



## 17460 - Heavy metals escaping from a hot Neptune

Cycle: 31, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

### INVESTIGATORS

<i>Name</i>	<i>Institution</i>
<b>Dr. Antonija Oklopčič (PI) (ESA Member) (Contact)</b>	<b>Universiteit van Amsterdam</b>
Dr. Heather A. Knutson (CoI) (AdminUSPI)	California Institute of Technology
Dr. Jessica Spake (CoI) (CoPI) (Contact)	California Institute of Technology
Dion Linssen (CoI) (ESA Member)	University of Amsterdam

### 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) LTT9779	STIS/CCD STIS/NUV-MAMA	3	11-Jun-2024 14:01:33.0	yes
02	(1) LTT9779	STIS/CCD STIS/NUV-MAMA	3	11-Jun-2024 14:01:35.0	yes
03	(1) LTT9779	STIS/CCD STIS/NUV-MAMA	3	11-Jun-2024 14:01:36.0	yes
04	(1) LTT9779	STIS/CCD STIS/NUV-MAMA	3	11-Jun-2024 14:01:37.0	yes
05	(1) LTT9779	STIS/CCD STIS/NUV-MAMA	3	11-Jun-2024 14:01:38.0	yes

15 Total Orbits Used

## **ABSTRACT**

A large fraction of known exoplanets orbit their host stars at very short periods. Due to such close proximity to the parent star, their atmospheres are exposed to high levels of stellar radiation and stellar wind, as well as strong tidal interactions, which can lead to atmospheric escape operating in a regime much more efficient than in the Solar System planets. Efficient atmospheric mass loss has the power to radically transform planets by changing their atmospheric structure or by removing the atmosphere altogether. Even though the first evidence of ongoing atmospheric escape in exoplanets was acquired for close-in gas giants, exoplanet demographics suggest that this process likely plays a much greater evolutionary role in planets the size of Neptune and smaller. It is believed to be responsible for shaping the so-called 'hot Neptune desert', the observed paucity of intermediate-sized planets at close orbital separations. LTT 9779b is a rare example of a planet residing well within this desert, in the part of the parameter space where atmospheric escape driven by stellar high-energy radiation can be further assisted by Roche lobe overflow, resulting in extremely high mass-loss rates. The goal of our proposal is to observe the ongoing atmospheric escape for this ultra-hot Neptune through transmission spectroscopy at NUV wavelengths with STIS. The NUV wavelength range gives us the best opportunity to observe the upper atmosphere in multiple lines of different species, which is necessary in order to break modeling degeneracies and constrain the atmospheric mass-loss rate.

