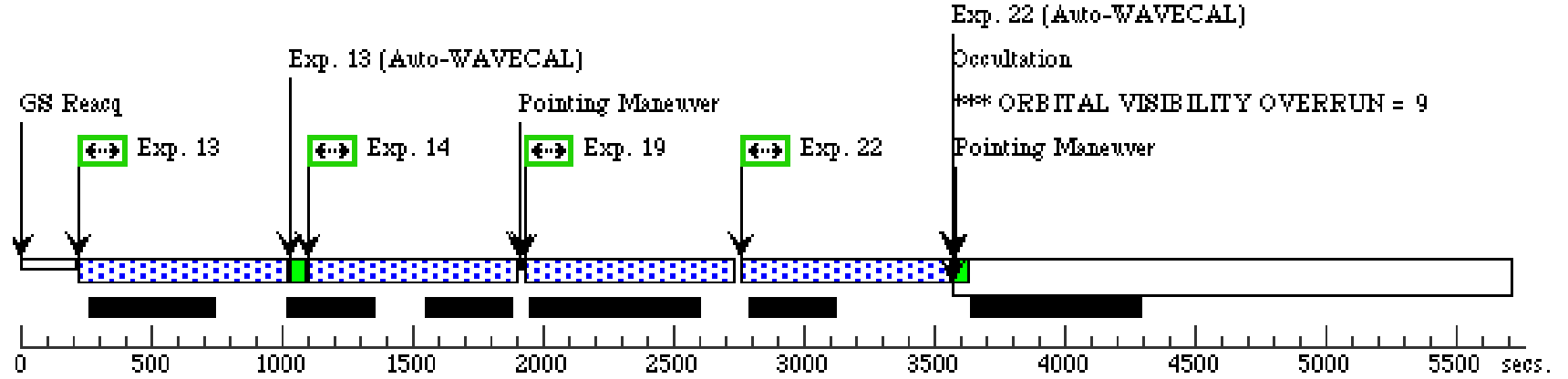
|    |                   |                           |                 |                          |                  |  |                                |     |
|----|-------------------|---------------------------|-----------------|--------------------------|------------------|--|--------------------------------|-----|
| 22 | (5) SN1987A-STIS4 | STIS/CCD, ACCUM, 52X0.1E1 | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0.25  | Prime + Parallel Group 22-24 in Visit 04 | 760 Secs (760 Secs)            | [2] |
| 23 | ANY               | ACS/WFC, ACCUM, WFC       | F658N           | CR-SPLIT=NO              |                  | Prime + Parallel Group 22-24 in Visit 04 | 660 Secs (660 Secs)            | [2] |
| 24 | ANY               | WFC3/UVIS, ACCUM, UVIS    | F502N           | CR-SPLIT=NO;<br>FLASH=15 |                  | Prime + Parallel Group 22-24 in Visit 04 | 671 Secs (671 Secs)            | [2] |
| 25 | (5) SN1987A-STIS4 | STIS/CCD, ACCUM, 52X0.1E1 | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,-0.25 | Prime + Parallel Group 25-30 in Visit 04 | 770 Secs (770 Secs)            | [3] |
| 26 | (5) SN1987A-STIS4 | STIS/CCD, ACCUM, 52X0.1E1 | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,-0.25 | Prime + Parallel Group 25-30 in Visit 04 | 770 Secs (770 Secs)            | [3] |
| 27 | ANY               | ACS/WFC, ACCUM, WFC       | F475W           | CR-SPLIT=NO              |                  | Prime + Parallel Group 25-30 in Visit 04 | 500 Secs (500 Secs)            | [3] |
| 28 | ANY               | ACS/WFC, ACCUM, WFC       | F814W           | CR-SPLIT=NO              |                  | Prime + Parallel Group 25-30 in Visit 04 | 400 Secs (400 Secs)            | [3] |
| 29 | ANY               | WFC3/UVIS, ACCUM, UVIS    | F606W           | CR-SPLIT=NO              |                  | Prime + Parallel Group 25-30 in Visit 04 | 500 Secs (500 Secs)            | [3] |
| 30 | ANY               | WFC3/UVIS, ACCUM, UVIS    | F502N           | CR-SPLIT=NO;<br>FLASH=15 |                  | Prime + Parallel Group 25-30 in Visit 04 | 750 Secs (750 Secs)            | [3] |
| 31 | (5) SN1987A-STIS4 | STIS/CCD, ACCUM, 52X0.1E1 | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,-0.5  | Prime + Parallel Group 31-33 in Visit 04 | 770 Secs (770 Secs)            | [3] |
| 32 | ANY               | ACS/WFC, ACCUM, WFC       | F502N           | CR-SPLIT=NO              |                  | Prime + Parallel Group 31-33 in Visit 04 | 680 Secs (680 Secs)            | [3] |
| 33 | ANY               | WFC3/UVIS, ACCUM, UVIS    | F814W           | CR-SPLIT=NO              |                  | Prime + Parallel Group 31-33 in Visit 04 | 680 Secs (680 Secs)            | [3] |
| 34 | (5) SN1987A-STIS4 | STIS/CCD, ACCUM, 52X0.1E1 | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,-0.5  | Prime + Parallel Group 34-36 in Visit 04 | 720 Secs (720 Secs)            | [3] |
| 35 | ANY               | ACS/WFC, ACCUM, WFC       | F658N           | CR-SPLIT=NO              |                  | Prime + Parallel Group 34-36 in Visit 04 | 650 Secs (650 Secs)            | [3] |
| 36 | ANY               | WFC3/UVIS, ACCUM, UVIS    | F658N           | CR-SPLIT=NO;<br>FLASH=15 |                  | Prime + Parallel Group 34-36 in Visit 04 | 775 Secs (775 Secs)            | [3] |
| 37 | CCDFLAT           | STIS/CCD, ACCUM, 52X0.1   | G750L<br>7751 A |                          |                  |  | [==>(Copy 1)]<br>[==>(Copy 2)] | [3] |

