



# 15876 - Ultra-Rapid UV Spectroscopy of an Interacting Supernova Discovered by TESS

Cycle: 27, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

## INVESTIGATORS

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## VISITS

| <i>Visit</i> | <i>Targets used in Visit</i> | <i>Configurations used in Visit</i>             | <i>Orbits Used</i> | <i>Last Orbit Planner Run</i> | <i>OP Current with Visit?</i> |
|--------------|------------------------------|---|--------------------|-------------------------------|-------------------------------|
| 01           | (2) TESS-SN                  | STIS/CCD  | 4                  | 14-Apr-2020 16:00:22.0        | yes                           |
| 02           | (2) TESS-SN                  | STIS/CCD  | 3                  | 14-Apr-2020 16:00:24.0        | yes                           |
| 03           | (2) TESS-SN                  | STIS/CCD  | 3                  | 14-Apr-2020 16:00:26.0        | yes                           |
| 04           | (2) TESS-SN                  | COS/FUV<br>STIS/CCD<br>STIS/NUV-MAMA            | 4                  | 14-Apr-2020 16:00:28.0        | yes                           |
| 05           | (2) TESS-SN                  | COS/FUV<br>STIS/CCD<br>STIS/NUV-MAMA            | 5                  | 14-Apr-2020 16:00:31.0        | yes                           |
| 14           | (2) TESS-SN                  | COS/FUV<br>COS/NUV<br>STIS/CCD<br>STIS/NUV-MAMA | 3                  | 14-Apr-2020 16:00:34.0        | yes                           |
| 15           | (2) TESS-SN                  | COS/FUV<br>COS/NUV<br>STIS/CCD<br>STIS/NUV-MAMA | 4                  | 14-Apr-2020 16:00:36.0        | yes                           |
| 25           | (2) TESS-SN                  | STIS/CCD<br>STIS/NUV-MAMA                       | 4                  | 14-Apr-2020 16:00:38.0        | yes                           |

30 Total Orbits Used

### **ABSTRACT**

The supernova (SN) community has a spectacular opportunity. Through July 2020, TESS will observe a large fraction of the sky with a 30-min cadence. In Cycle 27, TESS will detect ~60 (or more) SNe within hours - perhaps even minutes - of explosion. Such data have proven to be a unique window to the details of the SN explosion, progenitor, and circumstellar (CS) environment. We are devoting significant ground-based resources to search for and follow these SNe.

We propose to take advantage of these emergent SNe and exquisite TESS light curves to study 1 SN in detail with HST. For the first few days after a

SN explosion, one can potentially see signs of the SN interacting with its CS environment (e.g., a wind, accretion disk, companion star) that are not present later in its evolution. For instance, the large UV flux from a SN shock breakout will ionize CS gas. As the gas recombines over the following days, it produces excess broad-band flux and reveals the CSM (and thus progenitor) composition through emission lines. While early optical data can be illuminating, its utility is limited. However, UV spectra can greatly enhance our understanding of SN progenitor systems, including progenitor composition, CS environment, and the existence of a binary companion. Our program will observe a single TESS SN that shows signs of early interaction.

Because of the ephemeral nature of the interaction signatures, this program requires an ultra-rapid ToO. The combination of TESS photometry, ground-based data, and HST UV spectra will be a completely unique and defining data set. As the TESS prime mission ends during Cycle 27, this may be our only opportunity for such a program.

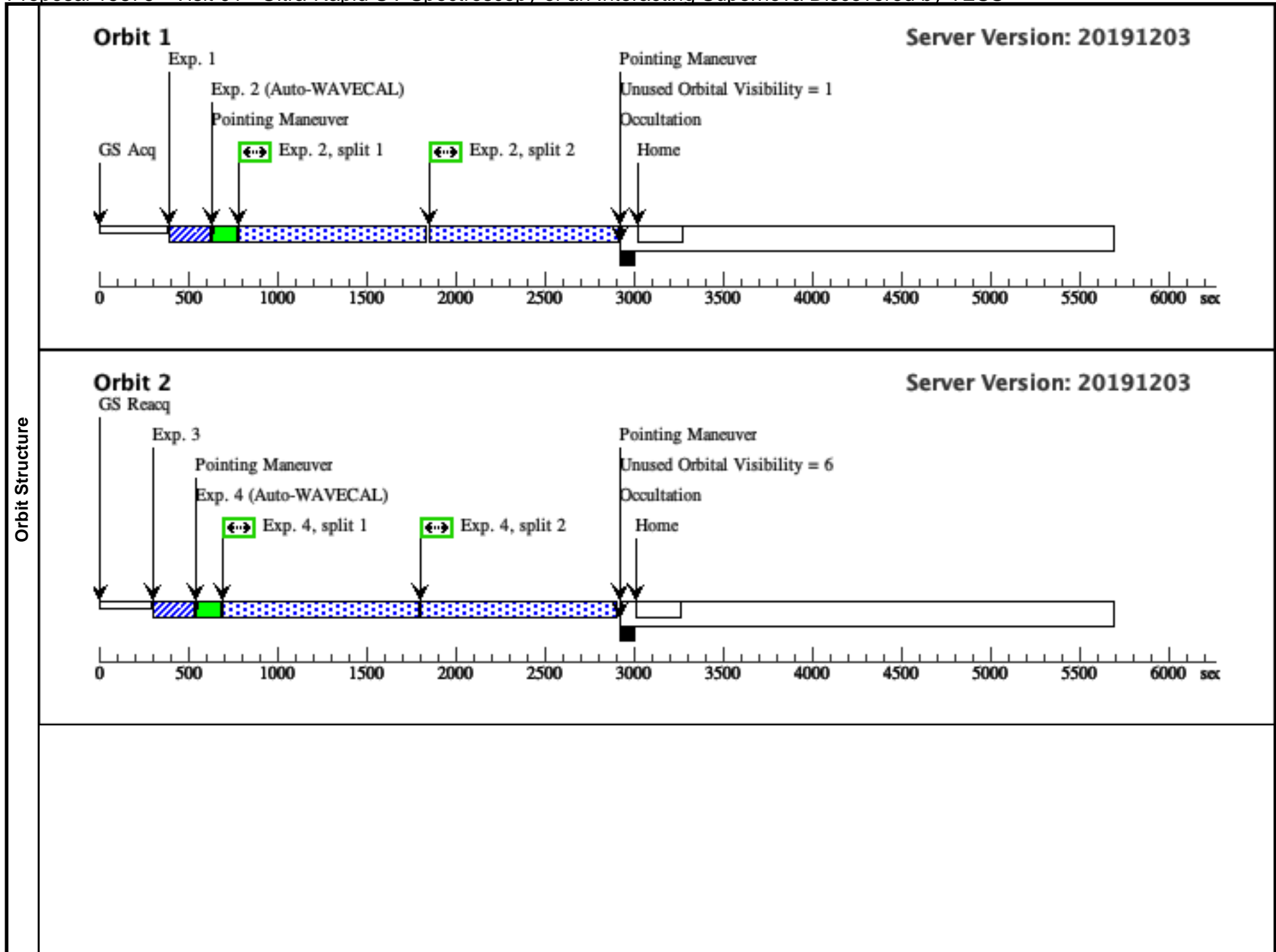
### **OBSERVING DESCRIPTION**

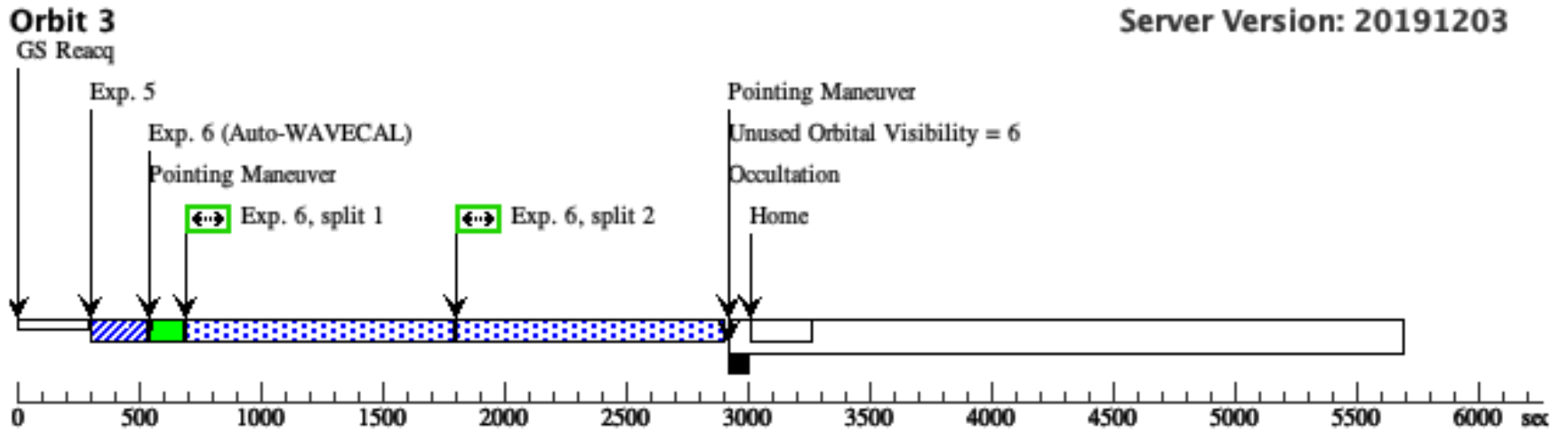
This is an ultra-rapid ToO. We will observe a TESS supernova that shows indications of interaction. Our first epoch should be scheduled as quickly as possible. The second and third epochs will be spaced by ~1 day. Our 4th epoch should be scheduled as quickly as possible to use COS and the STIS MAMA. The final epoch should be obtained ~1 week after the 4th visit.

