



15934 - Far-ultraviolet exploration of nearby young exoplanet-hosting stars

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	(1) K2-233 WAVE	STIS/CCD STIS/FUV-MAMA	1	25-Jul-2019 09:02:08.0	yes
02	(2) K2-136 WAVE	STIS/CCD STIS/FUV-MAMA	1	25-Jul-2019 09:02:09.0	yes

2 Total Orbits Used

ABSTRACT

One of the proposed explanations for the observed lack of close-in exoplanets with sizes between 1.5 and 2.0 Earth-radii is that this valley is carved by atmospheric erosion: sub-Neptune-sized planets begin their lives with large H/He-rich envelopes, which are lost during their early ages due to photoevaporation. The recent discovery of the young exoplanetary systems in K2-136 and K2-233 provides an excellent opportunity to test this hypothesis using Lyman-alpha transmission spectroscopy, but first we need to evaluate the FUV flux of the stars, which is the main objective of this

Proposal 15934 (STScI Edit Number: 0, Created: Thursday, July 25, 2019 at 8:02:10 AM Eastern Standard Time) - Overview

project. We realistically estimate that the Lyman-alpha emission of these K-type stars are promptly detectable with HST/STIS, despite their distance, owing to their young age. These observations will allow us to study the UV environment and evolution around young low-mass exoplanetary systems, and in the future could lead to the first evidence of atmospheric escape in a young sub- Neptune.

OBSERVING DESCRIPTION

This program aims to observe the Lyman-alpha emission (1215 Å) of young planet-hosting K4-type stars (V mag ~ 11) using the FUV-MAMA detector and the G140M grating centered in 1222 Å.

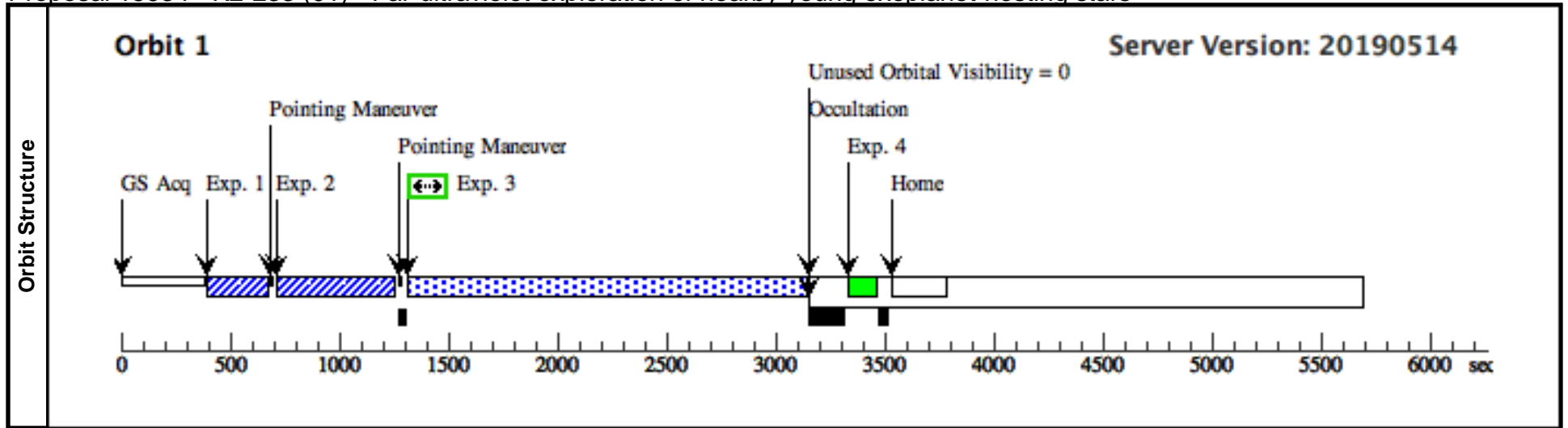
We perform the ACQ/PEAK exposures in spectroscopic mode because the target stars are too bright in the visible to be observed with MIRROR + 52X0.05D1 aperture (the same as the science exposures). We moved the AUTO-WAVECAL to GO-WAVECAL during Earth occultation: the time gained for the scientific exposures would be very useful, since the stars are faint in the FUV. The Bright Object Tool says all targets in the field are safe, however there is one unknown in the field of K2-136 in the GSC II database.

Since our program has only 2 orbits and we do not have strict time-window limits, the eventual failure of one of the gyros does not have a significant impact on our program and it can still be carried on whenever a feasible time window is available.

Proposal 15934 - K2-233 (01) - Far-ultraviolet exploration of nearby young exoplanet-hosting stars