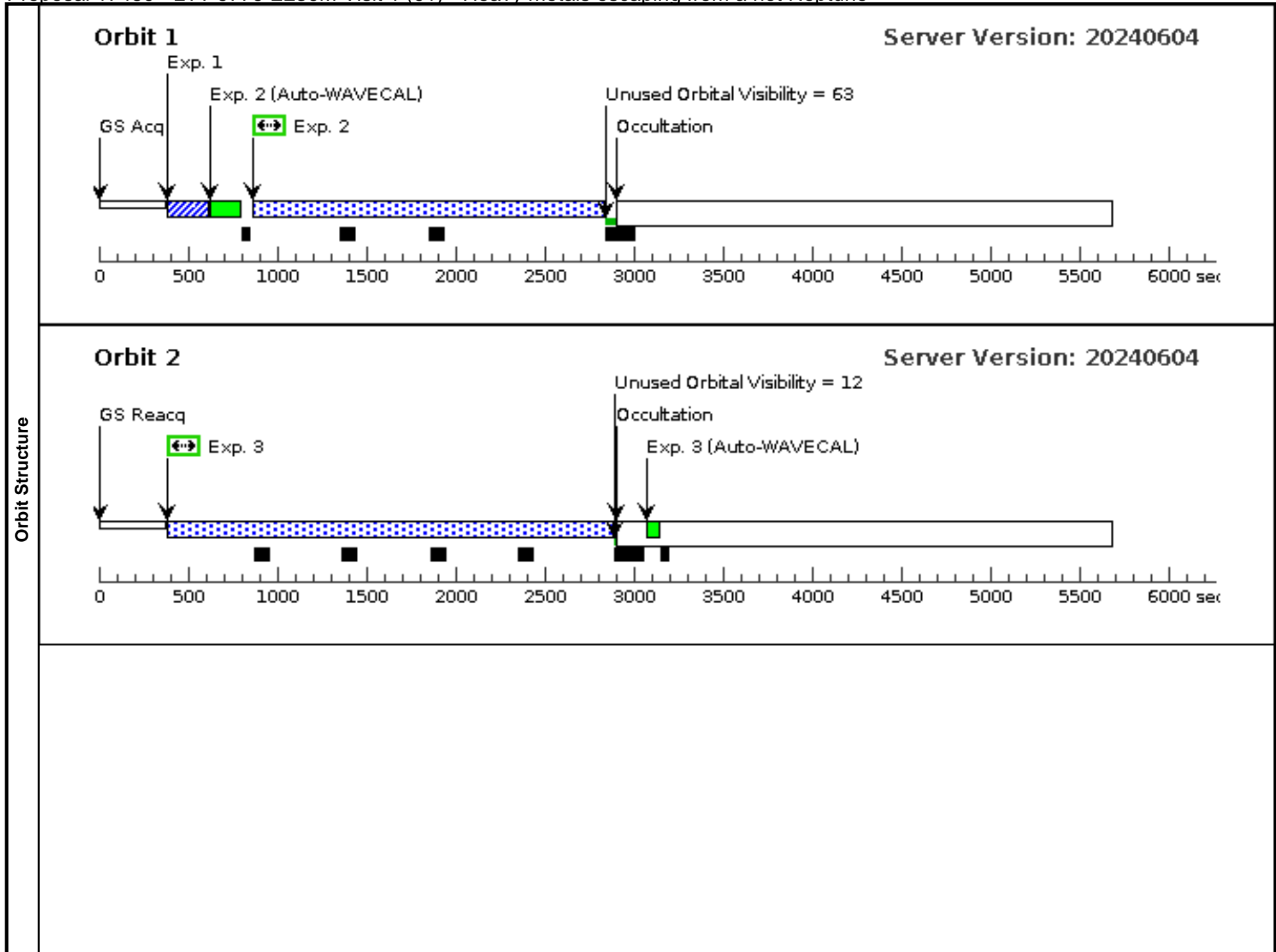
## **OBSERVING DESCRIPTION**

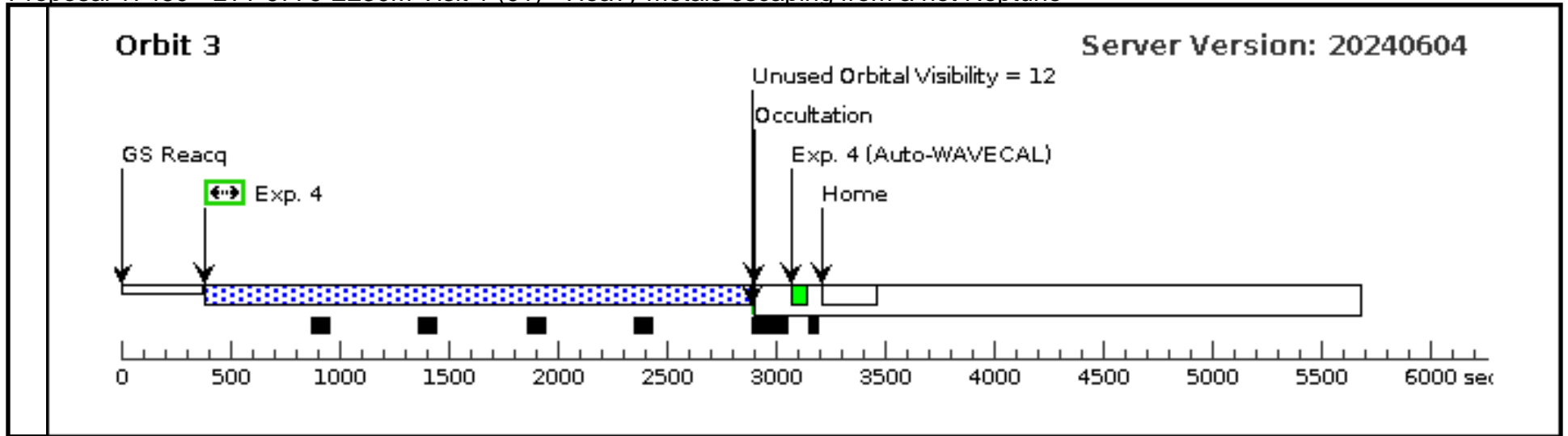
We will observe the transiting exoplanet system LTT 9779 with five visits of three orbits each. Each visit will be centered around a transit of the planet LTT 9779b, which has an orbital period of 0.79 days, allowing for frequent observing opportunities. Each of the five visits must be a non-interrupted sequence in order to cover a pre-transit baseline with the first orbit, the transit itself in the second orbit, and the post-transit baseline with the third orbit. Target acquisition will be performed with the recommended F28X50LP filter, and 0.2s exposure times. This is below the saturation time of 0.33s. The rest of the observing time will be dedicated to spectroscopy with the E230M echelle. The buffer time given by the exposure time calculator is 617 s. We have therefore used the recommended 4/5 value of 493 s.

