# 12165 - Characterizing the UV environment of GJ1214b

Cycle: 18, Proposal Category: GO

(Availability Mode: SUPPORTED)

**INVESTIGATORS**



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**VISITS**

| *Visit* | *Targets used in Visit* | *Configurations used in Visit* | *Orbits Used* | *Last Orbit Planner Run* | *OP Current with Visit?* |
|---|---|---|---|---|---|
| 01 | (1) GJ1214 | STIS/CCD<br>STIS/FUV-MAMA | 4 | 09-Jul-2010 22:12:02.0 | yes |

4 Total Orbits Used

**ABSTRACT**

The recent detection of a super-Earth transiting a nearby low-mass star GJ1214 (Charbonneau et al., 2009) has opened the door to testing the predictions of low mass planet atmosphere theories. Theoretical models predict that low mass planets are likely to exist with atmospheres that can vary widely in their composition and structure. Some super-Earths may be able to retain massive hydrogen-rich atmospheres. Others might never accumulate hydrogen or experience significant escape of lightweight elements, resulting in atmospheres more like those of the terrestrial planets in our Solar System. Planets which orbit close to their parent stars, such as close-in hot-Jupiters and super-Earths, are exposed to strong XEUV flux that

influence their atmospheres and may trigger atmospheric escape processes. This phenomenon, which shapes planetary atmospheres, determines the evolution of the planet. This can also dramatically enhance the detectability of a heavily irradiated hydrogen atmosphere when the planet transits in front of its parent star. We propose to use HST/STIS/G140M to determine the intensity and variability of the Lyman-alpha chromospheric emission line and provide observational constraints to super-Earth atmospheric models. We propose to coordinate this measurement with a planetary transit in order to detect large upper atmospheric signatures if present. This short measurement also enables us to determine whether a larger program dedicated to upper atmospheric study is feasible for a following cycle.

**OBSERVING DESCRIPTION**

We will observe the exoplanet host-star GJ 1214 (a M dwarf) during 1 visit of 4 HST orbits. We aim at quantifying the stellar chromospheric Lyman alpha flux and the variability of this emission line. This program serves as a basis for a possible next cycle program aimed at detecting the exosphere of GJ1214.

We will use the the STIS/FUV-MAMA with the G140M grating and the 52x0.05 slit. Each orbit start with an ACQ/PEAK exposure with the CCD/G750L and the 52x0.05 slit. The first exposure of the first orbit is an acquistion exposure (ACQ) with the CCD/MIRROR and the F28x50LP aperture.

## Visit

**Proposal 12165, Visit 01** Sat Jul 10 02:12:08 GMT 2010

**Diagnostic Status: No Diagnostics**

Scientific Instruments: STIS/FUV-MAMA, STIS/CCD

Special Requirements: Period 1.5804075 D AND ZERO-PHASE HJD2454983.908864

*Comments: This program serves as a basis for a next cycle program aimed at detecting the exosphere of GJ1214. Therefore, this single visit should be scheduled as soon as possible in order to increase the scientific outcome of this project.*

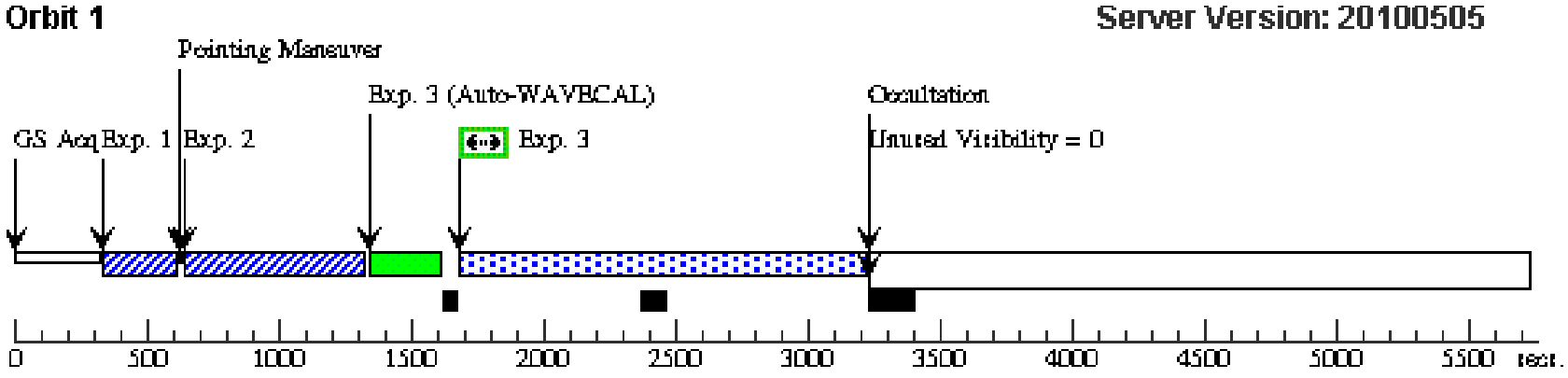
## Fixed Targets

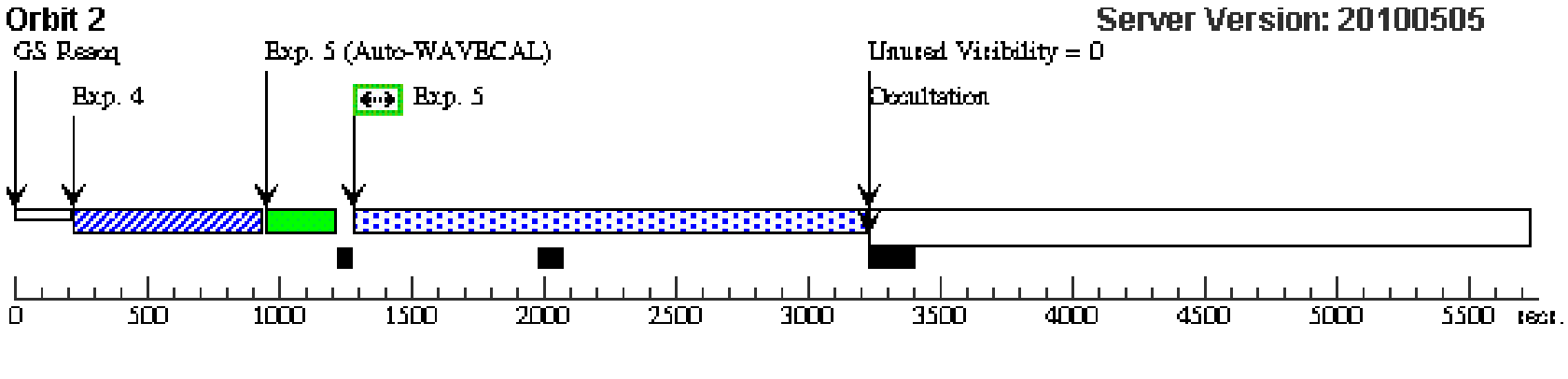
| # | Name | Target Coordinates | Targ. Coord. Corrections | Fluxes | Miscellaneous |
|---|---|---|---|---|---|
| (1) | GJ1214 | RA: 17 15 18.9400 (258.8289167d)<br>Dec: +04 57 49.70 (4.96381d)<br>Equinox: J2000 | Proper Motion RA: 0.039146817922343875s/yr<br>Proper Motion Dec: -0.752"/yr<br>Parallax: 0.0772"<br>Epoch of Position: 2000.53 | V=14.67+/-0.1<br>B=16.40,<br>J=9.75,<br>H=9.09,<br>K=8.78 | Reference Frame: ICRS |