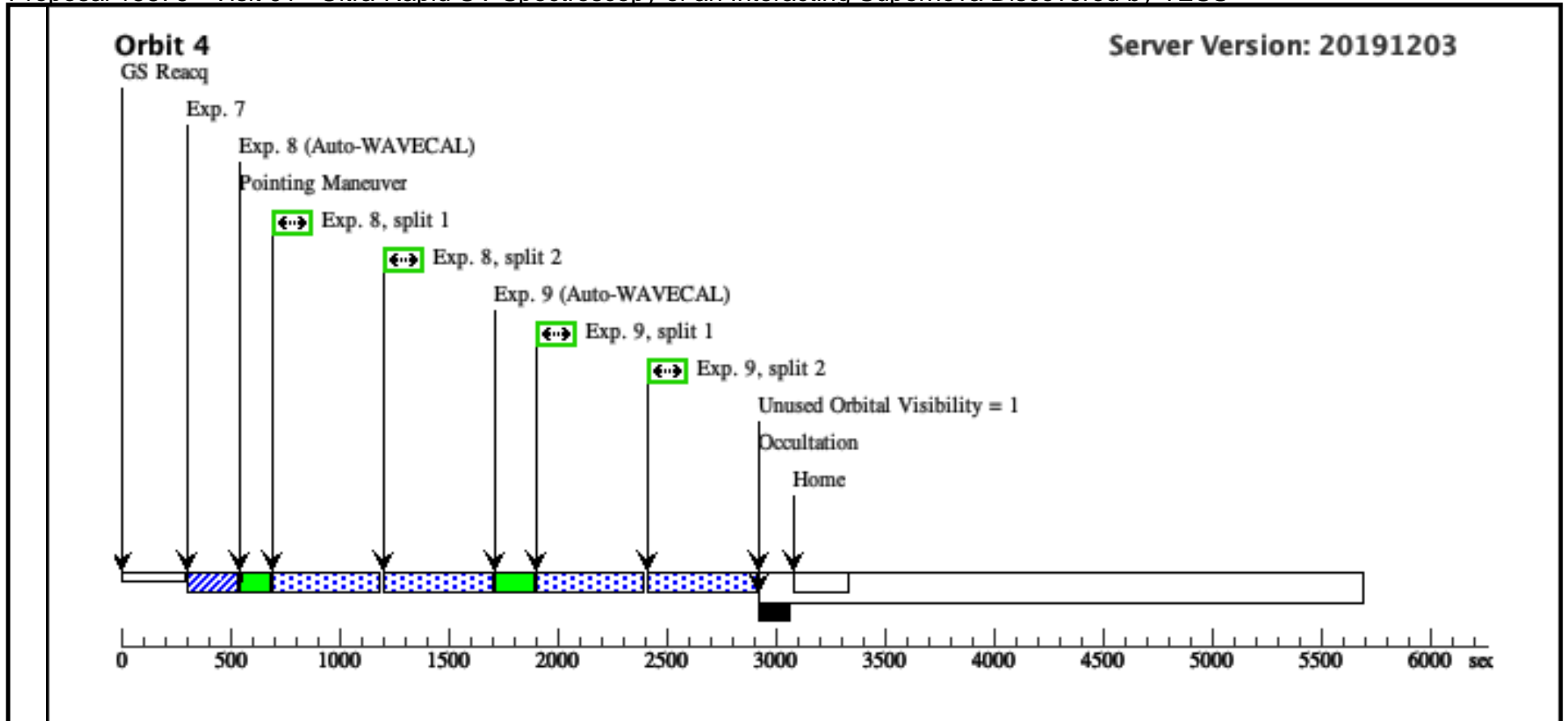
Proposal 15876 - Visit 01 - Ultra-Rapid UV Spectroscopy of an Interacting Supernova Discovered by TESS

Tue Apr 14 20:00:39 GMT 2020

| Visit         | <b>Proposal 15876, Visit 01, completed</b><br><b>Diagnostic Status: No Diagnostics</b><br>Scientific Instruments: STIS/CCD<br>Special Requirements: SCHED 100% |         |   |                          |                  |                       |   |        |   |       |
|---------------|--|---------|---|--------------------------|------------------|-----------------------|---|--------|---|-------|
| Fixed Targets | #  | Name    | Target Coordinates  | Targ. Coord. Corrections | Fluxes           | Miscellaneous         |   |        |   |       |
|               | (2)  | TESS-SN | RA: 12 36 33.2660 (189.1386083d)<br>Dec: +11 13 54.04 (11.23168d)<br>Equinox: J2000 |                          | V=15+/-4         | Reference Frame: ICRS |   |        |   |       |
|               | <i>Comments:</i><br>Category=STAR<br>Description=[SUPERNOVA]<br>Extended=NO  |         |   |                          |                  |                       |   |        |   |       |
| Exposures     | #  | Label   | Target  | Config,Mode,Aperture     | Spectral Els.    | Opt. Params.          | Special Reqs.                             | Groups | Exp. Time (Total)/[Actual Dur.]   | Orbit |
|               | 1  |         | (2) TESS-SN   | STIS/CCD, ACQ, F28X50LP  | MIRROR           |                       | GS ACQ SCENARI<br>O BASE1BE               |        | 0.1 Secs (0.1 Secs)<br>[==>]  | [1]   |
|               | 2  |         | (2) TESS-SN   | STIS/CCD, ACCUM, 52X0.2  | G230LB<br>2375 A |                       |   |        | 2165 Secs (2041 Secs)<br>[==>1020.5 Secs (Split 1)]<br>[==>1020.5 Secs (Split 2)] | [1]   |
|               | 3  |         | (2) TESS-SN   | STIS/CCD, ACQ, F28X50LP  | MIRROR           |                       | NEW OBSET;<br>GS ACQ SCENARI<br>O BASE1BE |        | 0.1 Secs (0.1 Secs)<br>[==>]  | [2]   |
|               | 4  |         | (2) TESS-SN   | STIS/CCD, ACCUM, 52X0.2  | G230LB<br>2375 A |                       |   |        | 2590 Secs (2128 Secs)<br>[==>1064.0 Secs (Split 1)]<br>[==>1064.0 Secs (Split 2)] | [2]   |
|               | 5  |         | (2) TESS-SN   | STIS/CCD, ACQ, F28X50LP  | MIRROR           |                       | NEW OBSET;<br>GS ACQ SCENARI<br>O BASE1BE |        | 0.1 Secs (0.1 Secs)<br>[==>]  | [3]   |
|               | 6  |         | (2) TESS-SN   | STIS/CCD, ACCUM, 52X0.2  | G230LB<br>2375 A |                       |   |        | 2590 Secs (2128 Secs)<br>[==>1064.0 Secs (Split 1)]<br>[==>1064.0 Secs (Split 2)] | [3]   |
|               | 7  |         | (2) TESS-SN   | STIS/CCD, ACQ, F28X50LP  | MIRROR           |                       | NEW OBSET;<br>GS ACQ SCENARI<br>O BASE1BE |        | 0.1 Secs (0.1 Secs)<br>[==>]  | [4]   |
|               | 8  |         | (2) TESS-SN   | STIS/CCD, ACCUM, 52X0.2  | G230LB<br>2375 A |                       |   |        | 1150 Secs (920 Secs)<br>[==>460.0 Secs (Split 1)]<br>[==>460.0 Secs (Split 2)]    | [4]   |
|               | 9  |         | (2) TESS-SN   | STIS/CCD, ACCUM, 52X0.2  | G430L<br>4300 A  |                       |   |        | 1150 Secs (920 Secs)<br>[==>460.0 Secs (Split 1)]<br>[==>460.0 Secs (Split 2)]    | [4]   |