Proposal 17460 - LTT 9779 E230M Visit 1 (01) - Heavy metals escaping from a hot Neptune

Tue Jun 11 18:01:38 GMT 2024

Visit	<b>Proposal 17460, LTT 9779 E230M Visit 1 (01), completed</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: STIS/NUV-MAMA, STIS/CCD Special Requirements: SCHED 100%; Period 0.7920641 D AND ZERO-PHASE HJD2459043.31061 <i>Comments: It is essential that the three orbits be scheduled in a continuous block.</i>																					
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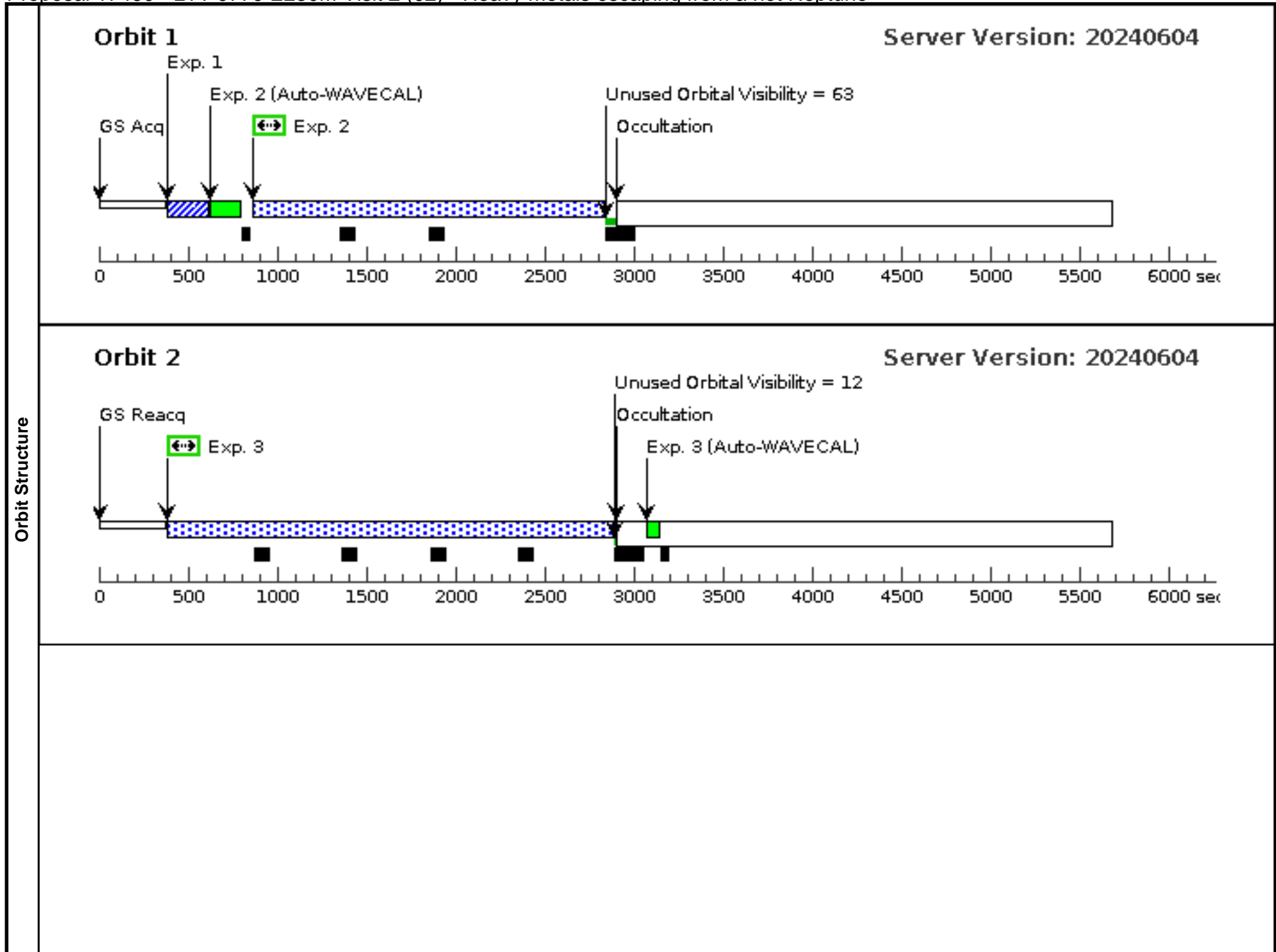


