



11707 - Detecting Isolated Black Holes through Astrometric Microlensing

Cycle: 17, Proposal Category: GO

(Availability Mode: AVAILABLE)

INVESTIGATORS

| <i>Name</i> | <i>Institution</i> | <i>E-Mail</i> |
|------------------------------|--|------------------------|
| Dr. Kailash Sahu (PI) | Space Telescope Science Institute | ksahu@stsci.edu |
| Dr. Howard E. Bond (CoI) | Space Telescope Science Institute | bond@stsci.edu |
| Dr. Jay Anderson (CoI) | Space Telescope Science Institute | jayander@stsci.edu |
| Dr. Andrzej Udalski (CoI) | Warsaw University | udalski@astrow.edu.pl |
| Dr. Martin Dominik (CoI) | University of St. Andrews | md35@st-andrews.ac.uk |
| Dr. Philip Yock (CoI) | The University of Auckland | p.yock@auckland.ac.nz |

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) MOA-2010-BLG-482 | WFC3/UVIS | 1 | 05-Oct-2010 21:01:03.0 | yes |
| 05 | (7) MOA-2009-BLG-260 | WFC3/UVIS | 1 | 05-Oct-2010 21:01:09.0 | yes |
| 06 | (7) MOA-2009-BLG-260 | WFC3/UVIS | 1 | 05-Oct-2010 21:01:14.0 | yes |
| 02 | (8) MOA-2010-BLG-364 | WFC3/UVIS | 1 | 05-Oct-2010 21:01:19.0 | yes |
| 10 | (6) MOA-2010-BLG-235 | WFC3/UVIS | 1 | 05-Oct-2010 21:01:24.0 | yes |
| 09 | (6) MOA-2010-BLG-235 | WFC3/UVIS | 1 | 05-Oct-2010 21:01:28.0 | yes |
| 04 | (2) MOA-2010-BLG-356 | WFC3/UVIS | 1 | 05-Oct-2010 21:01:31.0 | yes |
| 07 | (7) MOA-2009-BLG-260 | WFC3/UVIS | 1 | 05-Oct-2010 21:01:37.0 | yes |
| 08 | (7) MOA-2009-BLG-260 | WFC3/UVIS | 1 | 05-Oct-2010 21:01:40.0 | yes |
| 03 | (7) MOA-2009-BLG-260 | WFC3/UVIS | 1 | 05-Oct-2010 21:01:44.0 | yes |

10 Total Orbits Used

ABSTRACT

This proposal aims to make the first detection of isolated stellar-mass black holes (BHs) in the Milky Way, and to determine their masses. Until now, the only directly measured BH masses have come from radial-velocity measurements of X-ray binaries. Our proposed method uses the astrometric shifts that occur when a Galactic-bulge microlensing event is caused by a BH lens. Out of the hundreds of bulge microlensing events found annually by the OGLE and MOA surveys, a few are found to have very long durations (>200 days). It is generally believed that the majority of these long-duration events are caused by lenses that are isolated BHs.

To test this hypothesis, we will carry out high-precision astrometry of 5 long-duration events, using the ACS/HRC camera. The expected astrometric signal from a BH lens is >1.4 mas, at least 7 times the demonstrated astrometric precision attainable with the HRC.

This proposal will thus potentially lead to the first unambiguous detection of isolated stellar-mass BHs, and the first direct mass measurement for isolated stellar-mass BHs through any technique. Detection of several BHs will provide information on the frequency of BHs in the Galaxy, with implications for the slope of the IMF at high masses, the minimum mass of progenitors that produce BHs, and constraints on theoretical models of BH formation.

OBSERVING DESCRIPTION

We will select long-duration events which do not show any light contribution from the lens. In addition, the events should have reasonably high amplifications which will ensure that the centroid shift is close to zero at the peak amplification, and will facilitate detection of the parallax signal and hence the distance estimate for the lens. It is easy to identify long-duration events and to determine their time of peak amplification well before the actual peak. Our group includes members of the microlensing survey teams who have access to the survey data for proper selection of such events.

To guard against the possibility that the geometric distortion may be dependant on the location on the detector; we will position the target at different locations along close-to-central-x-axis of the of the detector.

We will take most images in a single filter, but also take a small number of images in a different filter to check the color dependency, if any, of the

astrometric shift.

We will try to take as many images as possible in a single ORIENT for better astrometry accuracy. However, maintaining a single ORIENT may not be possible for all the observations. Since almost all of our targets are close to the ecliptic, we plan to use the same orient for nearly half of the year, and then flip it by 180 deg.

Proposal 11707 (STScI Edit Number: 27, Created: Tuesday, October 5, 2010 8:01:47 PM EST) - Overview