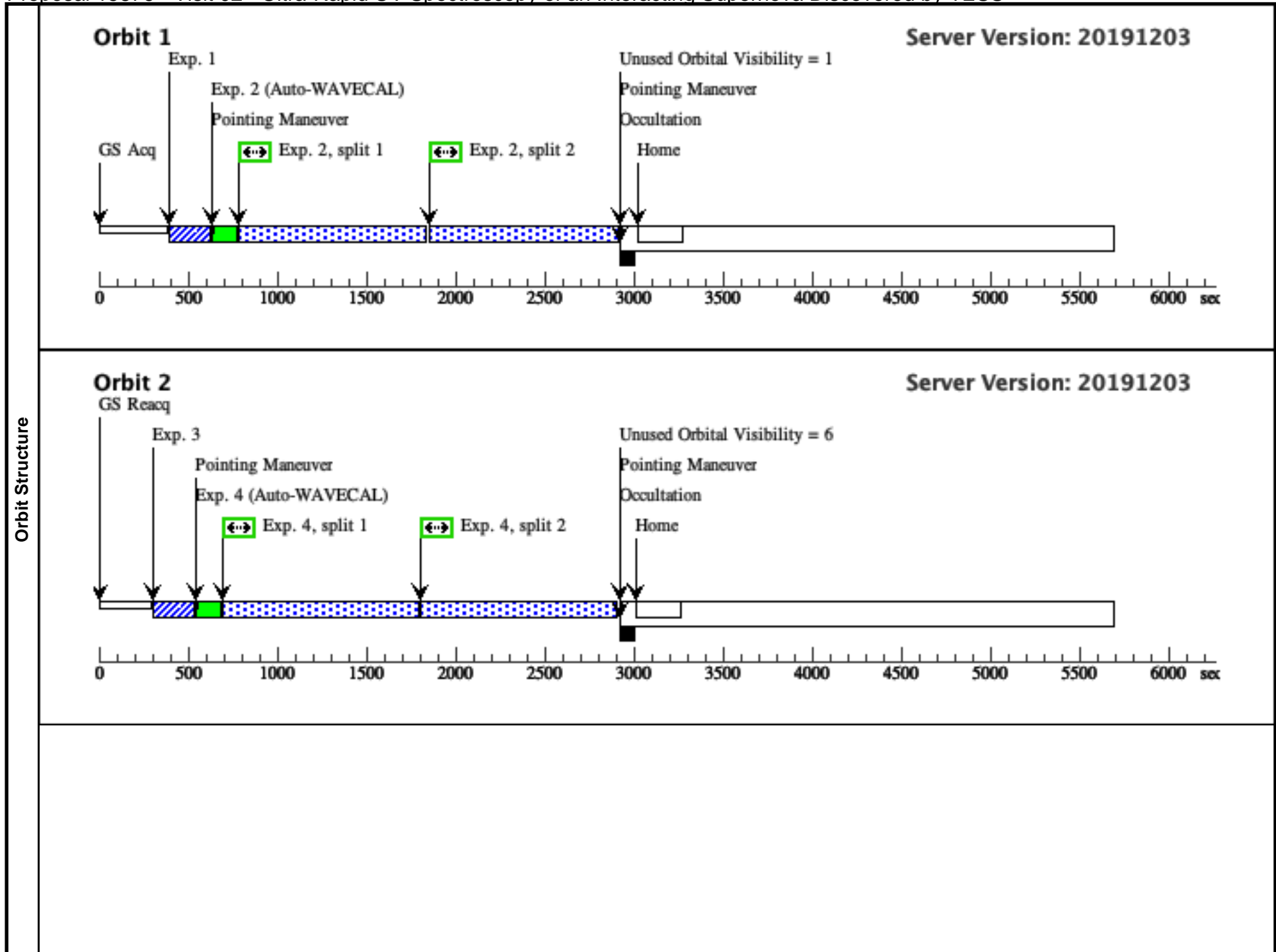


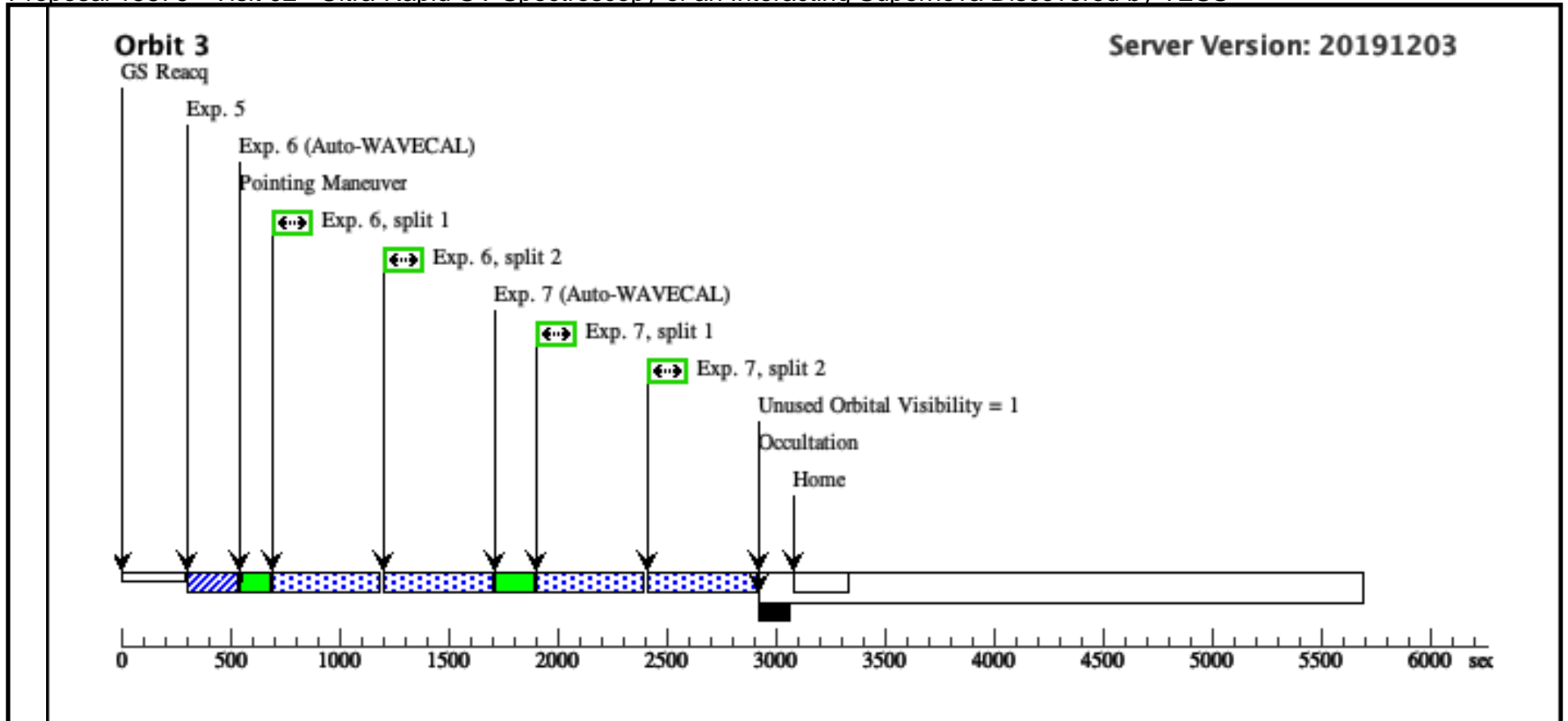


Proposal 15876 - Visit 02 - Ultra-Rapid UV Spectroscopy of an Interacting Supernova Discovered by TESS

Tue Apr 14 20:00:39 GMT 2020

| Visit     | <b>Proposal 15876, Visit 02, completed</b><br><b>Diagnostic Status: No Diagnostics</b><br>Scientific Instruments: STIS/CCD<br>Special Requirements: SCHED 100%<br><i>Comments: After Visit 1, 18h to 30h</i> |  |                          |                         |                       |              |   |        |   |       |  |   |      |                    |                          |        |               |     |         |   |  |          |
|-----------|--|--|--------------------------|-------------------------|-----------------------|--------------|---|--------|---|-------|--|---|------|--------------------|--------------------------|--------|---------------|-----|---------|---|--|----------|
|           | Fixed Targets  | <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>(2)</td> <td>TESS-SN</td> <td>RA: 12 36 33.2660 (189.1386083d)<br/>Dec: +11 13 54.04 (11.23168d)<br/>Equinox: J2000</td> <td></td> <td>V=15+/-4</td> <td>Reference Frame: ICRS</td> </tr> </tbody> </table> <i>Comments: Category=STAR<br/>Description=[SUPERNOVA]<br/>Extended=NO</i> |                          |                         |                       |              |   |        |   |       |  | # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous | (2) | TESS-SN | RA: 12 36 33.2660 (189.1386083d)<br>Dec: +11 13 54.04 (11.23168d)<br>Equinox: J2000 |  | V=15+/-4 |
| #         | Name   | Target Coordinates   | Targ. Coord. Corrections | Fluxes                  | Miscellaneous         |              |   |        |   |       |  |   |      |                    |                          |        |               |     |         |   |  |          |
| (2)       | TESS-SN  | RA: 12 36 33.2660 (189.1386083d)<br>Dec: +11 13 54.04 (11.23168d)<br>Equinox: J2000  |                          | V=15+/-4                | Reference Frame: ICRS |              |   |        |   |       |  |   |      |                    |                          |        |               |     |         |   |  |          |
| Exposures | #  | Label  | Target                   | Config,Mode,Aperture    | Spectral Els.         | Opt. Params. | Special Reqs.                             | Groups | Exp. Time (Total)/[Actual Dur.]   | Orbit |  |   |      |                    |                          |        |               |     |         |   |  |          |
|           | 1  | (2)  | TESS-SN                  | STIS/CCD, ACQ, F28X50LP | MIRROR                |              | GS ACQ SCENARI<br>O BASE1BE               |        | 0.1 Secs (0.1 Secs)<br>[==>]  | [1]   |  |   |      |                    |                          |        |               |     |         |   |  |          |
|           | 2  | (2)  | TESS-SN                  | STIS/CCD, ACCUM, 52X0.2 | G230LB<br>2375 A      |              |   |        | 2165 Secs (2041 Secs)<br>[==>1020.5 Secs (Split 1)]<br>[==>1020.5 Secs (Split 2)] | [1]   |  |   |      |                    |                          |        |               |     |         |   |  |          |
|           | 3  | (2)  | TESS-SN                  | STIS/CCD, ACQ, F28X50LP | MIRROR                |              | NEW OBSET;<br>GS ACQ SCENARI<br>O BASE1BE |        | 0.1 Secs (0.1 Secs)<br>[==>]  | [2]   |  |   |      |                    |                          |        |               |     |         |   |  |          |
|           | 4  | (2)  | TESS-SN                  | STIS/CCD, ACCUM, 52X0.2 | G230LB<br>2375 A      |              |   |        | 2590 Secs (2128 Secs)<br>[==>1064.0 Secs (Split 1)]<br>[==>1064.0 Secs (Split 2)] | [2]   |  |   |      |                    |                          |        |               |     |         |   |  |          |
|           | 5  | (2)  | TESS-SN                  | STIS/CCD, ACQ, F28X50LP | MIRROR                |              | NEW OBSET;<br>GS ACQ SCENARI<br>O BASE1BE |        | 0.1 Secs (0.1 Secs)<br>[==>]  | [3]   |  |   |      |                    |                          |        |               |     |         |   |  |          |
|           | 6  | (2)  | TESS-SN                  | STIS/CCD, ACCUM, 52X0.2 | G230LB<br>2375 A      |              |   |        | 1150 Secs (920 Secs)<br>[==>460.0 Secs (Split 1)]<br>[==>460.0 Secs (Split 2)]    | [3]   |  |   |      |                    |                          |        |               |     |         |   |  |          |
|           | 7  | (2)  | TESS-SN                  | STIS/CCD, ACCUM, 52X0.2 | G430L<br>4300 A       |              |   |        | 1150 Secs (920 Secs)<br>[==>460.0 Secs (Split 1)]<br>[==>460.0 Secs (Split 2)]    | [3]   |  |   |      |                    |                          |        |               |     |         |   |  |          |