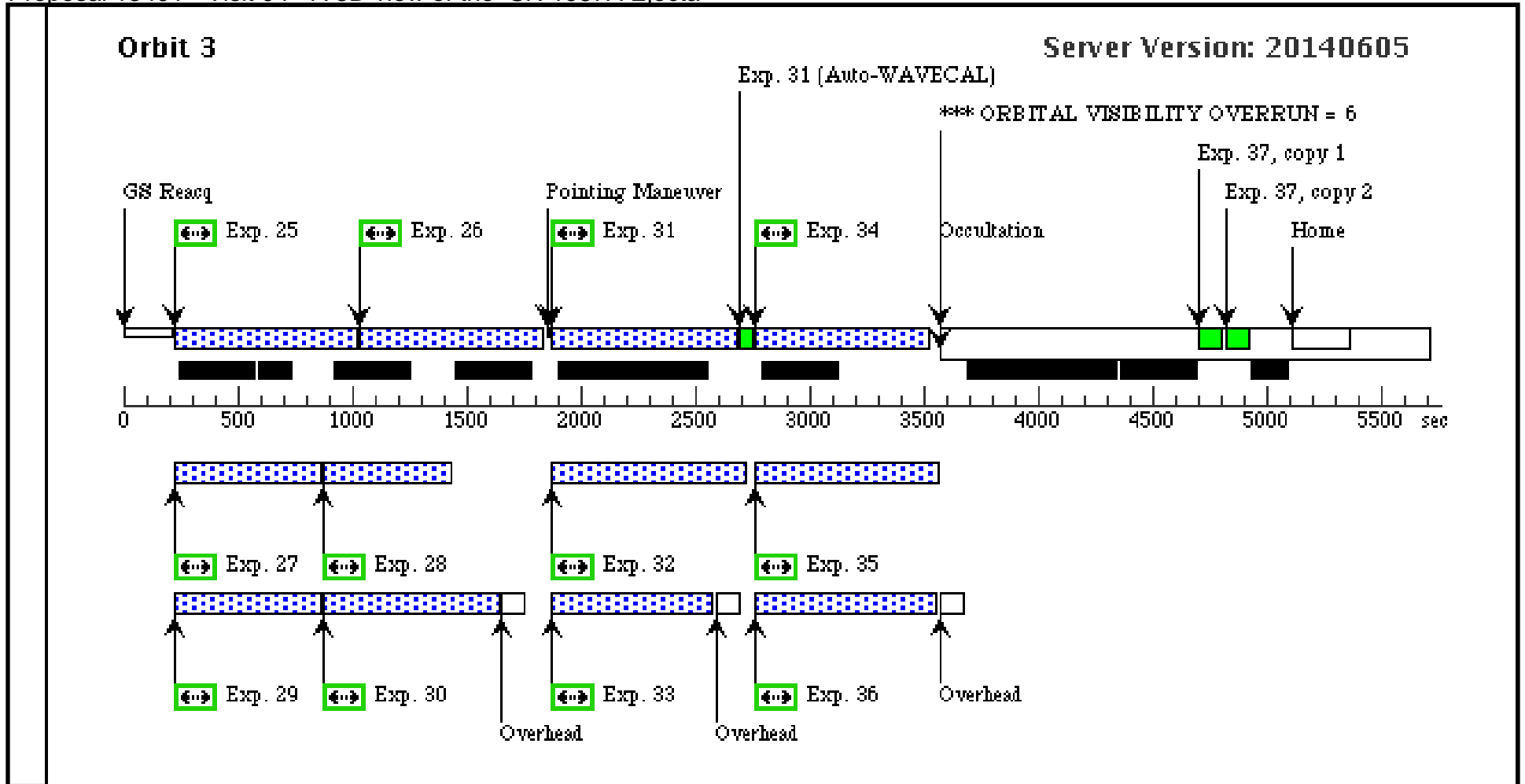
Orbit Structure



**Orbit 2**

Server Version: 20140605





Proposal 13401 - Visit 05 - A 3D view of the SN 1987A Ejecta

Fri Jul 11 01:02:26 GMT 2014

| <b>Visit</b>   | <b>Proposal 13401, Visit 05, scheduling</b><br><b>Diagnostic Status: Warning</b><br>Scientific Instruments: STIS/CCD, WFC3/UVIS, ACS/WFC<br>Special Requirements: ORIENT 45D TO 45 D; ORIENT 225D TO 225 D  |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |  |  |  |  |  |  |     |               |   |  |        |                                 |  |  |  |  |  |  |  |  |  |  |  |
|--|---|---|--------------------|--------------------------|---------------------------------|---------------|---------------|-----|---------------|---|--|---------------|-----------------------|--|--|--|--|--|--|-----|---------------|---|--|--------|---------------------------------|--|--|--|--|--|--|--|--|--|--|--|
|  | (Visit 05) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN<br>(Visit 05) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN<br>(Visit 05) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN  |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |  |  |  |  |  |  |     |               |   |  |        |                                 |  |  |  |  |  |  |  |  |  |  |  |
| <b>Diagnosics</b>  |   |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |  |  |  |  |  |  |     |               |   |  |        |                                 |  |  |  |  |  |  |  |  |  |  |  |
|  |   |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |  |  |  |  |  |  |     |               |   |  |        |                                 |  |  |  |  |  |  |  |  |  |  |  |
| <b>Fixed Targets</b>   | <table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Target Coordinates</th> <th>Targ. Coord. Corrections</th> <th>Fluxes</th> <th>Miscellaneous</th> </tr> </thead> <tbody> <tr> <td>(1)</td> <td>SN1987A-POINT</td> <td>RA: 05 35 30.5170 (83.8771542d)<br/>Dec: -69 16 18.52 (-69.27181d)<br/>Equinox: J2000</td> <td></td> <td>V=16.07+/-0.1</td> <td>Reference Frame: ICRS</td> </tr> <tr> <td colspan="6"> <i>Comments: position is measured from both STIS and UVIS images<br/>                     Also on PLATE A298 position is 5:35:30.484 -69:16:18.36<br/>                     so all these positions agree to about 0.1 arcsecond</i> </td> </tr> <tr> <td>(6)</td> <td>SN1987A-STIS5</td> <td>Offset from SN1987A-POINT<br/>RA Offset: -2.5195 Secs<br/>Dec Offset: 7.32 Arcsec</td> <td></td> <td>V=21.0</td> <td>Offset Position (SN1987A-STIS5)</td> </tr> <tr> <td colspan="6"> <i>Comments: OFFSET measured on recent WFC3/UVIS image</i> </td> </tr> </tbody> </table> | #   | Name               | Target Coordinates       | Targ. Coord. Corrections        | Fluxes        | Miscellaneous | (1) | SN1987A-POINT | RA: 05 35 30.5170 (83.8771542d)<br>Dec: -69 16 18.52 (-69.27181d)<br>Equinox: J2000 |  | V=16.07+/-0.1 | Reference Frame: ICRS | <i>Comments: position is measured from both STIS and UVIS images<br/>                     Also on PLATE A298 position is 5:35:30.484 -69:16:18.36<br/>                     so all these positions agree to about 0.1 arcsecond</i> |  |  |  |  |  | (6) | SN1987A-STIS5 | Offset from SN1987A-POINT<br>RA Offset: -2.5195 Secs<br>Dec Offset: 7.32 Arcsec |  | V=21.0 | Offset Position (SN1987A-STIS5) | <i>Comments: OFFSET measured on recent WFC3/UVIS image</i> |  |  |  |  |  |  |  |  |  |  |
|  | #   | Name  | Target Coordinates | Targ. Coord. Corrections | Fluxes                          | Miscellaneous |               |     |               |   |  |               |                       |  |  |  |  |  |  |     |               |   |  |        |                                 |  |  |  |  |  |  |  |  |  |  |  |
| (1)  | SN1987A-POINT   | RA: 05 35 30.5170 (83.8771542d)<br>Dec: -69 16 18.52 (-69.27181d)<br>Equinox: J2000 |                    | V=16.07+/-0.1            | Reference Frame: ICRS           |               |               |     |               |   |  |               |                       |  |  |  |  |  |  |     |               |   |  |        |                                 |  |  |  |  |  |  |  |  |  |  |  |
| <i>Comments: position is measured from both STIS and UVIS images<br/>                     Also on PLATE A298 position is 5:35:30.484 -69:16:18.36<br/>                     so all these positions agree to about 0.1 arcsecond</i> |   |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |  |  |  |  |  |  |     |               |   |  |        |                                 |  |  |  |  |  |  |  |  |  |  |  |
| (6)  | SN1987A-STIS5   | Offset from SN1987A-POINT<br>RA Offset: -2.5195 Secs<br>Dec Offset: 7.32 Arcsec     |                    | V=21.0                   | Offset Position (SN1987A-STIS5) |               |               |     |               |   |  |               |                       |  |  |  |  |  |  |     |               |   |  |        |                                 |  |  |  |  |  |  |  |  |  |  |  |
| <i>Comments: OFFSET measured on recent WFC3/UVIS image</i>   |   |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |  |  |  |  |  |  |     |               |   |  |        |                                 |  |  |  |  |  |  |  |  |  |  |  |
|  |   |   |                    |                          |                                 |               |               |     |               |   |  |               |                       |  |  |  |  |  |  |     |               |   |  |        |                                 |  |  |  |  |  |  |  |  |  |  |  |

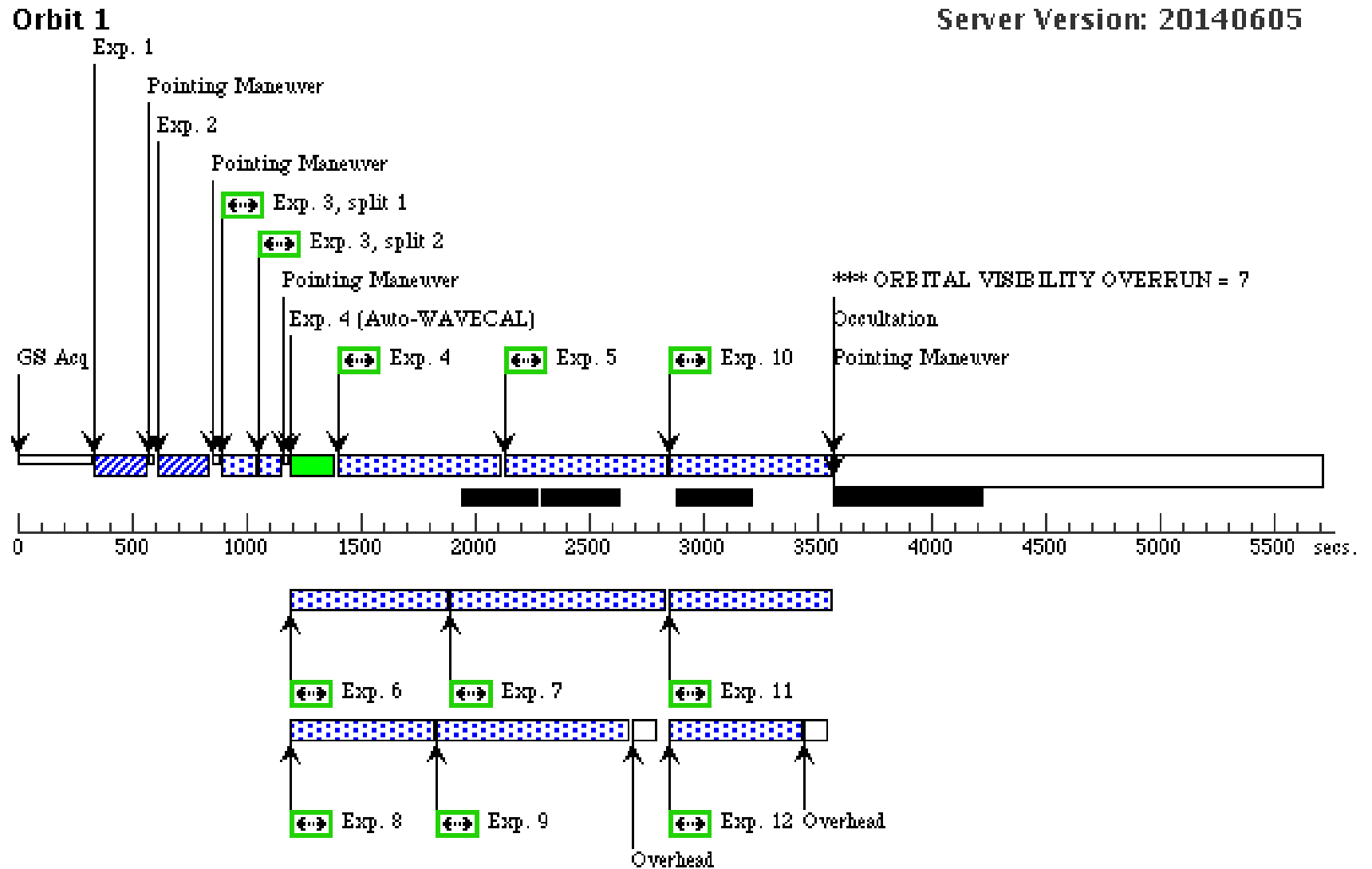
Proposal 13401 - Visit 05 - A 3D view of the SN 1987A Ejecta