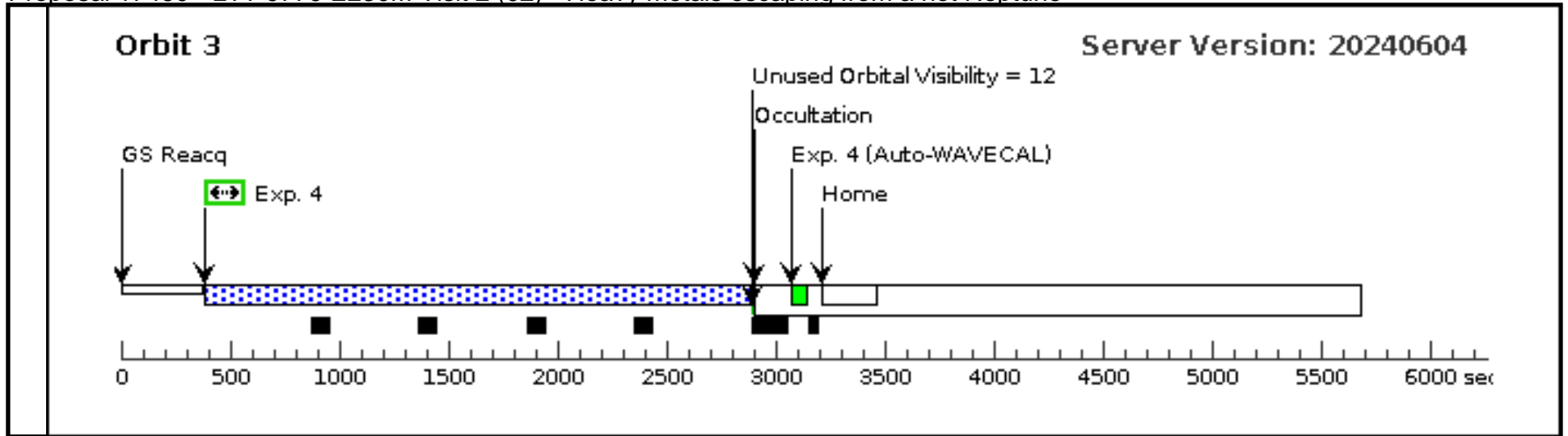


Proposal 17460 - LTT 9779 E230M Visit 2 (02) - Heavy metals escaping from a hot Neptune