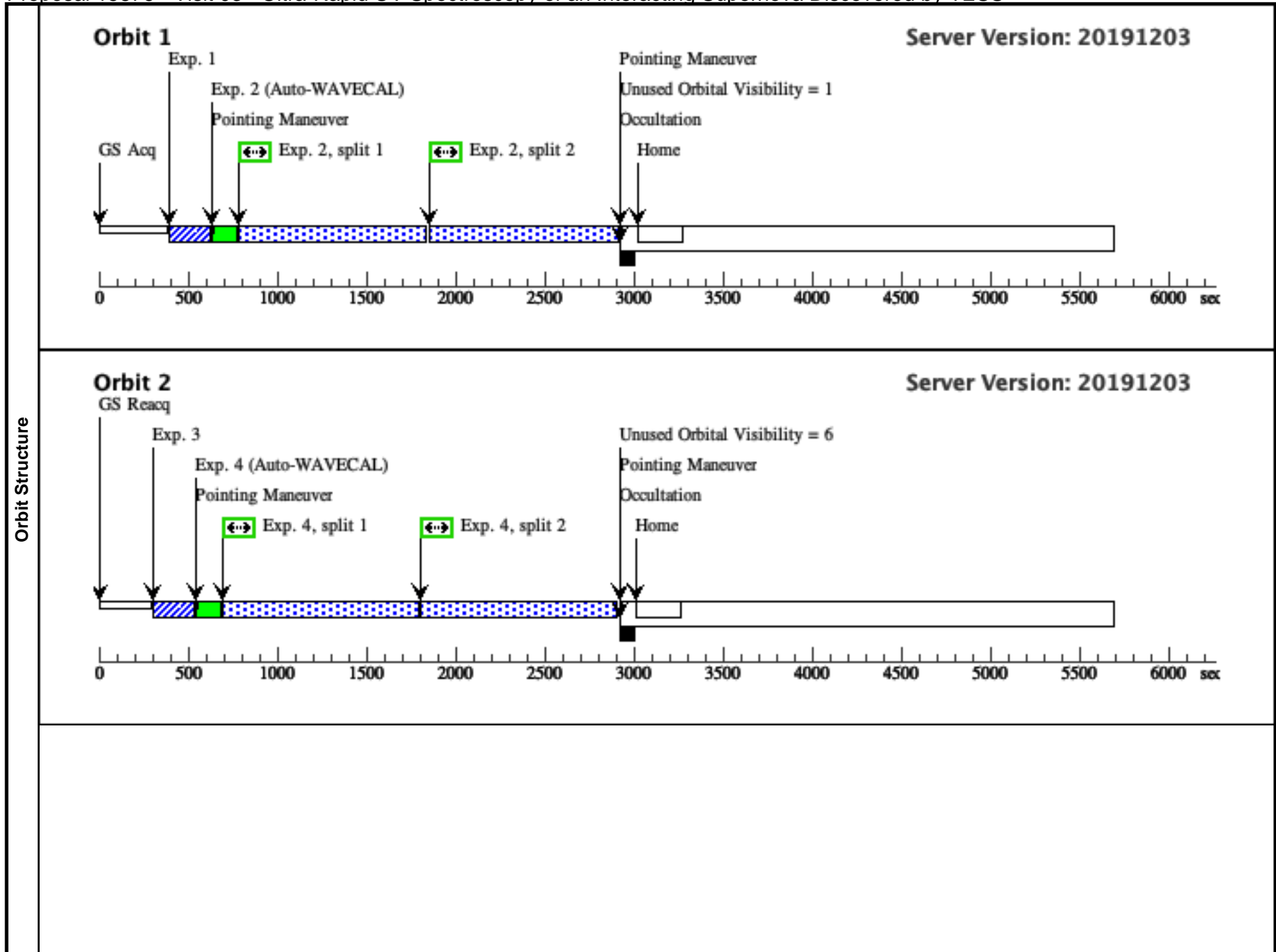


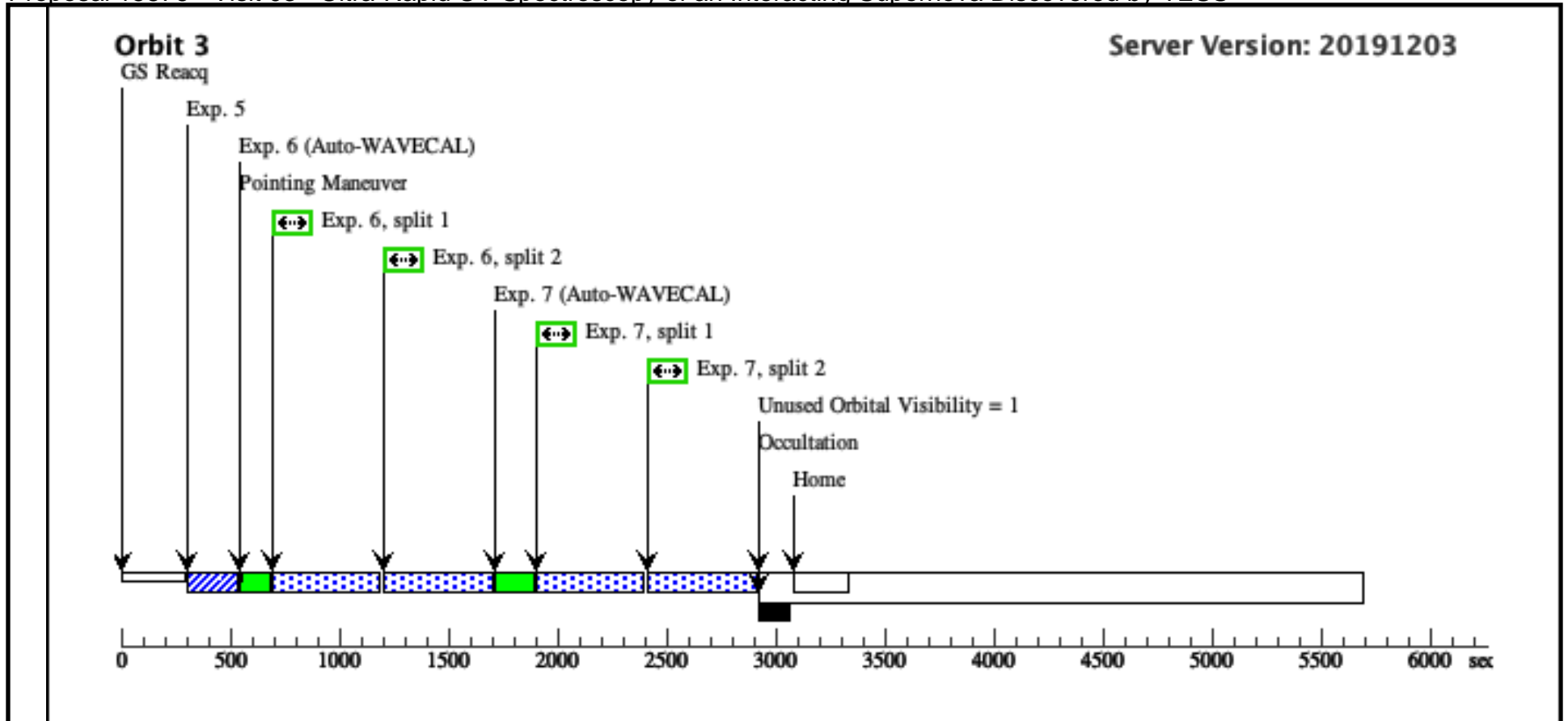


Proposal 15876 - Visit 03 - Ultra-Rapid UV Spectroscopy of an Interacting Supernova Discovered by TESS

Tue Apr 14 20:00:39 GMT 2020

| Visit     | <b>Proposal 15876, Visit 03, completed</b><br><b>Diagnostic Status: No Diagnostics</b><br>Scientific Instruments: STIS/CCD<br>Special Requirements: SCHED 100%<br><i>Comments: After Visit 3, 20h to 32h</i> |   |             |   |                          |              |   |        |   |       |
|-----------|--|---|-------------|---|--------------------------|--------------|---|--------|---|-------|
|           | Fixed Targets  | #   | Name        | Target Coordinates  | Targ. Coord. Corrections | Fluxes       | Miscellaneous                             |        |   |       |
|           |  | (2)   | TESS-SN     | RA: 12 36 33.2660 (189.1386083d)<br>Dec: +11 13 54.04 (11.23168d)<br>Equinox: J2000 |                          | V=15+/-4     | Reference Frame: ICRS                     |        |   |       |
|           |  | <i>Comments:</i><br>Category=STAR<br>Description=[SUPERNOVA]<br>Extended=NO |             |   |                          |              |   |        |   |       |
| Exposures | #  | Label   | Target      | Config,Mode,Aperture  | Spectral Els.            | Opt. Params. | Special Reqs.                             | Groups | Exp. Time (Total)/[Actual Dur.]   | Orbit |
|           | 1  |   | (2) TESS-SN | STIS/CCD, ACQ, F28X50LP   | MIRROR                   |              | GS ACQ SCENARI<br>O BASE1BE               |        | 0.1 Secs (0.1 Secs)<br>[==>]  | [1]   |
|           | 2  |   | (2) TESS-SN | STIS/CCD, ACCUM, 52X0.2   | G230LB<br>2375 A         |              |   |        | 2165 Secs (2041 Secs)<br>[==>1020.5 Secs (Split 1)]<br>[==>1020.5 Secs (Split 2)] | [1]   |
|           | 3  |   | (2) TESS-SN | STIS/CCD, ACQ, F28X50LP   | MIRROR                   |              | NEW OBSET;<br>GS ACQ SCENARI<br>O BASE1BE |        | 0.1 Secs (0.1 Secs)<br>[==>]  | [2]   |
|           | 4  |   | (2) TESS-SN | STIS/CCD, ACCUM, 52X0.2   | G230LB<br>2375 A         |              |   |        | 2590 Secs (2128 Secs)<br>[==>1064.0 Secs (Split 1)]<br>[==>1064.0 Secs (Split 2)] | [2]   |
|           | 5  |   | (2) TESS-SN | STIS/CCD, ACQ, F28X50LP   | MIRROR                   |              | NEW OBSET;<br>GS ACQ SCENARI<br>O BASE1BE |        | 0.1 Secs (0.1 Secs)<br>[==>]  | [3]   |
|           | 6  |   | (2) TESS-SN | STIS/CCD, ACCUM, 52X0.2   | G230LB<br>2375 A         |              |   |        | 1150 Secs (920 Secs)<br>[==>460.0 Secs (Split 1)]<br>[==>460.0 Secs (Split 2)]    | [3]   |
|           | 7  |   | (2) TESS-SN | STIS/CCD, ACCUM, 52X0.2   | G430L<br>4300 A          |              |   |        | 1150 Secs (920 Secs)<br>[==>460.0 Secs (Split 1)]<br>[==>460.0 Secs (Split 2)]    | [3]   |