| #  | Label     | Target                | Config,Mode,Aperture         | Spectral Els.   | Opt. Params.             | Special Reqs.               | Groups                                       | Exp. Time (Total)/[Actual Dur.]                         | Orbit |
|----|-----------|-----------------------|------------------------------|-----------------|--------------------------|-----------------------------|--|---|-------|
| 1  |           | (1) SN1987A-POIN<br>T | STIS/CCD, ACQ, F28X50LP      | MIRROR          |                          | GS ACQ SCENARI<br>O BASE1B3 |  | 1 Secs (1 Secs)<br>[==>]                                | [1]   |
| 2  |           | (1) SN1987A-POIN<br>T | STIS/CCD, ACQ/PEAK, 52X0.1E1 | MIRROR          |                          |                             |  | 1 Secs (1 Secs)<br>[==>]                                | [1]   |
| 3  |           | (6) SN1987A-STIS5     | STIS/CCD, ACCUM, F28X50LP    | MIRROR          | CR-SPLIT=2               | POS TARG 0,0.5              |  | 120 Secs (120 Secs)<br>[==>(Split 1)]<br>[==>(Split 2)] | [1]   |
| 4  |           | (6) SN1987A-STIS5     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0                | Prime + Parallel Gro<br>up 4-9 in Visit 05   | 676 Secs (676 Secs)<br>[==>]                            | [1]   |
| 5  |           | (6) SN1987A-STIS5     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0                | Prime + Parallel Gro<br>up 4-9 in Visit 05   | 676 Secs (676 Secs)<br>[==>]                            | [1]   |
| 6  |           | ANY                   | ACS/WFC, ACCUM, WFC          | F814W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 4-9 in Visit 05   | 480 Secs (480 Secs)<br>[==>]                            | [1]   |
| 7  |           | ANY                   | ACS/WFC, ACCUM, WFC          | F658N           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 4-9 in Visit 05   | 770 Secs (770 Secs)<br>[==>]                            | [1]   |
| 8  |           | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F606W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 4-9 in Visit 05   | 480 Secs (480 Secs)<br>[==>]                            | [1]   |
| 9  |           | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F656N           | CR-SPLIT=NO;<br>FLASH=15 |                             | Prime + Parallel Gro<br>up 4-9 in Visit 05   | 830 Secs (830 Secs)<br>[==>]                            | [1]   |
| 10 | Exposures | (6) SN1987A-STIS5     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0                | Prime + Parallel Gro<br>up 10-12 in Visit 05 | 676 Secs (676 Secs)<br>[==>]                            | [1]   |
| 11 |           | ANY                   | ACS/WFC, ACCUM, WFC          | F606W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 10-12 in Visit 05 | 560 Secs (560 Secs)<br>[==>]                            | [1]   |
| 12 |           | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F814W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 10-12 in Visit 05 | 550 Secs (550 Secs)<br>[==>]                            | [1]   |
| 13 |           | (6) SN1987A-STIS5     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0.5              | Prime + Parallel Gro<br>up 13-18 in Visit 05 | 760 Secs (760 Secs)<br>[==>]                            | [2]   |
| 14 |           | (6) SN1987A-STIS5     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0.5              | Prime + Parallel Gro<br>up 13-18 in Visit 05 | 760 Secs (760 Secs)<br>[==>]                            | [2]   |
| 15 |           | ANY                   | ACS/WFC, ACCUM, WFC          | F475W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 13-18 in Visit 05 | 600 Secs (600 Secs)<br>[==>]                            | [2]   |
| 16 |           | ANY                   | ACS/WFC, ACCUM, WFC          | F606W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 13-18 in Visit 05 | 400 Secs (400 Secs)<br>[==>]                            | [2]   |
| 17 |           | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F475W           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 13-18 in Visit 05 | 600 Secs (600 Secs)<br>[==>]                            | [2]   |
| 18 |           | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F336W           | CR-SPLIT=NO;<br>FLASH=12 |                             | Prime + Parallel Gro<br>up 13-18 in Visit 05 | 700 Secs (700 Secs)<br>[==>]                            | [2]   |
| 19 |           | (6) SN1987A-STIS5     | STIS/CCD, ACCUM, 52X0.1E1    | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0.25             | Prime + Parallel Gro<br>up 19-21 in Visit 05 | 760 Secs (760 Secs)<br>[==>]                            | [2]   |
| 20 |           | ANY                   | ACS/WFC, ACCUM, WFC          | F502N           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 19-21 in Visit 05 | 671 Secs (671 Secs)<br>[==>]                            | [2]   |
| 21 |           | ANY                   | WFC3/UVIS, ACCUM, UVIS       | F656N           | CR-SPLIT=NO              |                             | Prime + Parallel Gro<br>up 19-21 in Visit 05 | 670 Secs (670 Secs)<br>[==>]                            | [2]   |