Tue Jun 11 18:01:38 GMT 2024

Visit	<b>Proposal 17460, LTT 9779 E230M Visit 2 (02), completed</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: STIS/NUV-MAMA, STIS/CCD Special Requirements: SCHED 100%; Period 0.7920641 D AND ZERO-PHASE HJD2459043.31061 <i>Comments: It is essential that the three orbits be scheduled in a continuous block.</i>																					
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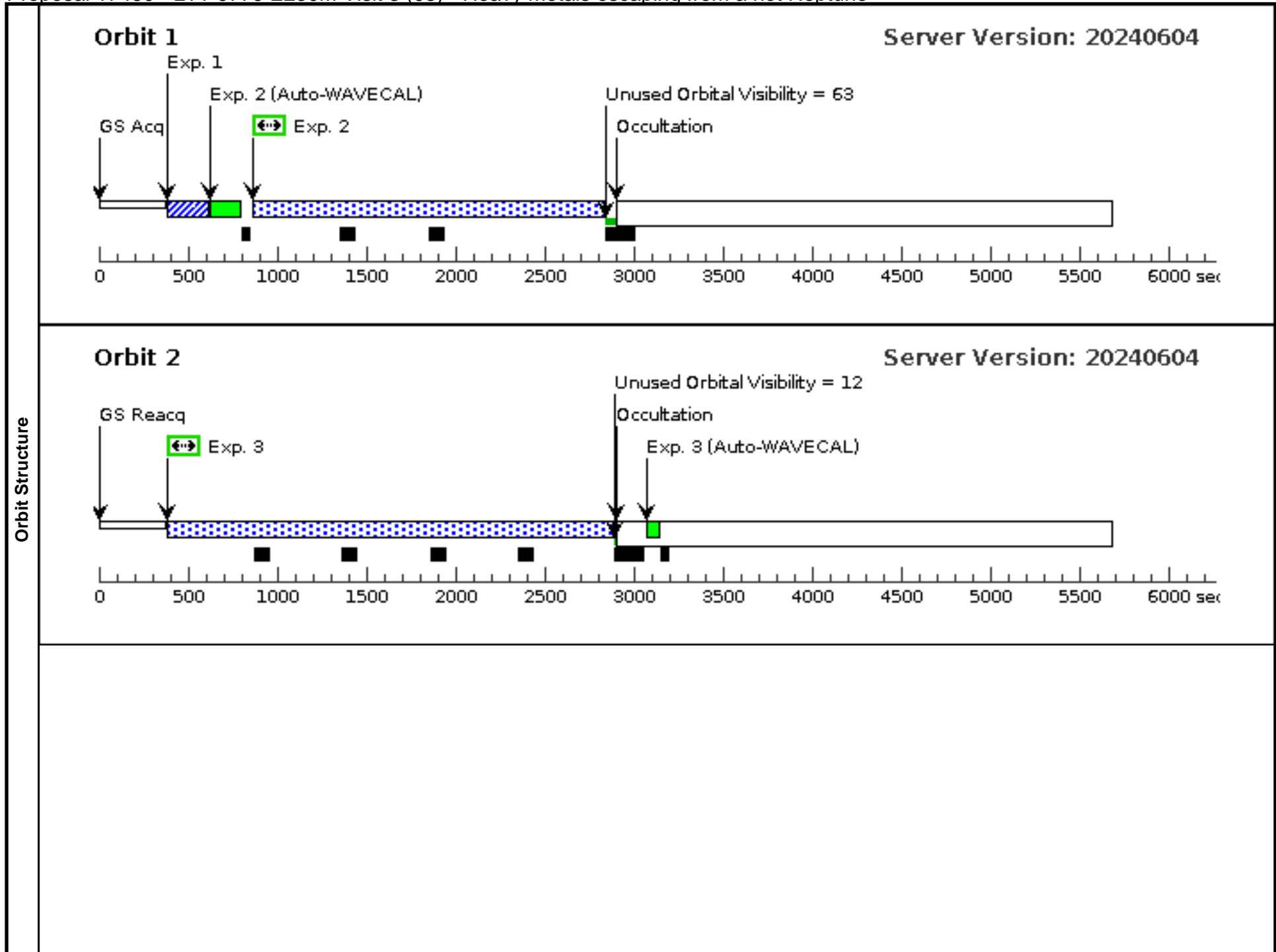