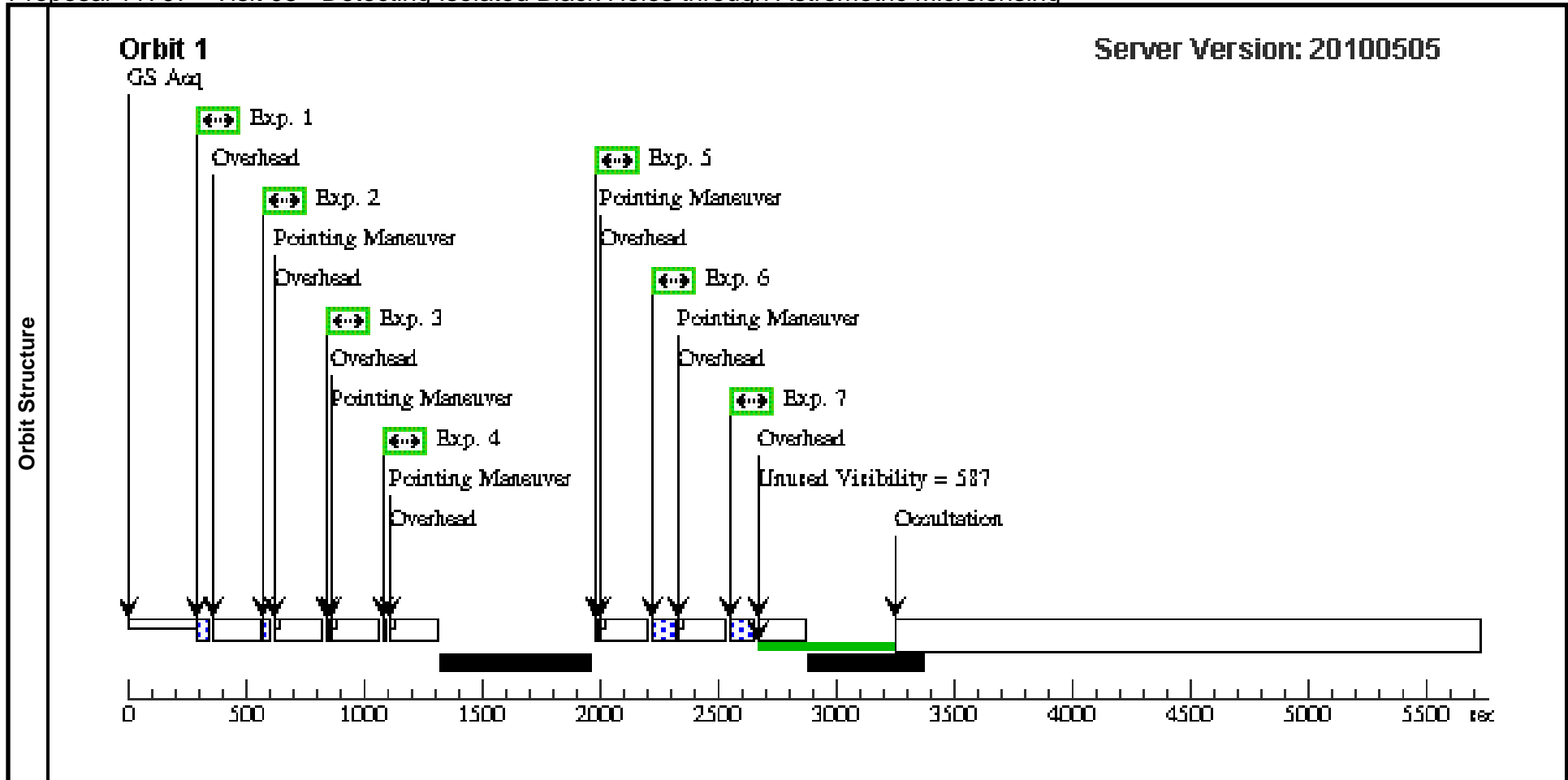
| Fixed Targets | Visit | | | | | Exposures | | | | | | | | | | |
|--|------------------|--|---------------------------------|--------------------------|---------------|-----------------------|---|----------|--------|----------------------|---------------|--------------|---------------|--------|-------------------------|-------|
| | # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous | # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time/[Actual Dur.] | Orbit |
| Proposal 11707, Visit 01, completed Wed Oct 06 01:01:48 GMT 2010 Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: ORIENT 90D TO 90 D; BETWEEN 10-AUG-2010:00:00:00 AND 24-AUG-2010:00:00:00 | | | | | | | | | | | | | | | | |
| (1) | MOA-2010-BLG-482 | RA: 17 59 47.9000 (269.9495833d) Dec: -27 00 29.00 (-27.00806d) Equinox: J2000 | | | V=21.18+/-1.5 | Reference Frame: ICRS | | | | | | | | | | |
| | 1 | (1) MOA-2010-BLG-482 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG -39.9,-2.79 | | 70 Secs | [==>] | [1] | | | | | | |
| | 2 | (1) MOA-2010-BLG-482 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG -23.94,-1.67 | | 70 Secs | [==>] | [1] | | | | | | |
| | 3 | (1) MOA-2010-BLG-482 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG -7.98,-0.56 | | 70 Secs | [==>] | [1] | | | | | | |
| | 4 | (1) MOA-2010-BLG-482 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG 7.98,0.56 | | 70 Secs | [==>] | [1] | | | | | | |
| | 5 | (1) MOA-2010-BLG-482 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG 23.94,1.67 | | 70 Secs | [==>] | [1] | | | | | | |
| | 6 | (1) MOA-2010-BLG-482 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F606W | CR-SPLIT=NO | POS TARG 39.9,2.79 | | 200 Secs | [==>] | [1] | | | | | | |
| | 7 | (1) MOA-2010-BLG-482 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F606W | CR-SPLIT=NO | SAME POS AS 5 | | 200 Secs | [==>] | [1] | | | | | | |

Proposal 11707 - Visit 01 - Detecting Isolated Black Holes through Astrometric Microlensing

Wed Oct 06 01:01:49 GMT 2010

| Fixed Targets | # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---------------|-----|------------------|--|--------------------------|--------|---------------|
| | (7) | MOA-2009-BLG-260 | RA: 17 58 28.5700 (269.6190417d) Dec: -26 50 21.09 (-26.83919d) Equinox: J2000 | | | V=16.61+/-1.5 |

| Exposures | # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time/[Actual Dur.] | Orbit | |
|-----------|---|----------------------|----------------------|---------------------------------|---------------|--------------|-----------------------|--------|-------------------------|-------------------|-----|
| | 1 | (7) MOA-2009-BLG-260 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG -39.9,-2.79 | | | 20 Secs [==>] | [1] |
| | 2 | (7) MOA-2009-BLG-260 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F606W | CR-SPLIT=NO | SAME POS AS 1 | | | 10 Secs [==>] | [1] |
| | 3 | (7) MOA-2009-BLG-260 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F606W | CR-SPLIT=NO | POS TARG -23.94,-1.67 | | | 10 Secs [==>] | [1] |
| | 4 | (7) MOA-2009-BLG-260 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F606W | CR-SPLIT=NO | POS TARG -7.98,-0.56 | | | 10 Secs [==>] | [1] |
| | 5 | (7) MOA-2009-BLG-260 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F606W | CR-SPLIT=NO | POS TARG 7.98,0.56 | | | 10 Secs [==>] | [1] |
| | 6 | (7) MOA-2009-BLG-260 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F606W | CR-SPLIT=NO | POS TARG 23.94,1.67 | | | 100 Secs [==>] | [1] |
| | 7 | (7) MOA-2009-BLG-260 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F606W | CR-SPLIT=NO | POS TARG 39.9,2.79 | | | 100 Secs [==>] | [1] |