Proposal 13401 - Visit 05 - A 3D view of the SN 1987A Ejecta

|    |                   |                           |                 |                          |                  |  |                                |     |
|----|-------------------|---------------------------|-----------------|--------------------------|------------------|--|--------------------------------|-----|
| 22 | (6) SN1987A-STIS5 | STIS/CCD, ACCUM, 52X0.1E1 | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,0.25  | Prime + Parallel Gro<br>up 22-24 in Visit 05 | 760 Secs (760 Secs)            | [2] |
| 23 | ANY               | ACS/WFC, ACCUM, WFC       | F658N           | CR-SPLIT=NO              |                  | Prime + Parallel Gro<br>up 22-24 in Visit 05 | 660 Secs (660 Secs)            | [2] |
| 24 | ANY               | WFC3/UVIS, ACCUM, UVIS    | F502N           | CR-SPLIT=NO;<br>FLASH=15 |                  | Prime + Parallel Gro<br>up 22-24 in Visit 05 | 671 Secs (671 Secs)            | [2] |
| 25 | (6) SN1987A-STIS5 | STIS/CCD, ACCUM, 52X0.1E1 | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,-0.25 | Prime + Parallel Gro<br>up 25-30 in Visit 05 | 770 Secs (770 Secs)            | [3] |
| 26 | (6) SN1987A-STIS5 | STIS/CCD, ACCUM, 52X0.1E1 | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,-0.25 | Prime + Parallel Gro<br>up 25-30 in Visit 05 | 770 Secs (770 Secs)            | [3] |
| 27 | ANY               | ACS/WFC, ACCUM, WFC       | F475W           | CR-SPLIT=NO              |                  | Prime + Parallel Gro<br>up 25-30 in Visit 05 | 500 Secs (500 Secs)            | [3] |
| 28 | ANY               | ACS/WFC, ACCUM, WFC       | F814W           | CR-SPLIT=NO              |                  | Prime + Parallel Gro<br>up 25-30 in Visit 05 | 400 Secs (400 Secs)            | [3] |
| 29 | ANY               | WFC3/UVIS, ACCUM, UVIS    | F606W           | CR-SPLIT=NO              |                  | Prime + Parallel Gro<br>up 25-30 in Visit 05 | 500 Secs (500 Secs)            | [3] |
| 30 | ANY               | WFC3/UVIS, ACCUM, UVIS    | F502N           | CR-SPLIT=NO;<br>FLASH=15 |                  | Prime + Parallel Gro<br>up 25-30 in Visit 05 | 750 Secs (750 Secs)            | [3] |
| 31 | (6) SN1987A-STIS5 | STIS/CCD, ACCUM, 52X0.1E1 | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,-0.5  | Prime + Parallel Gro<br>up 31-33 in Visit 05 | 770 Secs (770 Secs)            | [3] |
| 32 | ANY               | ACS/WFC, ACCUM, WFC       | F502N           | CR-SPLIT=NO              |                  | Prime + Parallel Gro<br>up 31-33 in Visit 05 | 680 Secs (680 Secs)            | [3] |
| 33 | ANY               | WFC3/UVIS, ACCUM, UVIS    | F814W           | CR-SPLIT=NO              |                  | Prime + Parallel Gro<br>up 31-33 in Visit 05 | 680 Secs (680 Secs)            | [3] |
| 34 | (6) SN1987A-STIS5 | STIS/CCD, ACCUM, 52X0.1E1 | G750L<br>7751 A | CR-SPLIT=NO              | POS TARG 0,-0.5  | Prime + Parallel Gro<br>up 34-36 in Visit 05 | 720 Secs (720 Secs)            | [3] |
| 35 | ANY               | ACS/WFC, ACCUM, WFC       | F658N           | CR-SPLIT=NO              |                  | Prime + Parallel Gro<br>up 34-36 in Visit 05 | 650 Secs (650 Secs)            | [3] |
| 36 | ANY               | WFC3/UVIS, ACCUM, UVIS    | F658N           | CR-SPLIT=NO;<br>FLASH=15 |                  | Prime + Parallel Gro<br>up 34-36 in Visit 05 | 775 Secs (775 Secs)            | [3] |
| 37 | CCDFLAT           | STIS/CCD, ACCUM, 52X0.1   | G750L<br>7751 A |                          |                  |  | [==>(Copy 1)]<br>[==>(Copy 2)] | [3] |