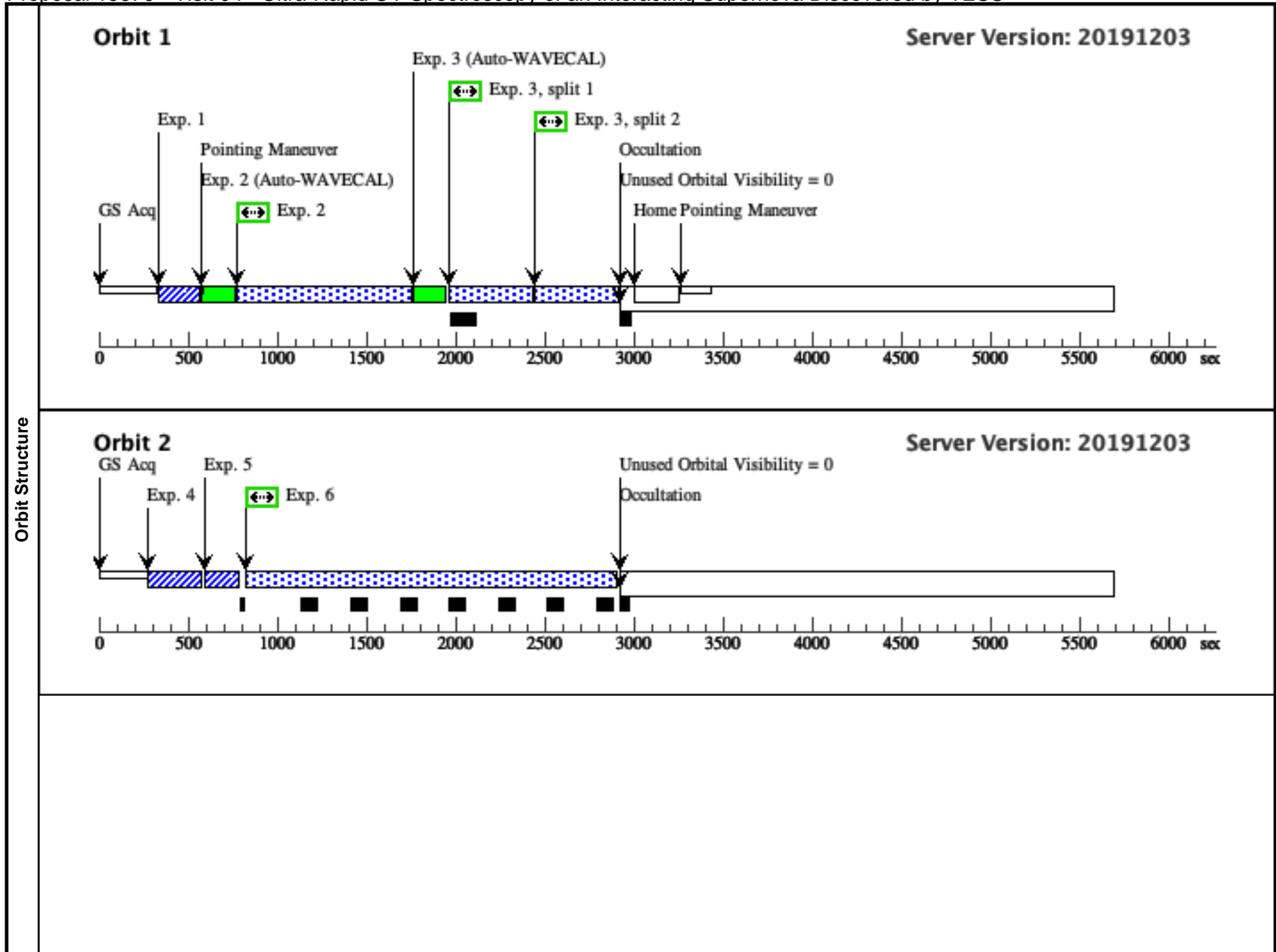


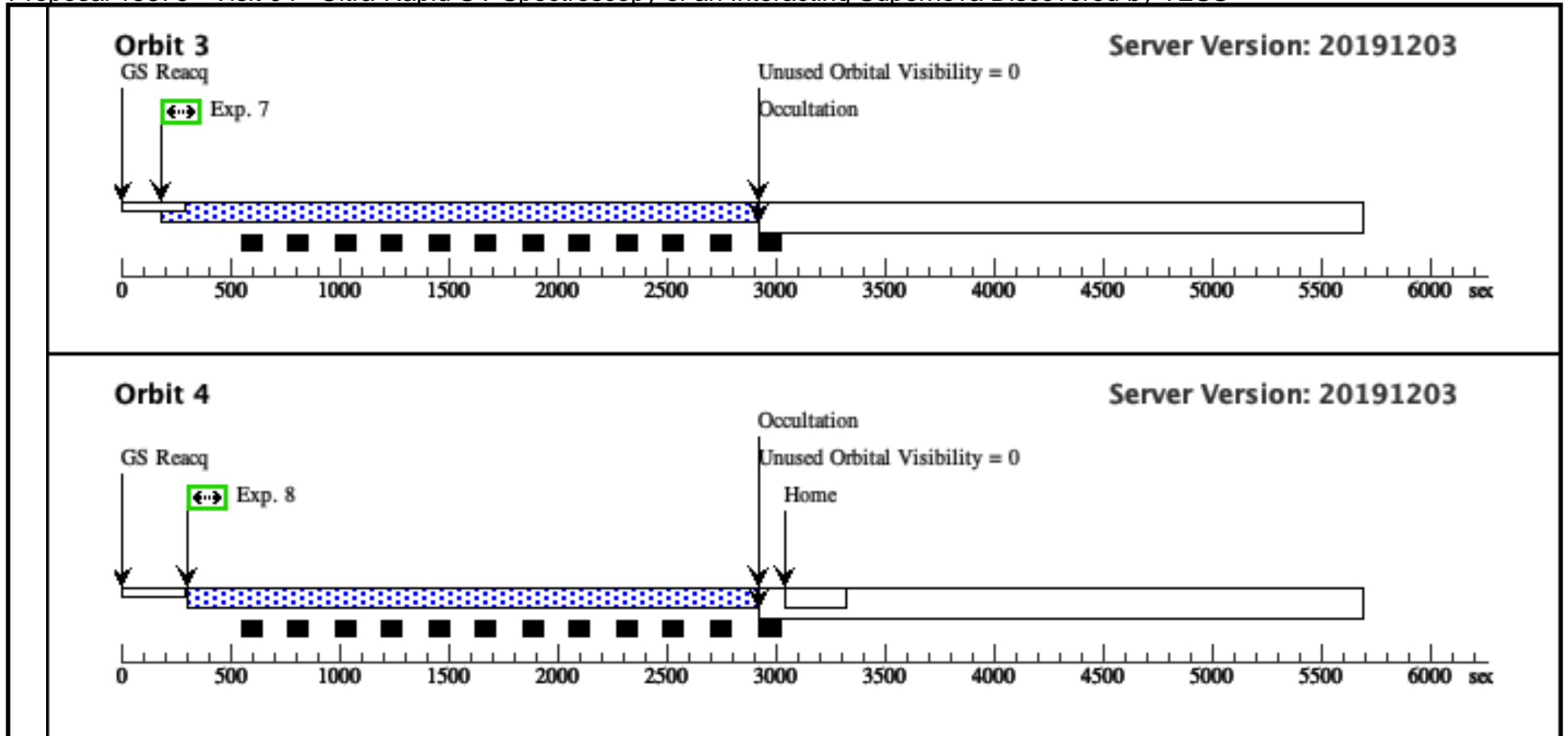


Proposal 15876 - Visit 04 - Ultra-Rapid UV Spectroscopy of an Interacting Supernova Discovered by TESS

Tue Apr 14 20:00:39 GMT 2020

| Visit     | <b>Proposal 15876, Visit 04, completed</b><br><b>Diagnostic Status: No Diagnostics</b><br>Scientific Instruments: STIS/NUV-MAMA, STIS/CCD, COS/FUV<br>Special Requirements: SCHED 100%<br><i>Comments: Want the earliest epoch possible when we can observe with COS and STIS/MAMA.</i> |  |                          |                                 |                       |  |                             |        |  |       |   |      |                    |                          |        |               |     |         |   |  |          |
|-----------|---|--|--------------------------|---------------------------------|-----------------------|--|-----------------------------|--------|--|-------|---|------|--------------------|--------------------------|--------|---------------|-----|---------|---|--|----------|
|           | Fixed Targets   | <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>(2)</td> <td>TESS-SN</td> <td>RA: 12 36 33.2660 (189.1386083d)<br/>Dec: +11 13 54.04 (11.23168d)<br/>Equinox: J2000</td> <td></td> <td>V=15+/-4</td> <td>Reference Frame: ICRS</td> </tr> </tbody> </table> <i>Comments:<br/>Category=STAR<br/>Description=[SUPERNOVA]<br/>Extended=NO</i> |                          |                                 |                       |  |                             |        |  |       | # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous | (2) | TESS-SN | RA: 12 36 33.2660 (189.1386083d)<br>Dec: +11 13 54.04 (11.23168d)<br>Equinox: J2000 |  | V=15+/-4 |
| #         | Name  | Target Coordinates   | Targ. Coord. Corrections | Fluxes                          | Miscellaneous         |  |                             |        |  |       |   |      |                    |                          |        |               |     |         |   |  |          |
| (2)       | TESS-SN   | RA: 12 36 33.2660 (189.1386083d)<br>Dec: +11 13 54.04 (11.23168d)<br>Equinox: J2000  |                          | V=15+/-4                        | Reference Frame: ICRS |  |                             |        |  |       |   |      |                    |                          |        |               |     |         |   |  |          |
| Exposures | #   | Label (ETC Run)  | Target                   | Config,Mode,Aperture            | Spectral Els.         | Opt. Params.   | Special Reqs.               | Groups | Exp. Time (Total)/[Actual Dur.]  | Orbit |   |      |                    |                          |        |               |     |         |   |  |          |
|           | 1   |  | (2) TESS-SN              | STIS/CCD, ACQ, F28X50LP         | MIRROR                |  | GS ACQ SCENARI<br>O BASE1B3 |        | 0.1 Secs (0.1 Secs)<br>[==>]   | [1]   |   |      |                    |                          |        |               |     |         |   |  |          |
|           | 2   | (STIS.sp.14<br>31331)  | (2) TESS-SN              | STIS/NUV-MAMA, ACCUM,<br>52X0.2 | G230L<br>2376 A       |  |                             |        | 1060 Secs (964 Secs)<br>[==>964.0 Secs ]                                       | [1]   |   |      |                    |                          |        |               |     |         |   |  |          |
|           | 3   |  | (2) TESS-SN              | STIS/CCD, ACCUM, 52X0.2         | G430L<br>4300 A       |  |                             |        | 1060 Secs (868 Secs)<br>[==>434.0 Secs (Split 1)]<br>[==>434.0 Secs (Split 2)] | [1]   |   |      |                    |                          |        |               |     |         |   |  |          |
|           | 4   | (COS.sa.143<br>4490)   | (2) TESS-SN              | COS/FUV, ACQ/PEAKXD, PSA        | G160M<br>1600 A       | NUM-POS=3;<br>CENTER=BRIGHT<br>EST;<br>SEGMENT=A;<br>STEP-SIZE=1 |                             |        | 32 Secs (32 Secs)<br>[==>]   | [2]   |   |      |                    |                          |        |               |     |         |   |  |          |
|           | 5   | (COS.sa.143<br>4490)   | (2) TESS-SN              | COS/FUV, ACQ/PEAKD, PSA         | G160M<br>1600 A       | NUM-POS=3;<br>SEGMENT=A;<br>CENTER=BRIGHT<br>EST;<br>STEP-SIZE=1 |                             |        | 32 Secs (32 Secs)<br>[==>]   | [2]   |   |      |                    |                          |        |               |     |         |   |  |          |
|           | 6   | (COS.sp.143<br>1349)   | (2) TESS-SN              | COS/FUV, TIME-TAG, PSA          | G160M<br>1600 A       | BUFFER-TIME=27<br>5;<br>FP-POS=4;<br>SEGMENT=A                   |                             |        | 2670 Secs (2032 Secs)<br>[==>2032.0 Secs ]                                     | [2]   |   |      |                    |                          |        |               |     |         |   |  |          |
|           | 7   | (COS.sp.143<br>4758)   | (2) TESS-SN              | COS/FUV, TIME-TAG, PSA          | G130M<br>1309 A       | BUFFER-TIME=21<br>5;<br>FP-POS=4;<br>SEGMENT=A                   |                             |        | 2920 Secs (2559 Secs)<br>[==>2559.0 Secs ]                                     | [3]   |   |      |                    |                          |        |               |     |         |   |  |          |
|           | 8   | (COS.sp.143<br>4758)   | (2) TESS-SN              | COS/FUV, TIME-TAG, PSA          | G130M<br>1309 A       | FP-POS=4;<br>SEGMENT=A;<br>BUFFER-TIME=21<br>5                   |                             |        | 2920 Secs (2561 Secs)<br>[==>2561.0 Secs ]                                     | [4]   |   |      |                    |                          |        |               |     |         |   |  |          |





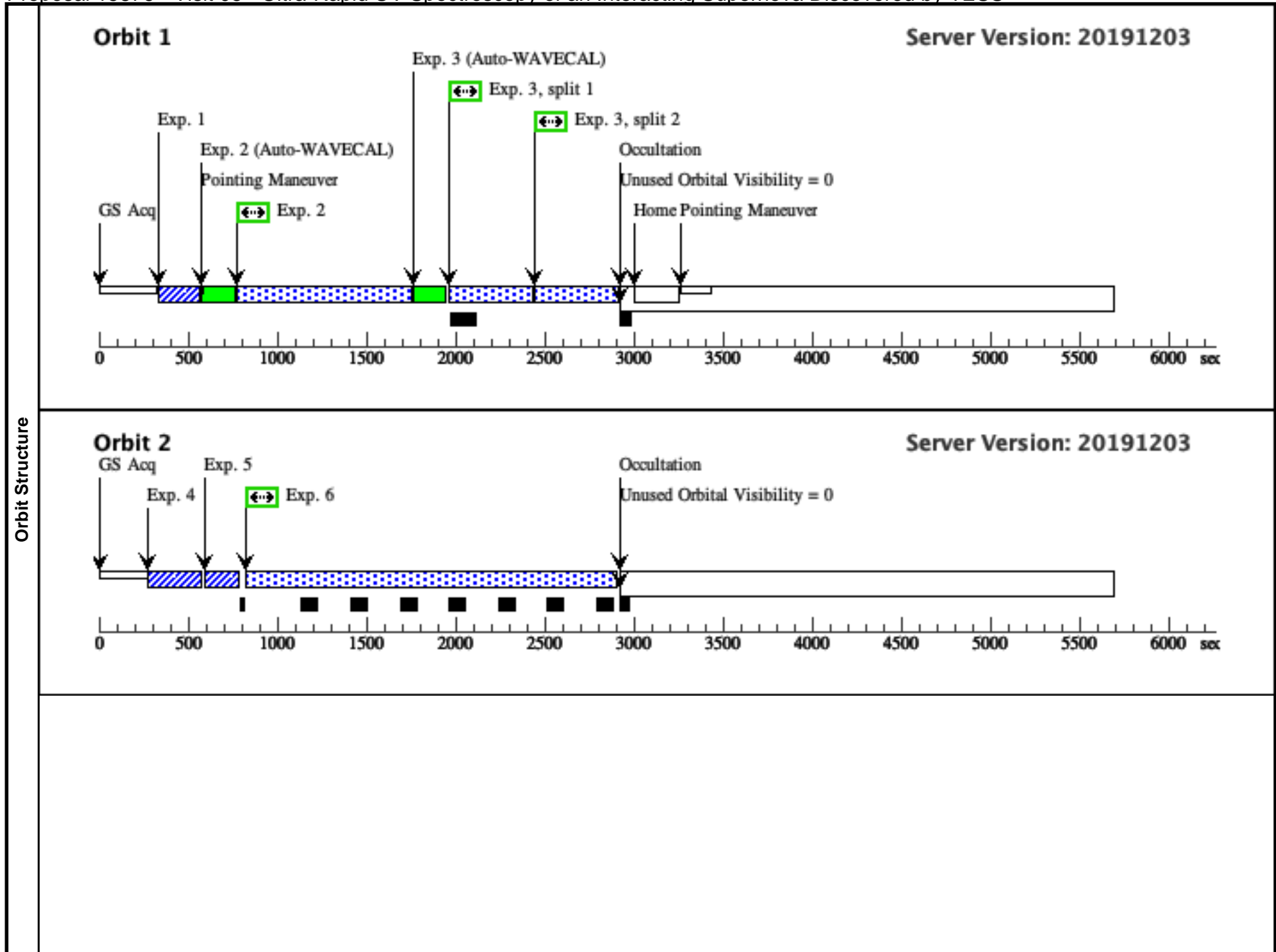
Proposal 15876 - Visit 05 - Ultra-Rapid UV Spectroscopy of an Interacting Supernova Discovered by TESS