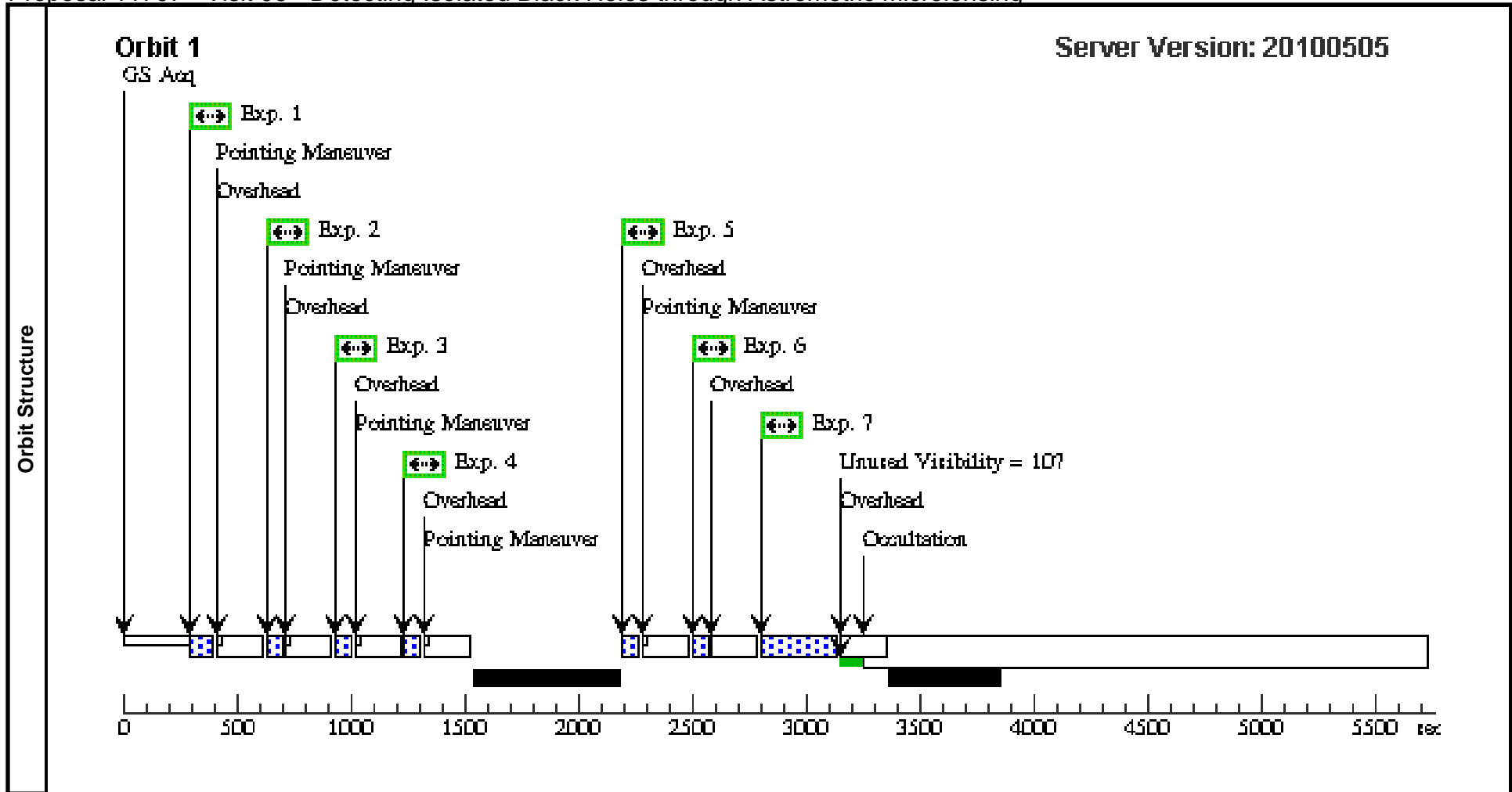


Proposal 11707 - Visit 05 - Detecting Isolated Black Holes through Astrometric Microlensing

Wed Oct 06 01:01:50 GMT 2010

| Fixed Targets | # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---------------|-----|------------------|--|--------------------------|---------------|-----------------------|
| | (7) | MOA-2009-BLG-260 | RA: 17 58 28.5700 (269.6190417d) Dec: -26 50 21.09 (-26.83919d) Equinox: J2000 | | V=16.61+/-1.5 | Reference Frame: ICRS |

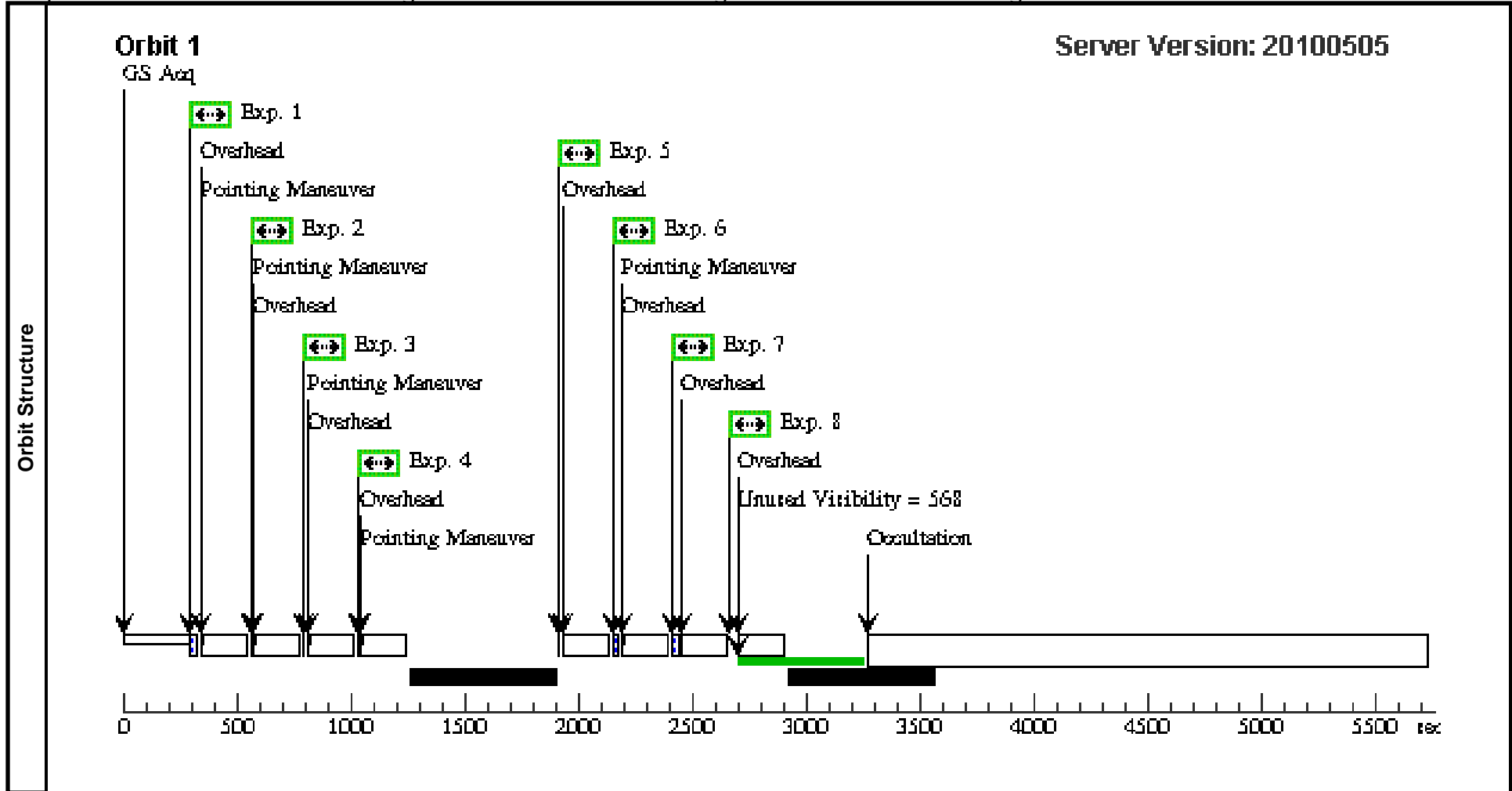
| Exposures | # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time/[Actual Dur.] | Orbit |
|-----------|---|----------------------|----------------------|---------------------------------|---------------|--------------|-----------------------|--------|-------------------------|-------|
| | 1 | (7) MOA-2009-BLG-260 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG -39.9,-2.79 | | 72 Secs [==>] | [1] |
| | 2 | (7) MOA-2009-BLG-260 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG -23.94,-1.67 | | 72 Secs [==>] | [1] |
| | 3 | (7) MOA-2009-BLG-260 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG -7.98,-0.56 | | 72 Secs [==>] | [1] |
| | 4 | (7) MOA-2009-BLG-260 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG 7.98,0.56 | | 72 Secs [==>] | [1] |
| | 5 | (7) MOA-2009-BLG-260 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG 23.94,1.67 | | 72 Secs [==>] | [1] |
| | 6 | (7) MOA-2009-BLG-260 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG 39.9,2.79 | | 72 Secs [==>] | [1] |
| | 7 | (7) MOA-2009-BLG-260 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F606W | CR-SPLIT=NO | POS TARG 39.9,2.79 | | 310 Secs [==>] | [1] |