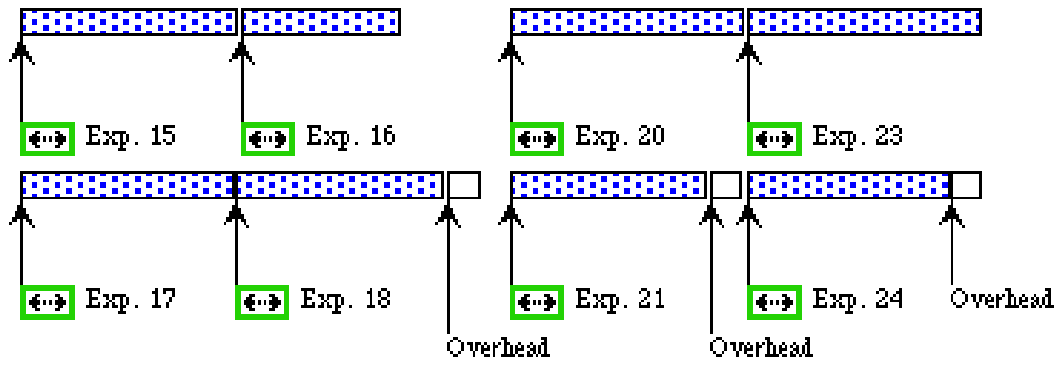
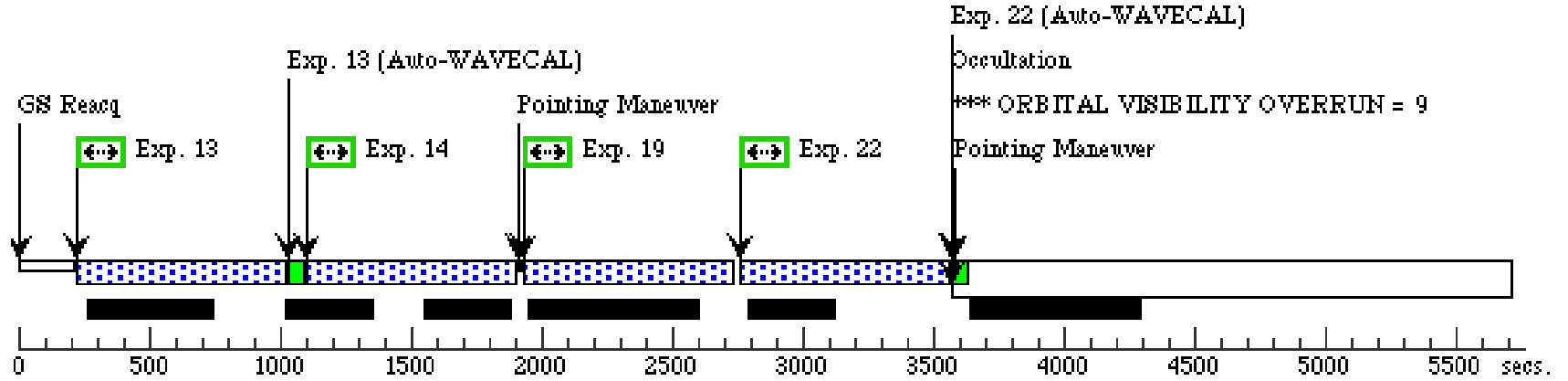
Orbit Structure