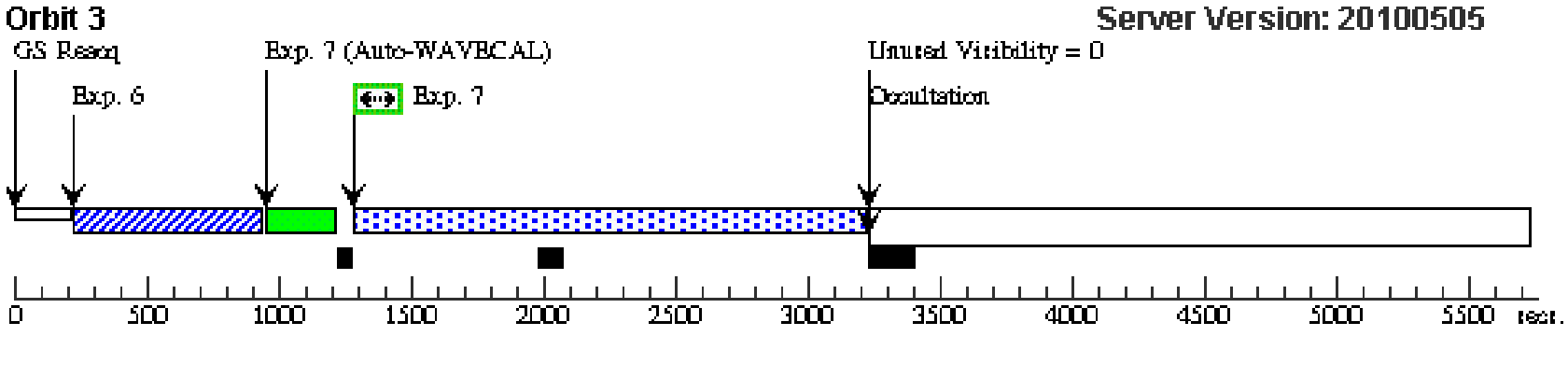
## Exposures

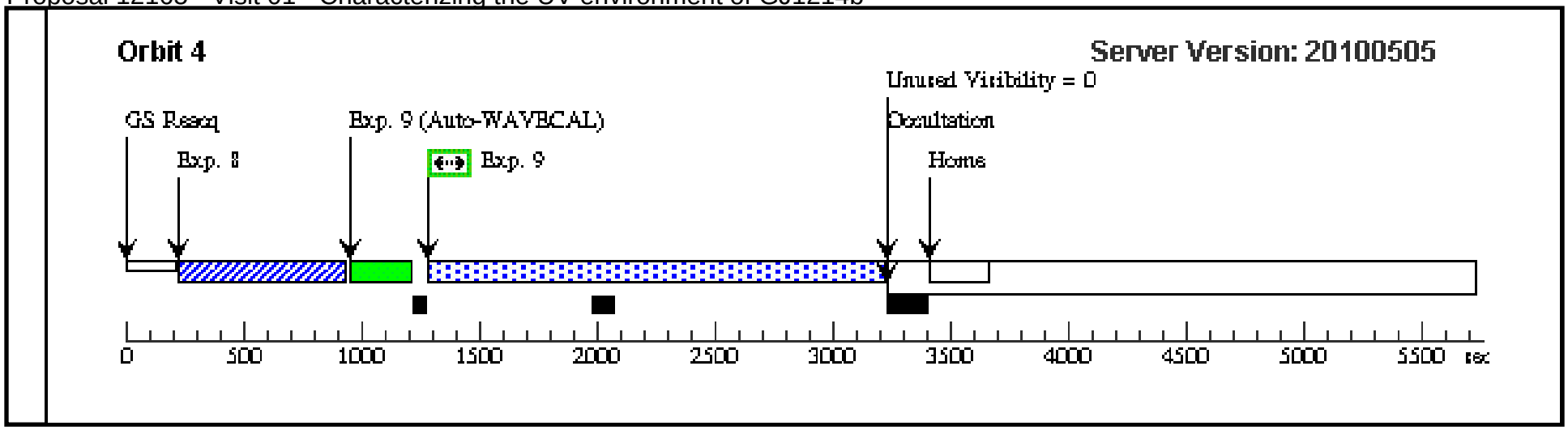
| # | Label | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | (1) GJ1214 | STIS/CCD, ACQ, F28X50OIII | MIRROR | ACQTYPE=POINT | PHASE 0.899 TO 0.913 | | 2 Secs<br>*[==>]* | <br>***[1]*** |
| *Comments: 10sec exposure time provides a S/N=50, well below the saturation time (from ETC-ACQ simulator).*<br>*The phase constraints are necessary to ensure that the planet is in transit for at least 2/3 of the 3rd orbit of the visit.* | | | | | | | | | |
| 2 | | (1) GJ1214 | STIS/CCD, ACQ/PEAK, 52X0.05 | G750L<br>7751 A | | | | 20 Secs<br>*[==>]* | <br>***[1]*** |
| *Comments: 20s exposure time provides a S/N=40 at 7751AA with the G750L and the 52x0.05 aperture, which is well below saturation (from ETC simulator).* | | | | | | | | | |
| 3 | | (1) GJ1214 | STIS/FUV-MAMA, TIME-TAG, 52X0.05 | G140M<br>1222 A | BUFFER-TIME=700 | | | 1521 Secs<br>*[==>]* | <br>***[1]*** |
| 4 | | (1) GJ1214 | STIS/CCD, ACQ/PEAK, 52X0.05 | G750L<br>7751 A | | | | 20 Secs<br>*[==>]* | <br>***[2]*** |
| *Comments: 20s exposure time provides a S/N=40 at 7751AA with the G750L and the 52x0.05 aperture, which is well below saturation (from ETC simulator).* | | | | | | | | | |
| 5 | | (1) GJ1214 | STIS/FUV-MAMA, TIME-TAG, 52X0.05 | G140M<br>1222 A | BUFFER-TIME=700 | | | 1920 Secs<br>*[==>]* | <br>***[2]*** |
| 6 | | (1) GJ1214 | STIS/CCD, ACQ/PEAK, 52X0.05 | G750L<br>7751 A | | | | 20 Secs<br>*[==>]* | <br>***[3]*** |
| *Comments: 20s exposure time provides a S/N=40 at 7751AA with the G750L and the 52x0.05 aperture, which is well below saturation (from ETC simulator).* | | | | | | | | | |
| 7 | | (1) GJ1214 | STIS/FUV-MAMA, TIME-TAG, 52X0.05 | G140M<br>1222 A | BUFFER-TIME=700 | | | 1920 Secs<br>*[==>]* | <br>***[3]*** |
| 8 | | (1) GJ1214 | STIS/CCD, ACQ/PEAK, 52X0.05 | G750L<br>7751 A | | | | 20 Secs<br>*[==>]* | <br>***[4]*** |
| *Comments: 20s exposure time provides a S/N=40 at 7751AA with the G750L and the 52x0.05 aperture, which is well below saturation (from ETC simulator).* | | | | | | | | | |
| 9 | | (1) GJ1214 | STIS/FUV-MAMA, TIME-TAG, 52X0.05 | G140M<br>1222 A | BUFFER-TIME=700 | | | 1920 Secs<br>*[==>]* | <br>***[4]*** |

Orbit Structure

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Exp. 9 (Auto-WAVECAL)
Exp. 9
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