Proposal 11707 - Visit 06 - Detecting Isolated Black Holes through Astrometric Microlensing

Wed Oct 06 01:01:50 GMT 2010

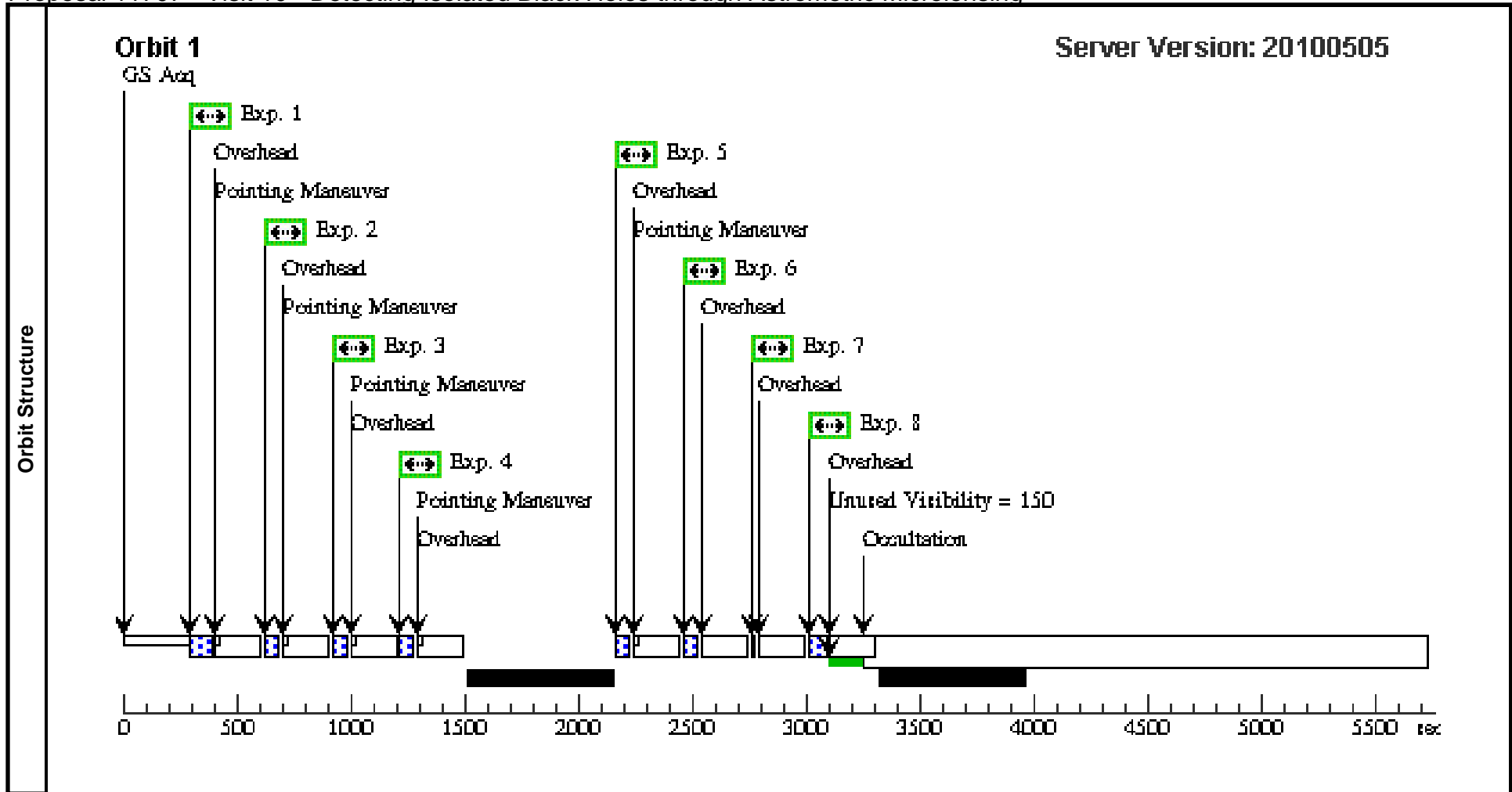
| Visit | Proposal 11707, Visit 02, completed Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: ORIENT 90D TO 090 D; BETWEEN 12-SEP-2010:00:00:00 AND 15-SEP-2010:00:00:00 | | | | | | | | | |
|-----------|---|----------------------|--|---------------------------------|--------------------------|---------------|---|--------|-------------------------|-------|
| | Fixed Targets | # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous | | | |
| | (8) | MOA-2010-BLG-364 | RA: 17 57 5.4000 (269.2725000d) Dec: -34 27 5.00 (-34.45139d) Equinox: J2000 | | | V=16.75+/-1.5 | Reference Frame: ICRS | | | |
| Exposures | # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time/[Actual Dur.] | Orbit |
| | 1 | (8) MOA-2010-BLG-364 | (8) MOA-2010-BLG-364 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG 23.94,1.67; GS ACQ SCENARIO BASE1B3 | | 1 Secs [==>] | [1] |
| | 2 | (8) MOA-2010-BLG-364 | (8) MOA-2010-BLG-364 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG 27.13,1.89 | | 3 Secs [==>] | [1] |
| | 3 | (8) MOA-2010-BLG-364 | (8) MOA-2010-BLG-364 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG 30.32,2.12 | | 3 Secs [==>] | [1] |
| | 4 | (8) MOA-2010-BLG-364 | (8) MOA-2010-BLG-364 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG 33.52,2.34 | | 3 Secs [==>] | [1] |
| | 5 | (8) MOA-2010-BLG-364 | (8) MOA-2010-BLG-364 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG 36.71,2.57 | | 3 Secs [==>] | [1] |
| | 6 | (8) MOA-2010-BLG-364 | (8) MOA-2010-BLG-364 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F606W | CR-SPLIT=NO | SAME POS AS 5 | | 2 Secs [==>] | [1] |
| | 7 | (8) MOA-2010-BLG-364 | (8) MOA-2010-BLG-364 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG 40.41,3.29 | | 3 Secs [==>] | [1] |
| | 8 | (8) MOA-2010-BLG-364 | (8) MOA-2010-BLG-364 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F606W | CR-SPLIT=NO | SAME POS AS 7 | | 1 Secs [==>] | [1] |