Tue Apr 14 20:00:39 GMT 2020

|              |   |          |   |                           |                                 |                       |
|--------------|---|----------|---|---------------------------|---------------------------------|-----------------------|
| <b>Visit</b> | <b>Proposal 15876, Visit 05, failed</b><br><b>Diagnostic Status: No Diagnostics</b><br>Scientific Instruments: STIS/NUV-MAMA, STIS/CCD, COS/FUV<br>Special Requirements: SCHED 100%<br><i>Comments: After Visit 4, 5d to 9d</i> |          |   |                           |                                 |                       |
|              | <b>Fixed Targets</b>  | <b>#</b> | <b>Name</b>   | <b>Target Coordinates</b> | <b>Targ. Coord. Corrections</b> | <b>Fluxes</b>         |
| (2)          |   | TESS-SN  | RA: 12 36 33.2660 (189.1386083d)<br>Dec: +11 13 54.04 (11.23168d)<br>Equinox: J2000 |                           | V=15+/-4                        | Reference Frame: ICRS |
|              | <i>Comments:</i><br>Category=STAR<br>Description=[SUPERNOVA]<br>Extended=NO   |          |   |                           |                                 |                       |

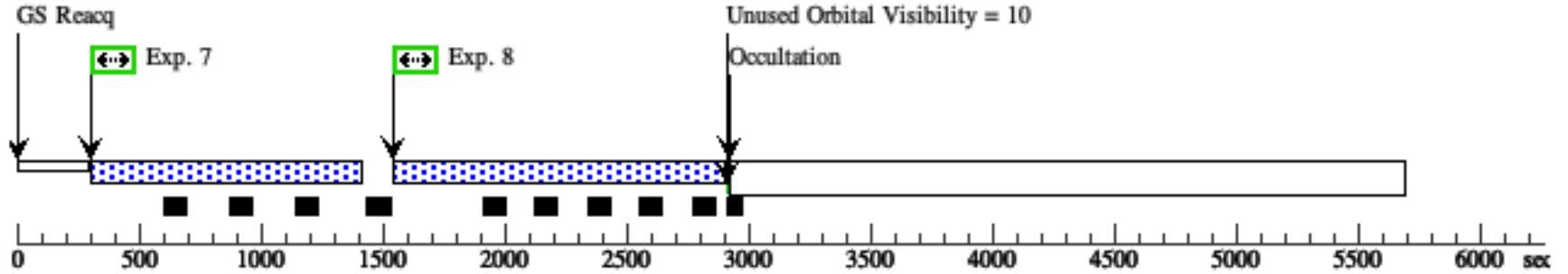
Proposal 15876 - Visit 05 - Ultra-Rapid UV Spectroscopy of an Interacting Supernova Discovered by TESS

| Exposures | #                    | Label<br>(ETC Run)    | Target                 | Config,Mode,Aperture            | Spectral Els.                                  | Opt. Params.   | Special Reqs.               | Groups                                     | Exp. Time (Total)/[Actual Dur.]  | Orbit |
|-----------|----------------------|-----------------------|------------------------|---------------------------------|--|--|-----------------------------|--|--|-------|
|           | 1                    |                       | (2) TESS-SN            | STIS/CCD, ACQ, F28X50LP         | MIRROR   |  | GS ACQ SCENARI<br>O BASE1B3 |  | 0.1 Secs (0.1 Secs)<br>[==>]   | [1]   |
|           | 2                    | (STIS.sp.14<br>31331) | (2) TESS-SN            | STIS/NUV-MAMA, ACCUM,<br>52X0.2 | G230L<br>2376 A                                |  |                             |  | 1060 Secs (964 Secs)<br>[==>964.0 Secs ]                                       | [1]   |
|           | 3                    |                       | (2) TESS-SN            | STIS/CCD, ACCUM, 52X0.2         | G430L<br>4300 A                                |  |                             |  | 1060 Secs (868 Secs)<br>[==>434.0 Secs (Split 1)]<br>[==>434.0 Secs (Split 2)] | [1]   |
|           | 4                    | (COS.sa.143<br>4490)  | (2) TESS-SN            | COS/FUV, ACQ/PEAKXD, PSA        | G160M<br>1600 A                                | NUM-POS=3;<br>CENTER=BRIGHT<br>EST;<br>SEGMENT=A;<br>STEP-SIZE=1 |                             |  | 32 Secs (32 Secs)<br>[==>]   | [2]   |
|           | 5                    | (COS.sa.143<br>4490)  | (2) TESS-SN            | COS/FUV, ACQ/PEAKD, PSA         | G160M<br>1600 A                                | NUM-POS=3;<br>SEGMENT=A;<br>CENTER=BRIGHT<br>EST;<br>STEP-SIZE=1 |                             |  | 32 Secs (32 Secs)<br>[==>]   | [2]   |
|           | 6                    | (COS.sp.143<br>1349)  | (2) TESS-SN            | COS/FUV, TIME-TAG, PSA          | G160M<br>1600 A                                | BUFFER-TIME=27<br>5;<br>FP-POS=4;<br>SEGMENT=A                   |                             |  | 2670 Secs (2032 Secs)<br>[==>2032.0 Secs ]                                     | [2]   |
|           | 7                    | (COS.sp.143<br>5005)  | (2) TESS-SN            | COS/FUV, TIME-TAG, PSA          | G160M<br>1600 A                                | BUFFER-TIME=27<br>0;<br>FP-POS=4;<br>SEGMENT=A                   |                             |  | 1200 Secs (1064 Secs)<br>[==>1064.0 Secs ]                                     | [3]   |
|           | 8                    | (COS.sp.143<br>5040)  | (2) TESS-SN            | COS/FUV, TIME-TAG, PSA          | G130M<br>1309 A                                | BUFFER-TIME=21<br>5;<br>FP-POS=4;<br>SEGMENT=A                   |                             |  | 1325 Secs (1189 Secs)<br>[==>1189.0 Secs ]                                     | [3]   |
|           | 9                    | (COS.sp.143<br>5072)  | (2) TESS-SN            | COS/FUV, TIME-TAG, PSA          | G130M<br>1309 A                                | BUFFER-TIME=21<br>5;<br>FP-POS=4;<br>SEGMENT=A                   |                             |  | 2920 Secs (2561 Secs)<br>[==>2561.0 Secs ]                                     | [4]   |
| 10        | (COS.sp.143<br>5072) | (2) TESS-SN           | COS/FUV, TIME-TAG, PSA | G130M<br>1309 A                 | FP-POS=4;<br>SEGMENT=A;<br>BUFFER-TIME=21<br>5 |  |                             | 2920 Secs (2561 Secs)<br>[==>2561.0 Secs ] | [5]  |       |