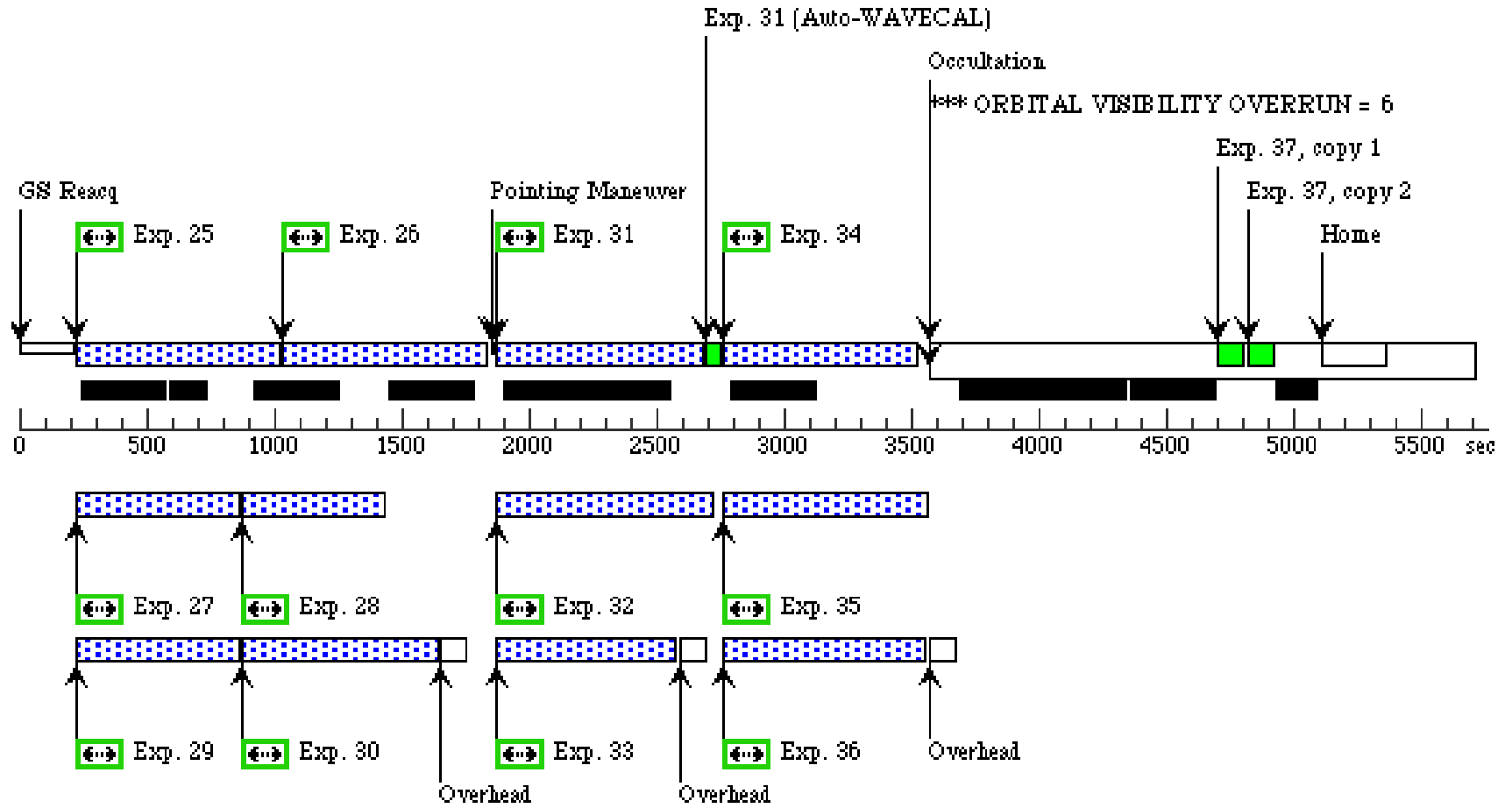
**Orbit 2**

Server Version: 20140605



**Orbit 3**

Server Version: 20140605



Proposal 13401 - Visit 06 - A 3D view of the SN 1987A Ejecta

Fri Jul 11 01:02:26 GMT 2014

| <b>Visit</b>  | <p><b>Proposal 13401, Visit 06, scheduling</b></p> <p><b>Diagnostic Status: Warning</b></p> <p>Scientific Instruments: STIS/CCD, WFC3/UVIS, STIS/FUV-MAMA, ACS/WFC</p> <p>Special Requirements: ORIENT 45D TO 45 D; ORIENT 225D TO 225 D</p> <p><i>Comments: just in ncase the SLEW to position sn1987a-stis3 is wrong, and the slit lands on star 2.... the exposures are safe</i></p> <p><i>STIS.sp.518462</i></p> <p><i>nearby star2 is V=15.0 E(B-V) =0.15 BIII star</i></p>  |   |                    |                          |                                 |               |      |                    |                          |        |               |     |               |   |  |               |                       |   |  |  |  |  |  |     |               |   |  |        |                                 |   |  |  |  |  |  |
|---|---|---|--------------------|--------------------------|---------------------------------|---------------|------|--------------------|--------------------------|--------|---------------|-----|---------------|---|--|---------------|-----------------------|---|--|--|--|--|--|-----|---------------|---|--|--------|---------------------------------|---|--|--|--|--|--|
|   | <p><b>Diagnosics</b></p> <p>(Visit 06) Warning (Orbit Planner): PARALLELS SIGNIFICANTLY EXTEND ALIGNMENT TIME</p>   |   |                    |                          |                                 |               |      |                    |                          |        |               |     |               |   |  |               |                       |   |  |  |  |  |  |     |               |   |  |        |                                 |   |  |  |  |  |  |
| <b>Fixed Targets</b>  | <table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Target Coordinates</th> <th>Targ. Coord. Corrections</th> <th>Fluxes</th> <th>Miscellaneous</th> </tr> </thead> <tbody> <tr> <td>(1)</td> <td>SN1987A-POINT</td> <td>RA: 05 35 30.5170 (83.8771542d)<br/>Dec: -69 16 18.52 (-69.27181d)<br/>Equinox: J2000</td> <td></td> <td>V=16.07+/-0.1</td> <td>Reference Frame: ICRS</td> </tr> <tr> <td colspan="6"> <p><i>Comments: position is measured from both STIS and UVIS images</i></p> <p><i>Also on PLATE A298 position is 5:35:30.484 -69:16:18.36</i></p> <p><i>so all these positions agree to about 0.1 arcsecond</i></p> </td> </tr> <tr> <td>(4)</td> <td>SN1987A-STIS3</td> <td>Offset from SN1987A-POINT<br/>RA Offset: -2.4815 Secs<br/>Dec Offset: 7.32 Arcsec</td> <td></td> <td>V=21.0</td> <td>Offset Position (SN1987A-STIS3)</td> </tr> <tr> <td colspan="6"> <p><i>Comments: OFFSET measured on recent WFC3/UVIS image</i></p> </td> </tr> </tbody> </table> |   |                    |                          |                                 | #             | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous | (1) | SN1987A-POINT | RA: 05 35 30.5170 (83.8771542d)<br>Dec: -69 16 18.52 (-69.27181d)<br>Equinox: J2000 |  | V=16.07+/-0.1 | Reference Frame: ICRS | <p><i>Comments: position is measured from both STIS and UVIS images</i></p> <p><i>Also on PLATE A298 position is 5:35:30.484 -69:16:18.36</i></p> <p><i>so all these positions agree to about 0.1 arcsecond</i></p> |  |  |  |  |  | (4) | SN1987A-STIS3 | Offset from SN1987A-POINT<br>RA Offset: -2.4815 Secs<br>Dec Offset: 7.32 Arcsec |  | V=21.0 | Offset Position (SN1987A-STIS3) | <p><i>Comments: OFFSET measured on recent WFC3/UVIS image</i></p> |  |  |  |  |  |
|   | #   | Name  | Target Coordinates | Targ. Coord. Corrections | Fluxes                          | Miscellaneous |      |                    |                          |        |               |     |               |   |  |               |                       |   |  |  |  |  |  |     |               |   |  |        |                                 |   |  |  |  |  |  |
| (1)   | SN1987A-POINT   | RA: 05 35 30.5170 (83.8771542d)<br>Dec: -69 16 18.52 (-69.27181d)<br>Equinox: J2000 |                    | V=16.07+/-0.1            | Reference Frame: ICRS           |               |      |                    |                          |        |               |     |               |   |  |               |                       |   |  |  |  |  |  |     |               |   |  |        |                                 |   |  |  |  |  |  |
| <p><i>Comments: position is measured from both STIS and UVIS images</i></p> <p><i>Also on PLATE A298 position is 5:35:30.484 -69:16:18.36</i></p> <p><i>so all these positions agree to about 0.1 arcsecond</i></p> |   |   |                    |                          |                                 |               |      |                    |                          |        |               |     |               |   |  |               |                       |   |  |  |  |  |  |     |               |   |  |        |                                 |   |  |  |  |  |  |
| (4)   | SN1987A-STIS3   | Offset from SN1987A-POINT<br>RA Offset: -2.4815 Secs<br>Dec Offset: 7.32 Arcsec     |                    | V=21.0                   | Offset Position (SN1987A-STIS3) |               |      |                    |                          |        |               |     |               |   |  |               |                       |   |  |  |  |  |  |     |               |   |  |        |                                 |   |  |  |  |  |  |
| <p><i>Comments: OFFSET measured on recent WFC3/UVIS image</i></p>   |   |   |                    |                          |                                 |               |      |                    |                          |        |               |     |               |   |  |               |                       |   |  |  |  |  |  |     |               |   |  |        |                                 |   |  |  |  |  |  |
|   |   |   |                    |                          |                                 |               |      |                    |                          |        |               |     |               |   |  |               |                       |   |  |  |  |  |  |     |               |   |  |        |                                 |   |  |  |  |  |  |