Proposal 11707 - Visit 02 - Detecting Isolated Black Holes through Astrometric Microlensing

Wed Oct 06 01:01:50 GMT 2010

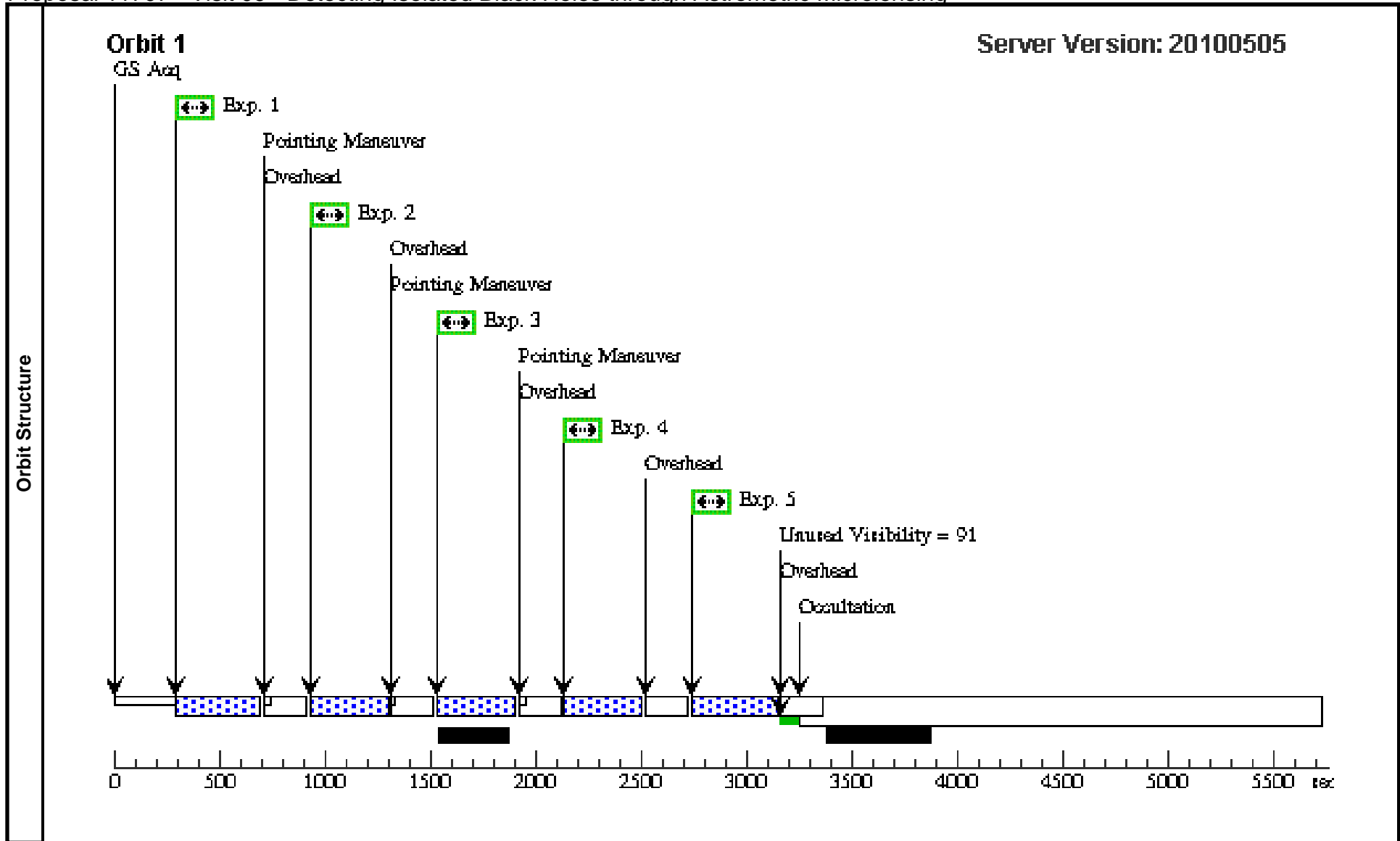
| Fixed Targets | Visit | | | | | | | | | |
|---------------|-------|----------------------|--|---------------------------------|---------------|-----------------------|-----------------------|--------|-------------------------|-------|
| | # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous | | | | |
| | (6) | MOA-2010-BLG-235 | RA: 18 04 56.6100 (271.2358750d) Dec: -29 02 18.30 (-29.03842d) Equinox: J2000 | | V=18 | Reference Frame: ICRS | | | | |
| Exposures | # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time/[Actual Dur.] | Orbit |
| | 1 | (6) MOA-2010-BLG-235 | (6) MOA-2010-BLG-235 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG -39.9,-2.79 | | 65 Secs [==>] | [1] |
| | 2 | (6) MOA-2010-BLG-235 | (6) MOA-2010-BLG-235 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG -23.94,-1.67 | | 65 Secs [==>] | [1] |
| | 3 | (6) MOA-2010-BLG-235 | (6) MOA-2010-BLG-235 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG -7.98,-0.56 | | 65 Secs [==>] | [1] |
| | 4 | (6) MOA-2010-BLG-235 | (6) MOA-2010-BLG-235 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG 7.98,0.56 | | 65 Secs [==>] | [1] |
| | 5 | (6) MOA-2010-BLG-235 | (6) MOA-2010-BLG-235 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG 23.94,1.67 | | 65 Secs [==>] | [1] |
| | 6 | (6) MOA-2010-BLG-235 | (6) MOA-2010-BLG-235 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG 39.9,2.79 | | 65 Secs [==>] | [1] |
| | 7 | (6) MOA-2010-BLG-235 | (6) MOA-2010-BLG-235 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG 39.9,2.79 | | 15 Secs [==>] | [1] |
| | 8 | (6) MOA-2010-BLG-235 | (6) MOA-2010-BLG-235 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F606W | CR-SPLIT=NO | POS TARG 39.9,2.79 | | 60 Secs [==>] | [1] |