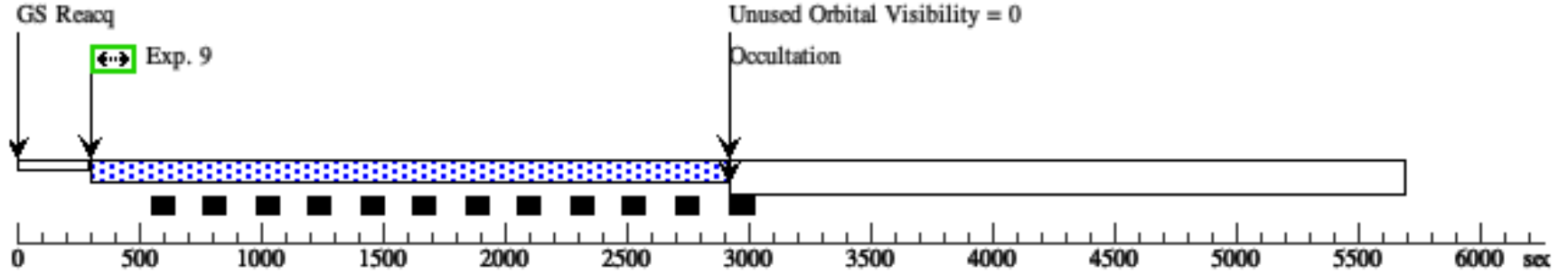
**Orbit 3**

Server Version: 20191203



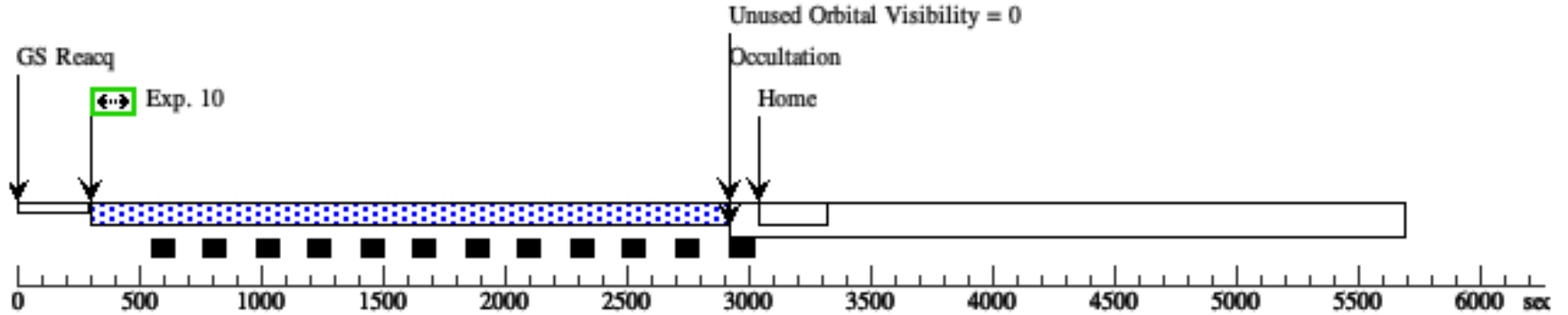
**Orbit 4**

Server Version: 20191203



**Orbit 5**

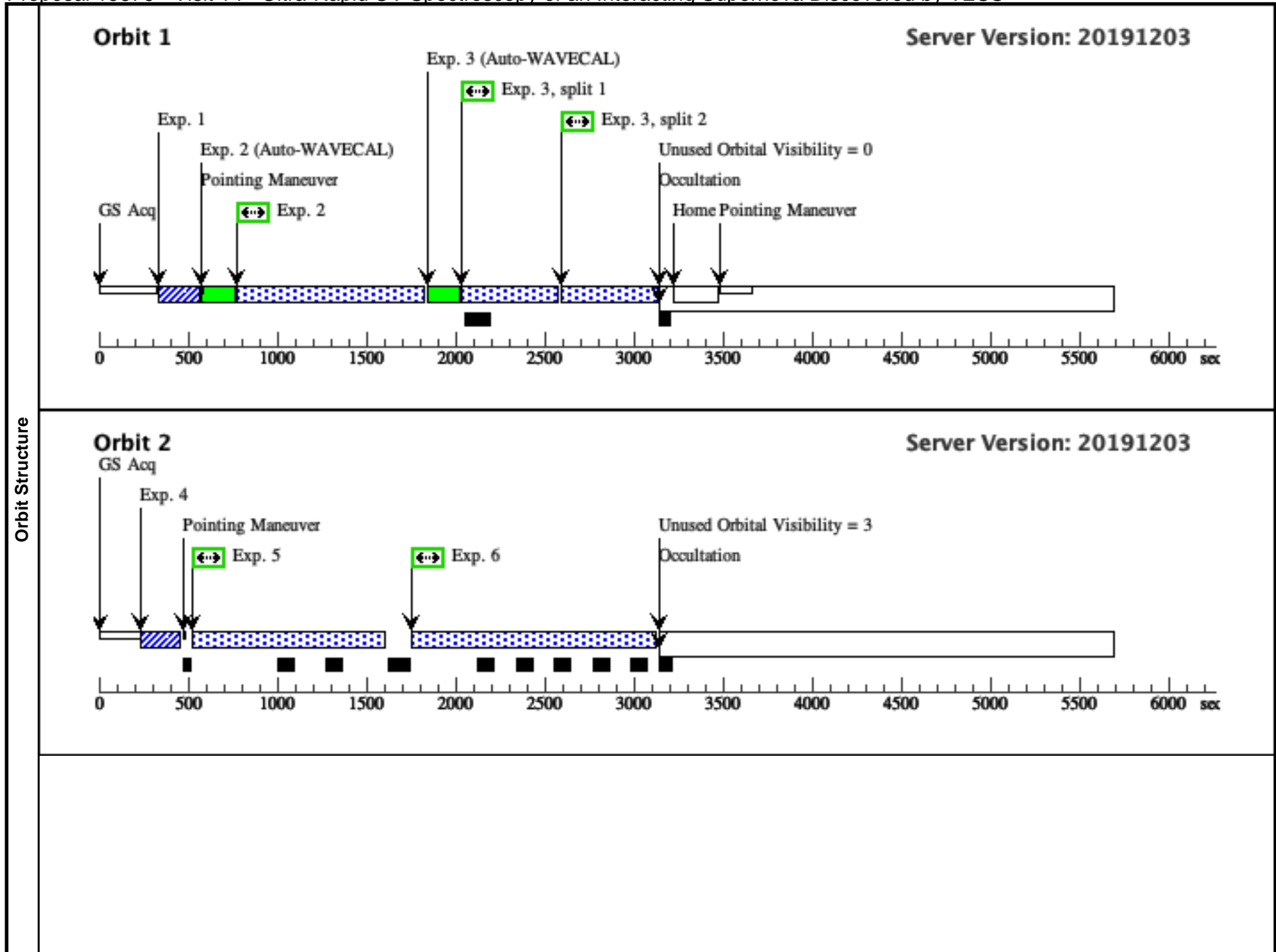
Server Version: 20191203

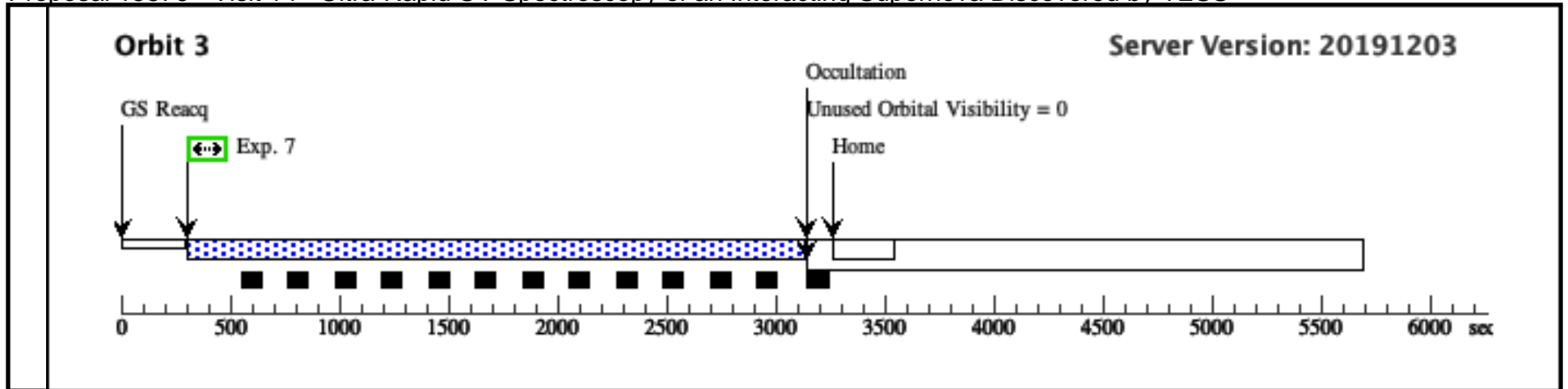


Proposal 15876 - Visit 14 - Ultra-Rapid UV Spectroscopy of an Interacting Supernova Discovered by TESS

Tue Apr 14 20:00:39 GMT 2020

| Visit     | <b>Proposal 15876, Visit 14, withdrawn</b><br><b>Diagnostic Status: No Diagnostics</b><br>Scientific Instruments: STIS/NUV-MAMA, STIS/CCD, COS/FUV, COS/NUV<br>Special Requirements: ON HOLD<br><i>Comments: Want the earliest epoch possible when we can observe with COS and STIS/MAMA. This is equivalent to visit 4, but using imaging acquisition for COS</i><br><i>On Hold Comments: This is equivalent to visit 4, but using imaging acquisition for COS</i> |                       |             |   |                          |              |  |        |   |       |
|-----------|---|-----------------------|-------------|---|--------------------------|--------------|--|--------|---|-------|
|           | Fixed Targets   | #                     | Name        | Target Coordinates  | Targ. Coord. Corrections | Fluxes       | Miscellaneous                                  |        |   |       |
|           |   | (2)                   | TESS-SN     | RA: 12 36 33.2660 (189.1386083d)<br>Dec: +11 13 54.04 (11.23168d)<br>Equinox: J2000 |                          | V=15+/-4     | Reference Frame: ICRS                          |        |   |       |
|           | <i>Comments: Category=STAR<br/>Description=[SUPERNOVA]<br/>Extended=NO</i>  |                       |             |   |                          |              |  |        |   |       |
| Exposures | #   | Label (ETC Run)       | Target      | Config,Mode,Aperture  | Spectral Els.            | Opt. Params. | Special Reqs.                                  | Groups | Exp. Time (Total)/[Actual Dur.]   | Orbit |
|           | 1   |                       | (2) TESS-SN | STIS/CCD, ACQ, F28X50LP   | MIRROR                   |              | GS ACQ SCENARI<br>O BASE1B3                    |        | 0.1 Secs (0.1 Secs)<br>[==>]  | [1]   |
|           | 2   | (STIS.sp.14<br>31331) | (2) TESS-SN | STIS/NUV-MAMA, ACCUM,<br>52X0.2   | G230L<br>2376 A          |              |  |        | 1060 Secs (1038 Secs)<br>[==>1038.0 Secs ]                                      | [1]   |
|           | 3   |                       | (2) TESS-SN | STIS/CCD, ACCUM, 52X0.2   | G430L<br>4300 A          |              |  |        | 1060 Secs (1016 Secs)<br>[==>508.0 Secs (Split 1)]<br>[==>508.0 Secs (Split 2)] | [1]   |
|           | 4   | (COS.ta.143<br>5267)  | (2) TESS-SN | COS/NUV, ACQ/IMAGE, PSA   | MIRRORA                  |              |  |        | 1.6 Secs (1.6 Secs)<br>[==>]  | [2]   |
|           | 5   | (COS.sp.143<br>1349)  | (2) TESS-SN | COS/FUV, TIME-TAG, PSA  | G160M<br>1600 A          |              | BUFFER-TIME=27<br>5;<br>FP-POS=4;<br>SEGMENT=A |        | 2670 Secs (868 Secs)<br>[==>868.0 Secs ]  | [2]   |
|           | 6   | (COS.sp.143<br>4758)  | (2) TESS-SN | COS/FUV, TIME-TAG, PSA  | G130M<br>1309 A          |              | BUFFER-TIME=21<br>5;<br>FP-POS=4;<br>SEGMENT=A |        | 2920 Secs (1205 Secs)<br>[==>1205.0 Secs ]                                      | [2]   |
|           | 7   | (COS.sp.143<br>4758)  | (2) TESS-SN | COS/FUV, TIME-TAG, PSA  | G130M<br>1309 A          |              | FP-POS=4;<br>SEGMENT=A;<br>BUFFER-TIME=21<br>5 |        | 2920 Secs (2783 Secs)<br>[==>2783.0 Secs ]                                      | [3]   |