Proposal 13401 - Visit 06 - A 3D view of the SN 1987A Ejecta

| #         | Label<br>(ETC Run) | Target                | Config,Mode,Aperture       | Spectral Els.                   | Opt. Params.             | Special Reqs.               | Groups           | Exp. Time (Total)/[Actual Dur.]              |                       | Orbit |
|-----------|--------------------|-----------------------|----------------------------|---------------------------------|--------------------------|-----------------------------|------------------|--|-----------------------|-------|
|           |                    |                       |                            |                                 |                          |                             |                  |  |                       |       |
| Exposures | 1                  | (1) SN1987A-POIN<br>T | STIS/CCD, ACQ, F28X50LP    | MIRROR                          |                          | GS ACQ SCENARI<br>O BASE1B3 |                  | 1 Secs (1 Secs)                              | [1]                   |       |
|           | 2                  | (1) SN1987A-POIN<br>T | STIS/CCD, ACQ/PEAK, 52X0.1 | MIRROR                          |                          |                             |                  | 1 Secs (1 Secs)                              | [1]                   |       |
|           | 3                  | (4) SN1987A-STIS3     | STIS/CCD, ACCUM, F28X50LP  | MIRROR                          | CR-SPLIT=2               |                             |                  | 60 Secs (60 Secs)                            | [1]                   |       |
|           | 4                  | (STIS.sp.51<br>8462)  | (4) SN1987A-STIS3          | STIS/FUV-MAMA, ACCUM,<br>52X0.1 | G140L<br>1425 A          |                             |                  | Prime + Parallel Gro<br>up 4-6 in Visit 06   | 975 Secs (975 Secs)   | [1]   |
|           | 5                  | ANY                   | ACS/WFC, ACCUM, WFC        | F658N                           | CR-SPLIT=NO              |                             |                  | Prime + Parallel Gro<br>up 4-6 in Visit 06   | 990 Secs (990 Secs)   | [1]   |
|           | 6                  | ANY                   | WFC3/UVIS, ACCUM, UVIS     | F656N                           | CR-SPLIT=NO;<br>FLASH=12 |                             |                  | Prime + Parallel Gro<br>up 4-6 in Visit 06   | 1050 Secs (1050 Secs) | [1]   |
|           | 7                  | (STIS.sp.51<br>8462)  | (4) SN1987A-STIS3          | STIS/FUV-MAMA, ACCUM,<br>52X0.1 | G140L<br>1425 A          |                             | POS TARG 0,0.25  | Prime + Parallel Gro<br>up 7-9 in Visit 06   | 975 Secs (975 Secs)   | [1]   |
|           | 8                  | ANY                   | ACS/WFC, ACCUM, WFC        | F502N                           | CR-SPLIT=NO              |                             |                  | Prime + Parallel Gro<br>up 7-9 in Visit 06   | 960 Secs (960 Secs)   | [1]   |
|           | 9                  | ANY                   | WFC3/UVIS, ACCUM, UVIS     | F656N                           | CR-SPLIT=NO;<br>FLASH=12 |                             |                  | Prime + Parallel Gro<br>up 7-9 in Visit 06   | 1050 Secs (1050 Secs) | [1]   |
|           | 10                 | (STIS.sp.51<br>8462)  | (4) SN1987A-STIS3          | STIS/FUV-MAMA, ACCUM,<br>52X0.1 | G140L<br>1425 A          |                             | POS TARG 0,-0.25 | Prime + Parallel Gro<br>up 10-14 in Visit 06 | 1530 Secs (1530 Secs) | [2]   |
|           | 11                 | ANY                   | ACS/WFC, ACCUM, WFC        | F606W                           | CR-SPLIT=NO              |                             |                  | Prime + Parallel Gro<br>up 10-14 in Visit 06 | 350 Secs (350 Secs)   | [2]   |
|           | 12                 | ANY                   | ACS/WFC, ACCUM, WFC        | F502N                           | CR-SPLIT=NO              |                             |                  | Prime + Parallel Gro<br>up 10-14 in Visit 06 | 975 Secs (975 Secs)   | [2]   |
|           | 13                 | ANY                   | WFC3/UVIS, ACCUM, UVIS     | F502N                           | CR-SPLIT=NO;<br>FLASH=12 |                             |                  | Prime + Parallel Gro<br>up 10-14 in Visit 06 | 980 Secs (980 Secs)   | [2]   |
|           | 14                 | ANY                   | WFC3/UVIS, ACCUM, UVIS     | F606W                           | CR-SPLIT=NO              |                             |                  | Prime + Parallel Gro<br>up 10-14 in Visit 06 | 350 Secs (350 Secs)   | [2]   |
|           | 15                 | (STIS.sp.51<br>8462)  | (4) SN1987A-STIS3          | STIS/FUV-MAMA, ACCUM,<br>52X0.1 | G140L<br>1425 A          |                             | POS TARG 0,0.5   | Prime + Parallel Gro<br>up 15-18 in Visit 06 | 1530 Secs (1530 Secs) | [2]   |
|           | 16                 | ANY                   | ACS/WFC, ACCUM, WFC        | F606W                           | CR-SPLIT=NO              |                             |                  | Prime + Parallel Gro<br>up 15-18 in Visit 06 | 340 Secs (340 Secs)   | [2]   |
|           | 17                 | ANY                   | ACS/WFC, ACCUM, WFC        | F658N                           | CR-SPLIT=NO              |                             |                  | Prime + Parallel Gro<br>up 15-18 in Visit 06 | 890 Secs (890 Secs)   | [2]   |
|           | 18                 | ANY                   | WFC3/UVIS, ACCUM, UVIS     | F656N                           | CR-SPLIT=NO              |                             |                  | Prime + Parallel Gro<br>up 15-18 in Visit 06 | 1400 Secs (1400 Secs) | [2]   |

Orbit Structure