Proposal 11707 - Visit 10 - Detecting Isolated Black Holes through Astrometric Microlensing

Wed Oct 06 01:01:51 GMT 2010

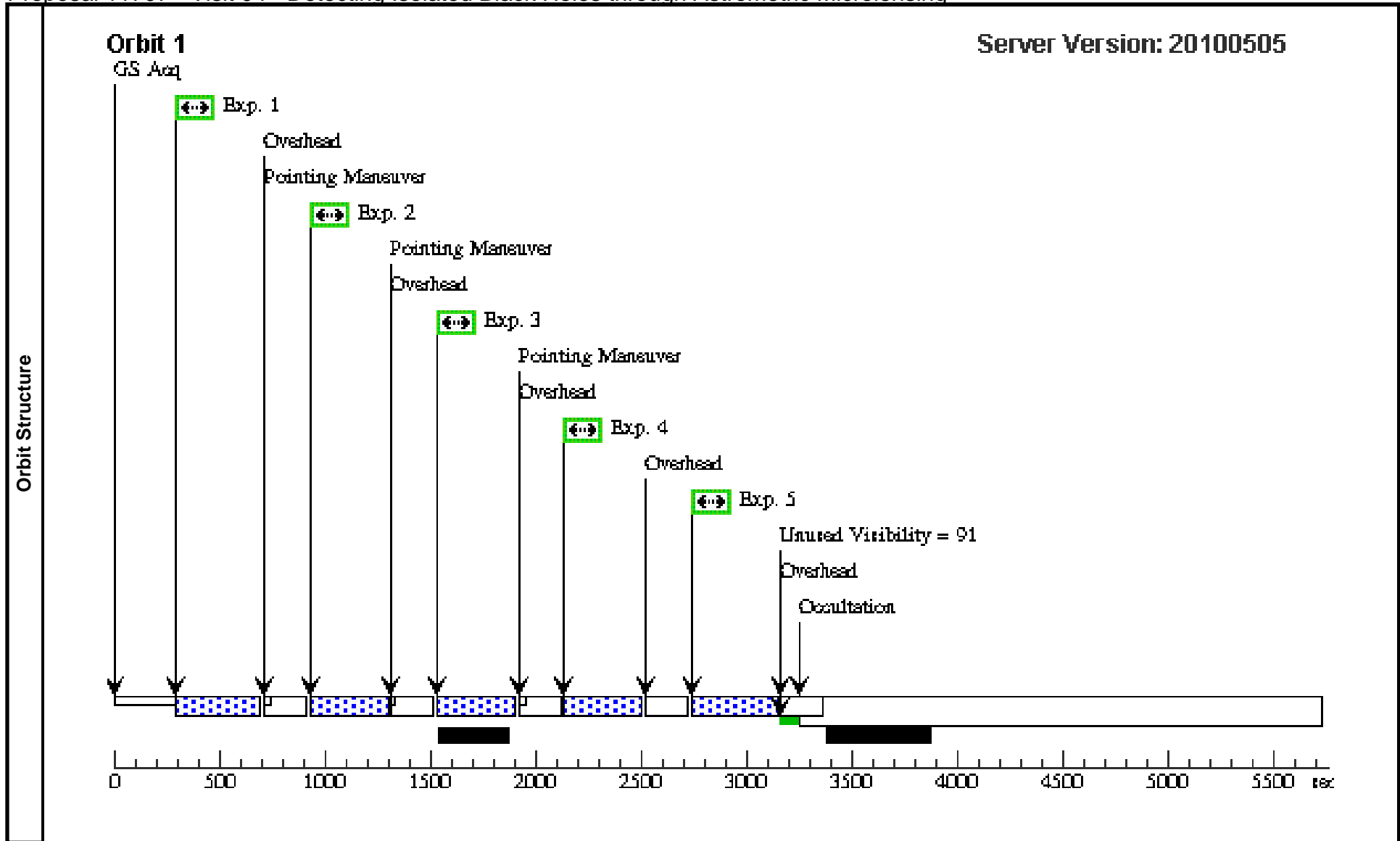
| Visit | Proposal 11707, Visit 09, completed Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: ORIENT 318D TO 318 D; BETWEEN 21-JUN-2010:00:00:00 AND 27-JUN-2010:00:00:00 | | | | | | | | | |
|-----------|--|----------------------|--|---------------------------------|--------------------------|-----------------------|--|--------|-------------------------|-------|
| | Fixed Targets | # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous | | | |
| | (6) | MOA-2010-BLG-235 | RA: 18 04 56.6100 (271.2358750d) Dec: -29 02 18.30 (-29.03842d) Equinox: J2000 | | V=18 | Reference Frame: ICRS | | | | |
| Exposures | # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time/[Actual Dur.] | Orbit |
| | 1 | (6) MOA-2010-BLG-235 | (6) MOA-2010-BLG-235 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG -39.9,-2.79; GS ACQ SCENARIO BASE1B3 | | 375 Secs [==>] | [1] |
| | 2 | (6) MOA-2010-BLG-235 | (6) MOA-2010-BLG-235 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG -7.98,-0.56 | | 375 Secs [==>] | [1] |
| | 3 | (6) MOA-2010-BLG-235 | (6) MOA-2010-BLG-235 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG 7.98,0.56 | | 375 Secs [==>] | [1] |
| | 4 | (6) MOA-2010-BLG-235 | (6) MOA-2010-BLG-235 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG 39.9,2.79 | | 375 Secs [==>] | [1] |
| | 5 | (6) MOA-2010-BLG-235 | (6) MOA-2010-BLG-235 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F606W | CR-SPLIT=NO | POS TARG 39.9,2.79 | | 390 Secs [==>] | [1] |



Proposal 11707 - Visit 09 - Detecting Isolated Black Holes through Astrometric Microlensing

Wed Oct 06 01:01:51 GMT 2010

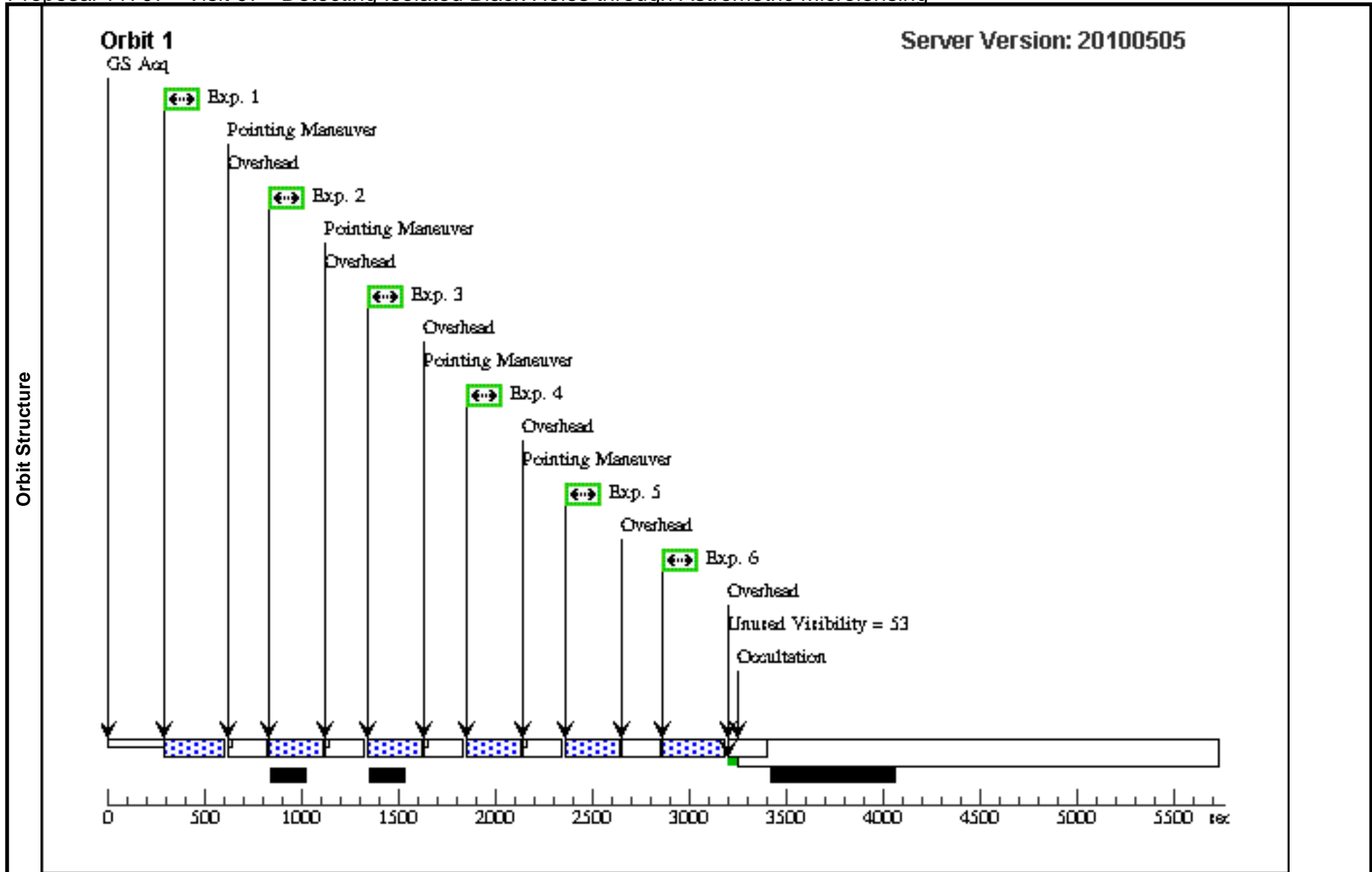
| Visit | Proposal 11707, Visit 04, completed Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: ORIENT 90D TO 90 D; BETWEEN 01-JUL-2010:00:00:00 AND 02-AUG-2010:00:00:00 | | | | | | | | | |
|-----------|--|------------------|--|---------------------------------|--------------------------|-----------------------|--|--------|-------------------------|-------|
| | Fixed Targets | # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous | | | |
| | (2) | MOA-2010-BLG-356 | RA: 17 59 25.4000 (269.8558333d) Dec: -27 21 31.30 (-27.35869d) Equinox: J2000 | | V=18.5 | Reference Frame: ICRS | | | | |
| Exposures | # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time/[Actual Dur.] | Orbit |
| | 1 | | (2) MOA-2010-BLG-356 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG -39.9,-2.79; GS ACQ SCENARIO BASE1B3 | | 375 Secs [==>] | [1] |
| | 2 | | (2) MOA-2010-BLG-356 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG -7.98,-0.56 | | 375 Secs [==>] | [1] |
| | 3 | | (2) MOA-2010-BLG-356 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG 7.98,0.56 | | 375 Secs [==>] | [1] |
| | 4 | | (2) MOA-2010-BLG-356 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG 39.9,2.79 | | 375 Secs [==>] | [1] |
| | 5 | | (2) MOA-2010-BLG-356 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F606W | CR-SPLIT=NO | POS TARG 39.9,2.79 | | 390 Secs [==>] | [1] |



Proposal 11707 - Visit 04 - Detecting Isolated Black Holes through Astrometric Microlensing