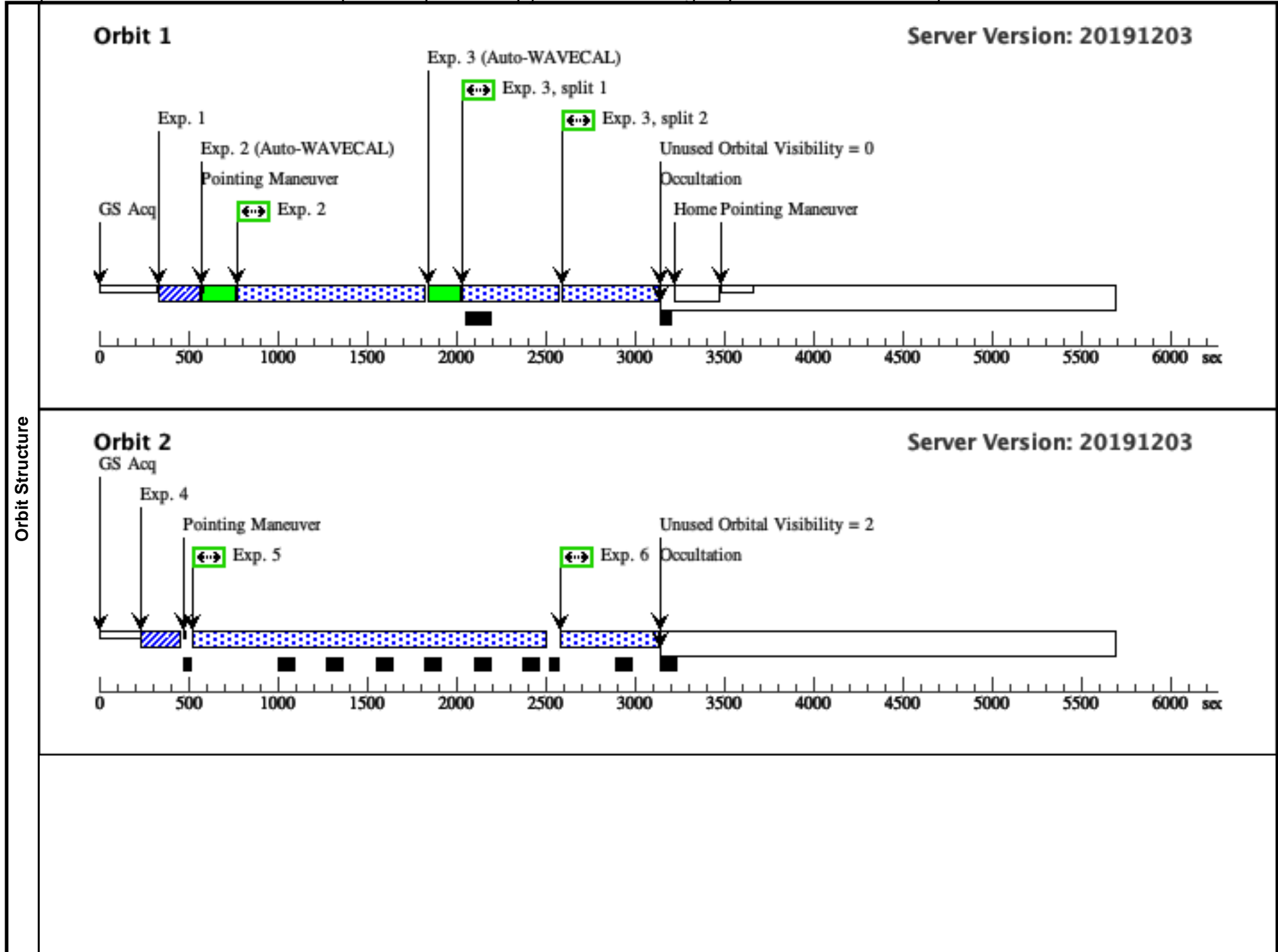


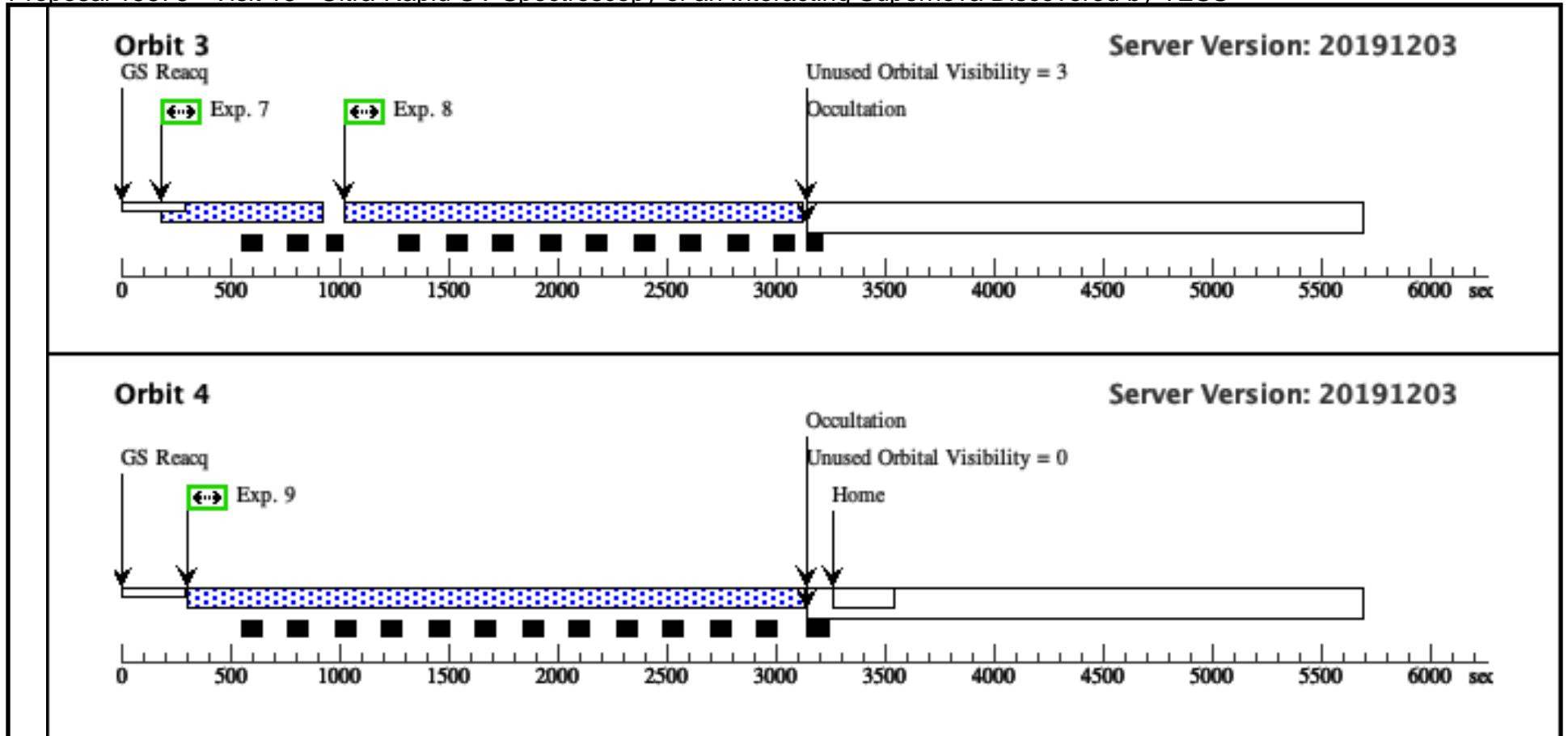


Proposal 15876 - Visit 15 - Ultra-Rapid UV Spectroscopy of an Interacting Supernova Discovered by TESS

Tue Apr 14 20:00:39 GMT 2020

| Visit     | <b>Proposal 15876, Visit 15, withdrawn</b><br><b>Diagnostic Status: No Diagnostics</b><br>Scientific Instruments: STIS/NUV-MAMA, STIS/CCD, COS/FUV, COS/NUV<br>Special Requirements: ON HOLD<br>Comments: After Visit 4, 5d to 9d<br>This is equivalent to visit 5, but using imaging acquisition for COS<br>On Hold Comments: This is equivalent to visit 5, but using imaging acquisition for COS |   |             |                                 |                 |  |                             |        |   |       |
|-----------|---|---|-------------|---------------------------------|-----------------|--|-----------------------------|--------|---|-------|
|           | Fixed Targets   | #      Name      Target Coordinates      Targ. Coord. Corrections      Fluxes      Miscellaneous<br>(2)      TESS-SN      RA: 12 36 33.2660 (189.1386083d)<br>Dec: +11 13 54.04 (11.23168d)<br>Equinox: J2000<br>Comments:<br>Category=STAR<br>Description=[SUPERNOVA]<br>Extended=NO |             |                                 |                 |  |                             |        |   |       |
| Exposures | #   | Label (ETC Run)   | Target      | Config,Mode,Aperture            | Spectral Els.   | Opt. Params.                                   | Special Reqs.               | Groups | Exp. Time (Total)/[Actual Dur.]   | Orbit |
|           | 1   |   | (2) TESS-SN | STIS/CCD, ACQ, F28X50LP         | MIRROR          |  | GS ACQ SCENARI<br>O BASE1B3 |        | 0.1 Secs (0.1 Secs)<br>[==>]  | [1]   |
|           | 2   | (STIS.sp.14<br>31331)   | (2) TESS-SN | STIS/NUV-MAMA, ACCUM,<br>52X0.2 | G230L<br>2376 A |  |                             |        | 1060 Secs (1038 Secs)<br>[==>1038.0 Secs ]                                      | [1]   |
|           | 3   |   | (2) TESS-SN | STIS/CCD, ACCUM, 52X0.2         | G430L<br>4300 A |  |                             |        | 1060 Secs (1016 Secs)<br>[==>508.0 Secs (Split 1)]<br>[==>508.0 Secs (Split 2)] | [1]   |
|           | 4   | (COS.ta.143<br>5267)  | (2) TESS-SN | COS/NUV, ACQ/IMAGE, PSA         | MIRRORA         |  |                             |        | 1.6 Secs (1.6 Secs)<br>[==>]  | [2]   |
|           | 5   | (COS.sp.143<br>1349)  | (2) TESS-SN | COS/FUV, TIME-TAG, PSA          | G160M<br>1600 A | BUFFER-TIME=27<br>5;<br>FP-POS=4;<br>SEGMENT=A |                             |        | 2670 Secs (1764 Secs)<br>[==>1764.0 Secs ]                                      | [2]   |
|           | 6   | (COS.sp.143<br>5005)  | (2) TESS-SN | COS/FUV, TIME-TAG, PSA          | G160M<br>1600 A | BUFFER-TIME=27<br>0;<br>FP-POS=4;<br>SEGMENT=A |                             |        | 1200 Secs (496 Secs)<br>[==>496.0 Secs ]  | [2]   |
|           | 7   | (COS.sp.143<br>5040)  | (2) TESS-SN | COS/FUV, TIME-TAG, PSA          | G130M<br>1309 A | BUFFER-TIME=21<br>5;<br>FP-POS=4;<br>SEGMENT=A |                             |        | 1325 Secs (573 Secs)<br>[==>573.0 Secs ]  | [3]   |
|           | 8   | (COS.sp.143<br>4758)  | (2) TESS-SN | COS/FUV, TIME-TAG, PSA          | G130M<br>1309 A | BUFFER-TIME=21<br>5;<br>FP-POS=4;<br>SEGMENT=A |                             |        | 2920 Secs (2055 Secs)<br>[==>2055.0 Secs ]                                      | [3]   |
|           | 9   | (COS.sp.143<br>4758)  | (2) TESS-SN | COS/FUV, TIME-TAG, PSA          | G130M<br>1309 A | FP-POS=4;<br>SEGMENT=A;<br>BUFFER-TIME=21<br>5 |                             |        | 2920 Secs (2783 Secs)<br>[==>2783.0 Secs ]                                      | [4]   |





Proposal 15876 - Visit 25 - Ultra-Rapid UV Spectroscopy of an Interacting Supernova Discovered by TESS

Tue Apr 14 20:00:40 GMT 2020

| Visit     | <b>Proposal 15876, Visit 25, implementation</b><br><b>Diagnostic Status: No Diagnostics</b><br>Scientific Instruments: STIS/NUV-MAMA, STIS/CCD<br>Special Requirements: SCHED 100%<br><i>Comments: Replacement for failed visit 05</i> |                    |             |   |                          |              |                             |        |   |       |
|-----------|--|--------------------|-------------|---|--------------------------|--------------|-----------------------------|--------|---|-------|
|           | Fixed Targets  | #                  | Name        | Target Coordinates  | Targ. Coord. Corrections | Fluxes       | Miscellaneous               |        |   |       |
|           |  | (2)                | TESS-SN     | RA: 12 36 33.2660 (189.1386083d)<br>Dec: +11 13 54.04 (11.23168d)<br>Equinox: J2000 |                          | V=15+/-4     | Reference Frame: ICRS       |        |   |       |
|           | <i>Comments:</i><br>Category=STAR<br>Description=[SUPERNOVA]<br>Extended=NO  |                    |             |   |                          |              |                             |        |   |       |
| Exposures | #  | Label (ETC Run)    | Target      | Config,Mode,Aperture  | Spectral Els.            | Opt. Params. | Special Reqs.               | Groups | Exp. Time (Total)/[Actual Dur.]   | Orbit |
|           | 1  | (STIS.ta.143 8068) | (2) TESS-SN | STIS/CCD, ACQ, F28X50LP   | MIRROR                   |              | GS ACQ SCENARI<br>O BASE1BE |        | 12 Secs (12 Secs)<br>[==>]  | [1]   |
|           | 2  | (STIS.sp.14 38070) | (2) TESS-SN | STIS/NUV-MAMA, ACCUM, 52X0.2  | G230L<br>2376 A          |              |                             |        | 1360 Secs (2017 Secs)<br>[==>2017.0 Secs ]                                      | [1]   |
|           | 3  | (STIS.sp.14 38070) | (2) TESS-SN | STIS/NUV-MAMA, ACCUM, 52X0.2  | G230L<br>2376 A          |              |                             |        | 1360 Secs (2597 Secs)<br>[==>2597.0 Secs ]                                      | [2]   |
|           | 4  | (STIS.sp.14 38070) | (2) TESS-SN | STIS/NUV-MAMA, ACCUM, 52X0.2  | G230L<br>2376 A          |              |                             |        | 1360 Secs (2597 Secs)<br>[==>2597.0 Secs ]                                      | [3]   |
|           | 5  | (STIS.sp.14 38070) | (2) TESS-SN | STIS/NUV-MAMA, ACCUM, 52X0.2  | G230L<br>2376 A          |              |                             |        | 500 Secs (601 Secs)<br>[==>601.0 Secs ]   | [4]   |
|           | 6  | (STIS.sp.14 38075) | (2) TESS-SN | STIS/CCD, ACCUM, 52X0.2   | G430L<br>4300 A          |              |                             |        | 1500 Secs (1702 Secs)<br>[==>851.0 Secs (Split 1)]<br>[==>851.0 Secs (Split 2)] | [4]   |