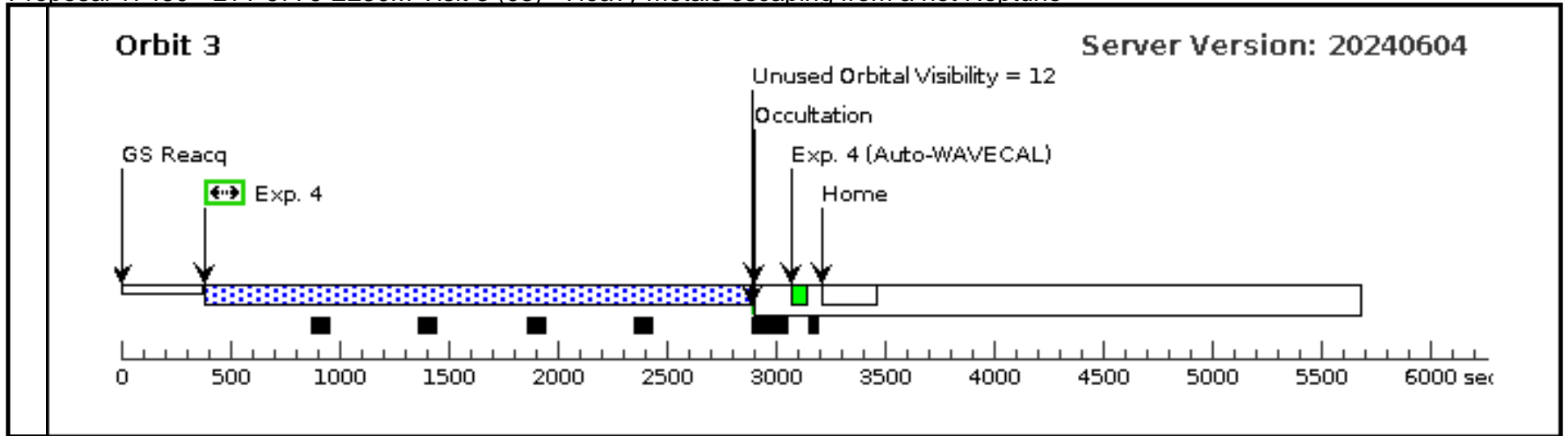


Proposal 17460 - LTT 9779 E230M Visit 3 (03) - Heavy metals escaping from a hot Neptune

Tue Jun 11 18:01:39 GMT 2024

Visit	<b>Proposal 17460, LTT 9779 E230M Visit 3 (03), implementation</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: STIS/NUV-MAMA, STIS/CCD Special Requirements: SCHED 100%; Period 0.7920641 D AND ZERO-PHASE HJD2459043.31061 <i>Comments: It is essential that the three orbits be scheduled in a continuous block.</i>																					
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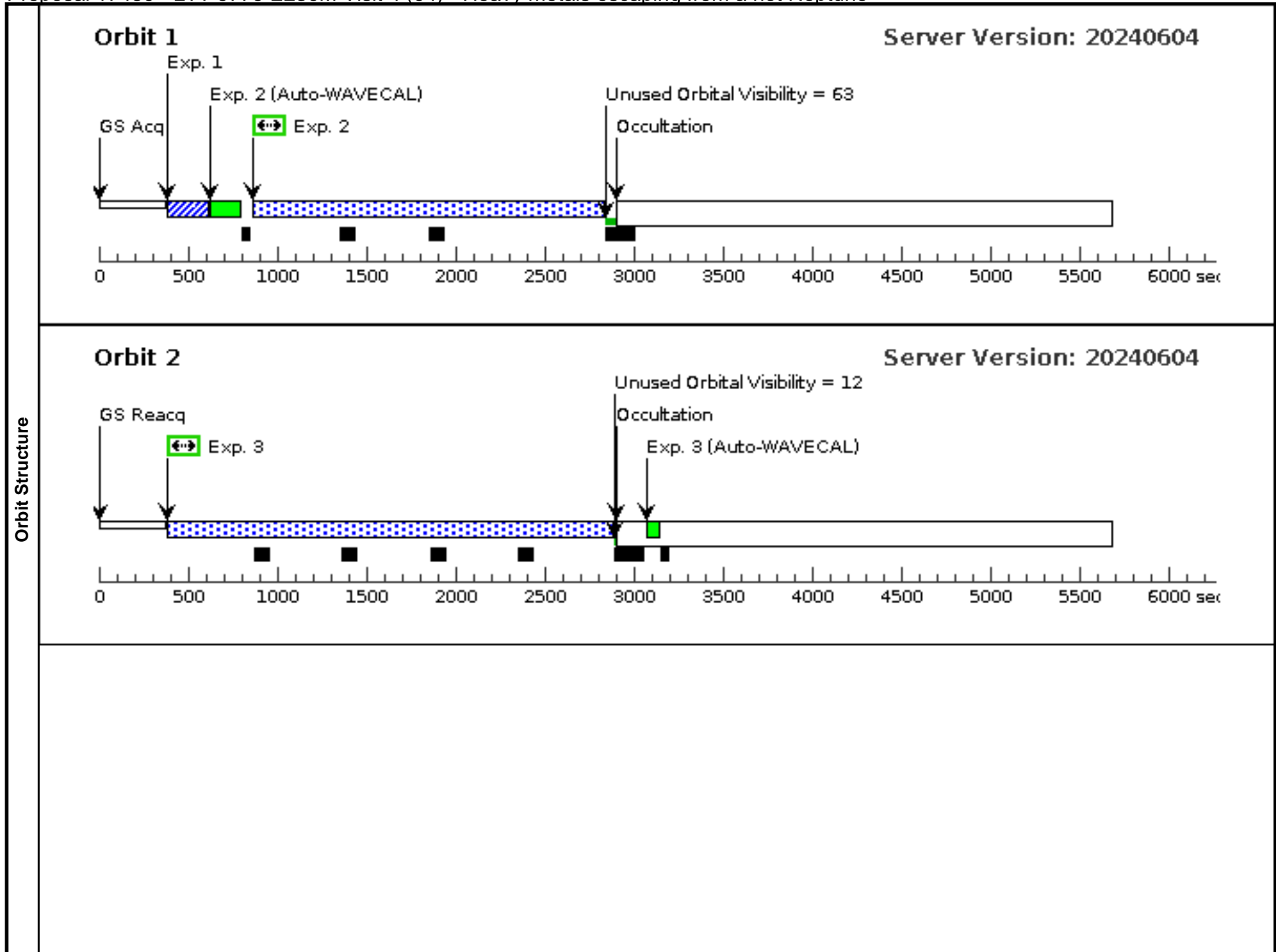