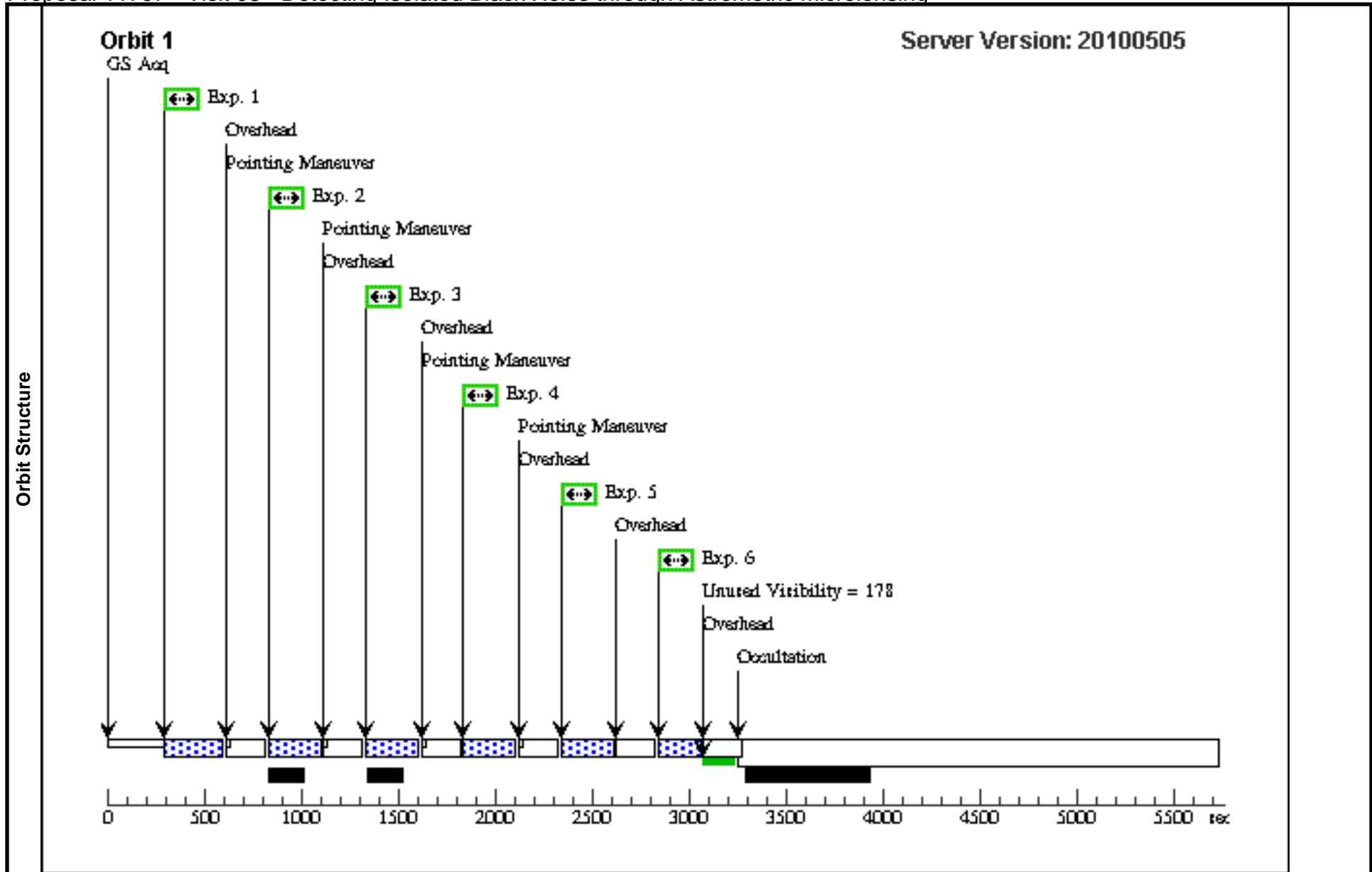
Wed Oct 06 01:01:52 GMT 2010

| Fixed Targets | Visit | | | | | | | | | |
|---------------|--|--|--------------------------|---------------------------------|-----------------------|--------------|-----------------------|--------|-------------------------|-------|
| | Proposal 11707, Visit 07, completed Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: ORIENT 275D TO 275 D; BETWEEN 22-MAR-2010:00:00:00 AND 24-MAR-2010:00:00:00 | | | | | | | | | |
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous | | | | | |
| (7) | MOA-2009-BLG-260 | RA: 17 58 28.5700 (269.6190417d) Dec: -26 50 21.09 (-26.83919d) Equinox: J2000 | | V=16.61+/-1.5 | Reference Frame: ICRS | | | | | |
| Exposures | # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time/[Actual Dur.] | Orbit |
| | 1 | (7) MOA-2009-BLG-260 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG -39.9,-2.79 | | 280 Secs [==>] | [1] |
| | 2 | (7) MOA-2009-BLG-260 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG -23.94,-1.67 | | 280 Secs [==>] | [1] |
| | 3 | (7) MOA-2009-BLG-260 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG -7.98,-0.56 | | 280 Secs [==>] | [1] |
| | 4 | (7) MOA-2009-BLG-260 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG 7.98,0.56 | | 280 Secs [==>] | [1] |
| | 5 | (7) MOA-2009-BLG-260 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG 23.94,1.67 | | 280 Secs [==>] | [1] |
| | 6 | (7) MOA-2009-BLG-260 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F606W | CR-SPLIT=NO | SAME POS AS 5 | | 300 Secs [==>] | [1] |



Proposal 11707 - Visit 07 - Detecting Isolated Black Holes through Astrometric Microlensing

| | | | | | | | | | | |
|------------------|--|----------------------|--|---------------------------------|--------------------------|-----------------------|-----------------------|--------|-------------------------|-------|
| Visit | Proposal 11707, Visit 08, completed Wed Oct 06 01:01:52 GMT 2010 Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: ORIENT 275D TO 275 D; BETWEEN 14-JUN-2010:00:00:00 AND 24-JUN-2010:00:00:00 | | | | | | | | | |
| | Fixed Targets | # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous | | | |
| (7) | | MOA-2009-BLG-260 | RA: 17 58 28.5700 (269.6190417d) Dec: -26 50 21.09 (-26.83919d) Equinox: J2000 | | V=16.61+/-1.5 | Reference Frame: ICRS | | | | |
| Exposures | # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time/[Actual Dur.] | Orbit |
| | 1 | (7) MOA-2009-BLG-260 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG -39.9,-2.79 | | 275 Secs [==>] | [1] |
| | 2 | (7) MOA-2009-BLG-260 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG -23.94,-1.67 | | 275 Secs [==>] | [1] |
| | 3 | (7) MOA-2009-BLG-260 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG -7.98,-0.56 | | 275 Secs [==>] | [1] |
| | 4 | (7) MOA-2009-BLG-260 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG 7.98,0.56 | | 275 Secs [==>] | [1] |
| | 5 | (7) MOA-2009-BLG-260 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG 23.94,1.67 | | 275 Secs [==>] | [1] |
| | 6 | (7) MOA-2009-BLG-260 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F606W | CR-SPLIT=NO | SAME POS AS 5 | | 200 Secs [==>] | [1] |



Proposal 11707 - Visit 08 - Detecting Isolated Black Holes through Astrometric Microlensing

Wed Oct 06 01:01:53 GMT 2010

| Fixed Targets | # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---------------|-----|------------------|--|--------------------------|---------------|-----------------------|
| | (7) | MOA-2009-BLG-260 | RA: 17 58 28.5700 (269.6190417d) Dec: -26 50 21.09 (-26.83919d) Equinox: J2000 | | V=16.61+/-1.5 | Reference Frame: ICRS |

| Exposures | # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time/[Actual Dur.] | Orbit |
|-----------|---|----------------------|---------------------------------|----------------------|---------------|-----------------------|---------------|--------|-------------------------|-------|
| | 1 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F606W | CR-SPLIT=NO | POS TARG -23.94,-1.67 | | | 275 Secs [==>] | [1] |
| | 2 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | SAME POS AS 1 | | | 275 Secs [==>] | [1] |
| | 3 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG -7.98,-0.56 | | | 275 Secs [==>] | [1] |
| | 4 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG 7.98,0.56 | | | 275 Secs [==>] | [1] |
| | 5 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F814W | CR-SPLIT=NO | POS TARG 23.94,1.67 | | | 275 Secs [==>] | [1] |
| | 6 | (7) MOA-2009-BLG-260 | WFC3/UVIS, ACCUM, UVIS1-2K4-SUB | F606W | CR-SPLIT=NO | SAME POS AS 5 | | | 275 Secs [==>] | [1] |

