14162 - The magnetic activity puzzle of the super-earth host star KOI-314

Cycle: 23, Proposal Category: GO

(UV Initiative)

(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) 2MASS-J19213157+4317347	WFC3/UVIS	1	16-Oct-2015 21:08:29.0	yes

1 Total Orbits Used

ABSTRACT

Magnetic activity is an ubiquitous phenomenon of cool stars and causes stellar high-energy emission, which is thought to be the driver of atmospheric evaporation of exoplanets in close orbits around their host stars. We have recently observed the super-earth hosting star KOI-314 in X-rays, in order to characterize the evaporation and evolution of its planets. However, we found the star to be very X-ray dim, indicating very low magnetic activity. This is in direct contrast with archival NUV observations with GALEX and optical high-resolution spectra, which show strong magnetic activity in the upper and lower chromosphere. We propose to obtain a new NUV spectrum with the WFC3/UVIS UV grism in one HST orbit in order to characterize the current activity level in the upper chromosphere, and compare this to current X-ray measurements of the coronal activity and optical spectra of the lower chromosphere activity. Investigating this stellar atmosphere that seems to deviate from the usual coronal and

chromopsheric heating standard model is relevant for understanding the high-energy environment and evolution of exoplanetary atmospheres.

OBSERVING DESCRIPTION

We propose to observe the planetary system KOI-314 with WFC3/UVIS using the G280 UV grism to cover a wavelength region of 2000-4000 Angstrom, using one HST orbit split into four spectral exposures.

We request 4 moderate duration spectra of 600 s each during one orbit, which we will later stack to reach higher S/N. This is within the data transmission constraints for WFC3.

For the sequence of exposures during the orbit, we request first blind target acquisition; the proper motion of the target is small. Guide star acquisition will take 6 minutes according to the HST handbook.

After that, we request several (identical) exposures of 600 s duration in UVIS-ACCUM mode. The readout overhead for the first exposure is 2.6 minutes, and 2.1 minutes for the subsequent exposures. The buffer can be dumped into the solid state recorder during each subsequent exposure, so that no additional overhead occurs for the buffer dump.

We request to use the post-flash at the end of every exposure to mitigate effects of degrading charge transfer efficiency. This will add 0.1 minutes to each science exposure. This setup will require a total of 3318 s to perform, using 97% of the available visibility time of 3420 s in a single orbit.

Visit

Proposal 14162, Visit 01, implementation Sat Oct 17 01:08:30 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Comments: I have dithered the exposures 1, 2, and 3 by hand, by setting different POS TARG arguments. This should be equivalent to a dither of 5 pixels between exposures.