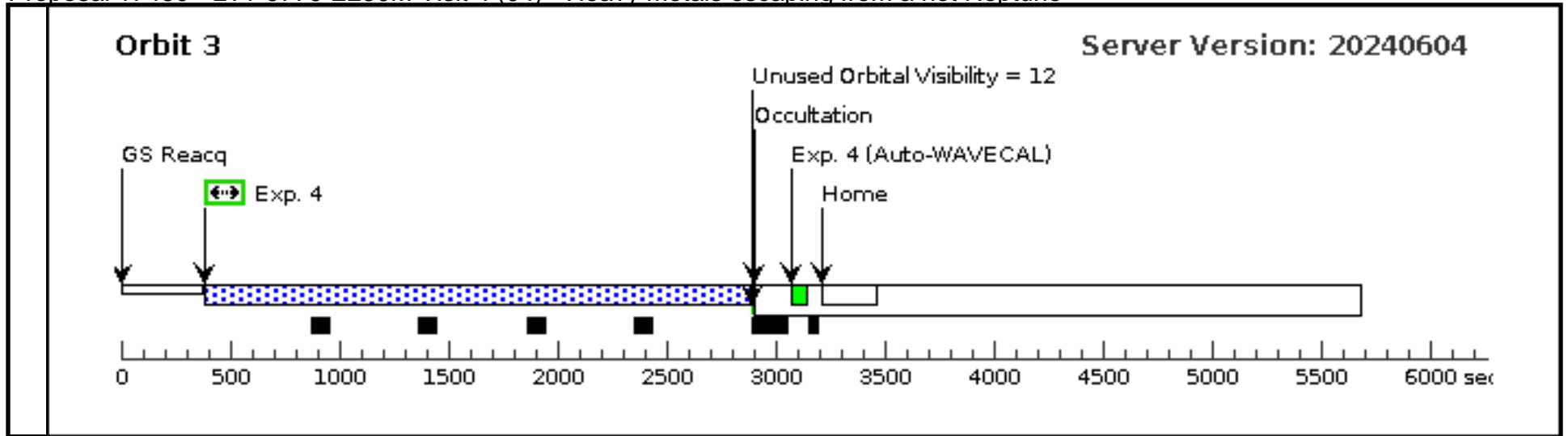


Proposal 17460 - LTT 9779 E230M Visit 4 (04) - Heavy metals escaping from a hot Neptune

Tue Jun 11 18:01:39 GMT 2024

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Proposal 17460 - LTT 9779 E230M Visit 5 (05) - Heavy metals escaping from a hot Neptune

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