Thu Jul 25 13:02:10 GMT 2019

Visit		Proposal 15934, K2-233 (01) Diagnostic Status: No Diagnostics Scientific Instruments: STIS/CCD, STIS/FUV-MAMA Special Requirements: (none)									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous					
	(1)	K2-233	RA: 15 21 55.1981 (230.4799921d) Dec: -20 13 53.99 (-20.23166d) Equinox: J2000	Proper Motion RA: -19.871 mas/yr Proper Motion Dec: -31.188 mas/yr Parallax: 0.014785" Epoch of Position: 2000 Radial Velocity: -10.264443704601566 km/sec	V=10.88+/-0.09 B 11.81, G 10.4191, J 8.968, H 8.501, K 8.375	Reference Frame: ICRS					
<i>Comments: Astrometric information obtained from Gaia and magnitudes from SIMBAD.</i> Category=STAR Description=[EXTRA-SOLAR PLANETARY SYSTEM, K III-I]											
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit	
	1	ACQ (STIS.ta.137 0052)	(1) K2-233	STIS/CCD, ACQ, F28X50OII	MIRROR			Sequence 1-4 Non-Int in K2-233 (01)	6 Secs (6 Secs) [==>]	[1]	
	<i>Comments: The target is too bright for the longpass filter, so the F28X50OII was selected instead. The time to reach signal to noise ratio of 40 is estimated at 6 s, with time to saturation 603 s.</i>										
	2	ACQ/PEAK (STIS.sp.13 70722)	(1) K2-233	STIS/CCD, ACQ/PEAK, 52X0.05D1	G430M 4451 A			Sequence 1-4 Non-Int in K2-233 (01)	12 Secs (12 Secs) [==>]	[1]	
	<i>Comments: We need to use a grating instead of mirror because the target is too bright. 12 s allows to reach S/N=10 with STIS/CCD/G430M and aperture 52x0.05D1 (the same as the science observations), and is below the time to saturation (4000 s). The Spectroscopic ETC yields a warning about the issue with charge transfer efficiency for low background, but we are just using the CCD for the target acquisition, after which we switch to the MAMA.</i>										
3	SCIENCE (STIS.sp.13 70117)	(1) K2-233	STIS/FUV-MAMA, TIME-TAG, 52X0.05D1	G140M 1222 A	BUFFER-TIME=90 0; WAVECAL=NO		Sequence 1-4 Non-Int in K2-233 (01)	1500 Secs (1664 Secs) [==>1664.0 Secs]	[1]		
<i>Comments: We are photon-starved and set the exposure time to the maximum possible value. The star is later-type (K3) than the K0 stars HD189733 and HD97658, observed with the same settings in previous programs, and it is farther away and fainter. We thus expect lower count rates, and set the buffer-time as Texp/2.</i>											
4	GO-WAVE CAL	WAVE	STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A			Sequence 1-4 Non-Int in K2-233 (01)	[==>]	[1]		



Proposal 15934 - K2-136 (02) - Far-ultraviolet exploration of nearby young exoplanet-hosting stars

Thu Jul 25 13:02:10 GMT 2019

Visit		Proposal 15934, K2-136 (02) Diagnostic Status: No Diagnostics Scientific Instruments: STIS/CCD, STIS/FUV-MAMA Special Requirements: (none)									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous					
	(2)	K2-136	RA: 04 29 38.9938 (67.4124742d) Dec: +22 52 57.79 (22.88272d) Equinox: J2000	Proper Motion RA: 82.874 mas/yr Proper Motion Dec: -35.617 mas/yr Parallax: 0.016849678662681658 " Epoch of Position: 2000 Radial Velocity: 39.484744811025294 km/sec	V=11.20+/-0.01 B 12.48, R 10.90, G 10.8545, J 9.096, H 8.496, K 8.368	Reference Frame: ICRS					
<i>Comments: Astrometric information obtained from Gaia and magnitudes from SIMBAD.</i> Category=STAR Description=[EXTRA-SOLAR PLANETARY SYSTEM, K V-IV]											
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit	
	1	ACQ (STIS.ta.137 0118)	(2) K2-136	STIS/CCD, ACQ, F28X50OII	MIRROR			Sequence 1-4 Non-Int in K2-136 (02)	13 Secs (13 Secs) [==>]	[1]	
	<i>Comments: The target is too bright for the longpass filter, so the F28X50OII was selected instead. The time to reach signal to noise ratio of 40 is estimated at 13 s, with time to saturation 1286 s.</i>										
	2	ACQ/PEAK (STIS.sp.13 70728)	(2) K2-136	STIS/CCD, ACQ/PEAK, 52X0.05D1	G430M 4451 A			Sequence 1-4 Non-Int in K2-136 (02)	19 Secs (19 Secs) [==>]	[1]	
	<i>Comments: We need to use a grating instead of mirror because the target is too bright. 19 s allows to reach over S/N=10 with STIS/CCD/G430M and aperture 52x0.05D1 (the same as the science observations), and is below the time to saturation (5800 s). The Spectroscopic ETC yields a warning about the issue with charge transfer efficiency for low background, but we are just using the CCD for the target acquisition, after which we switch to the MAMA.</i>										
3	SCIENCE (STIS.sp.13 70717)	(2) K2-136	STIS/FUV-MAMA, TIME-TAG, 52X0.05D1	G140M 1222 A	BUFFER-TIME=90 0; WAVECAL=NO		Sequence 1-4 Non-Int in K2-136 (02)	1500 Secs (1524 Secs) [==>1524.0 Secs]	[1]		
<i>Comments: We are photon-starved and set the exposure time to the maximum possible value. The star is later-type (K6) than the K0 stars HD189733 and HD97658, observed with the same settings in previous programs, and it is farther away and fainter. We thus expect lower count rates, and set the buffer-time as Texp/2.</i>											
4	GO-WAVE CAL	WAVE	STIS/FUV-MAMA, ACCUM, 52X0.05	G140M 1222 A			Sequence 1-4 Non-Int in K2-136 (02)	[==>]	[1]		