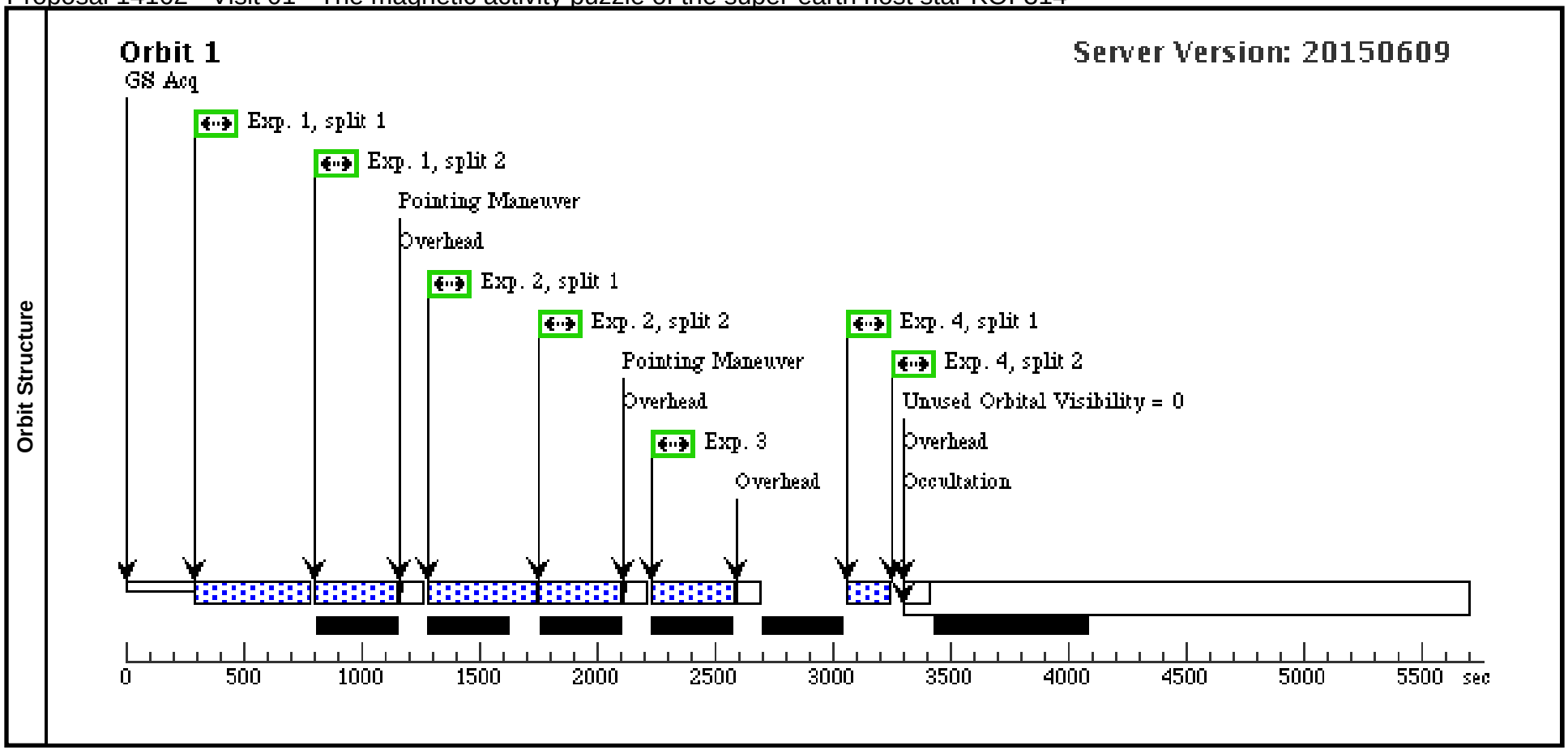
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	2MASS-J19213157+4317347 Alt Name1: KOI-314	RA: 19 21 31.5710 (290.3815458d) Dec: +43 17 34.70 (43.29297d) Equinox: J2000		V=13.3+/-0.2 J=10.3, H=9.7, K=9.5	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Extended=NO

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) 2MASS-J19213157+4317347	WFC3/UVIS, ACCUM, UVIS	G280	CR-SPLIT=2	POS TARG null,-50		695 Secs (695 Secs) *[==>(Split 1)]* *[==>(Split 2)]*	***[1]***
2		(1) 2MASS-J19213157+4317347	WFC3/UVIS, ACCUM, UVIS	G280	CR-SPLIT=2	POS TARG null,-49.8		695 Secs (695 Secs) *[==>(Split 1)]* *[==>(Split 2)]*	***[1]***
3		(1) 2MASS-J19213157+4317347	WFC3/UVIS, ACCUM, UVIS	G280		POS TARG null,-49.6		348 Secs (348 Secs) *[==>]*	***[1]***
4		(1) 2MASS-J19213157+4317347	WFC3/UVIS, ACCUM, G280-REF	F300X	CR-SPLIT=2; FLASH=12	POS TARG null,-49.6		75 Secs (75 Secs) *[==>(Split 1)]* *[==>(Split 2)]*	***[1]***


Orbit Structure
Orbit 1
Server Version: 20150609
GS Acq
Exp. 1, split 1
Exp. 1, split 2
Pointing Maneuver
Overhead
Exp. 2, split 1
Exp. 2, split 2
Pointing Maneuver
Overhead
Exp. 3
Overhead
Exp. 4, split 1
Exp. 4, split 2
Unused Orbital Visibility = 0
Overhead
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec