



## 14698 - The first spectrally resolved Ha measurement of an accreting planet

Cycle: 24, Proposal Category: GO

(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) EM-LKCA-15	STIS/CCD	2	29-Jul-2016 14:54:46.0	yes
02	(1) EM-LKCA-15	STIS/CCD	2	29-Jul-2016 14:54:48.0	yes

4 Total Orbits Used

### ABSTRACT

LkCa 15 b was recently detected in H $\alpha$  using AO enhanced imaging and we propose to follow-up on this detection with HST STIS observations to provide, for the first time, a velocity resolved profile of planetary H $\alpha$  emission. The velocity shift of the H $\alpha$  emission is related to the planetary accretion mode, magnetospheric or boundary layer accretion. If a velocity shift is found that is close to the free-fall velocity, this would point to magnetospheric accretion, and thus, would provide evidence of early planetary magnetic fields.

## **OBSERVING DESCRIPTION**

The goal of the observations is to obtain extremely high S/N data on the H $\alpha$  line with the slit aligned along the line connecting the star and the planet (separated from the star by about 0,1 arcsec). We take the P.A. of Sallum et al. (2015) extrapolated to the approx. date of the observations (P.A. about 254 deg, East of North). To exclude systematics, we repeat the observations with HST rotated by 180 deg.

The target is moderately variable so that we have to budget for this when calculating exposure times to safely avoid saturation. Exposure times are calculated from an ESO VLT Xshooter spectrum of the source scaled to match the photometry of Grankin et al. (2007). Running the ETC using this spectrum implies that we have to use multiple short exposures to avoid saturation, which is also the rationale for using CCDGAIN=4. To reduce the overhead, in particular the readout time, we use a subarray mode. We readout 64 pixel (or 3.2 arcsec) around the center of the spectral trace. This ensures that the relevant part of the detector is read in all exposures, i.e., the detector region that can be used for background estimates is covered in all exposures despite dithering.

Dithering along the slit is implemented to avoid detector artifacts falling in the region of the H $\alpha$  line. We specifically implement a 5-point dither with steps of 4.2 pixel (or 0.213 arcsec per step and a total shift of 0.852 arcsec). Thereby, we shift the spectral trace by several PSF-widths to avoid potential detector artifacts and expect that the spatial centroid of the spectral trace falls onto different locations with respect to the pixel center.

Target ACQ and ACQ/PEAK:

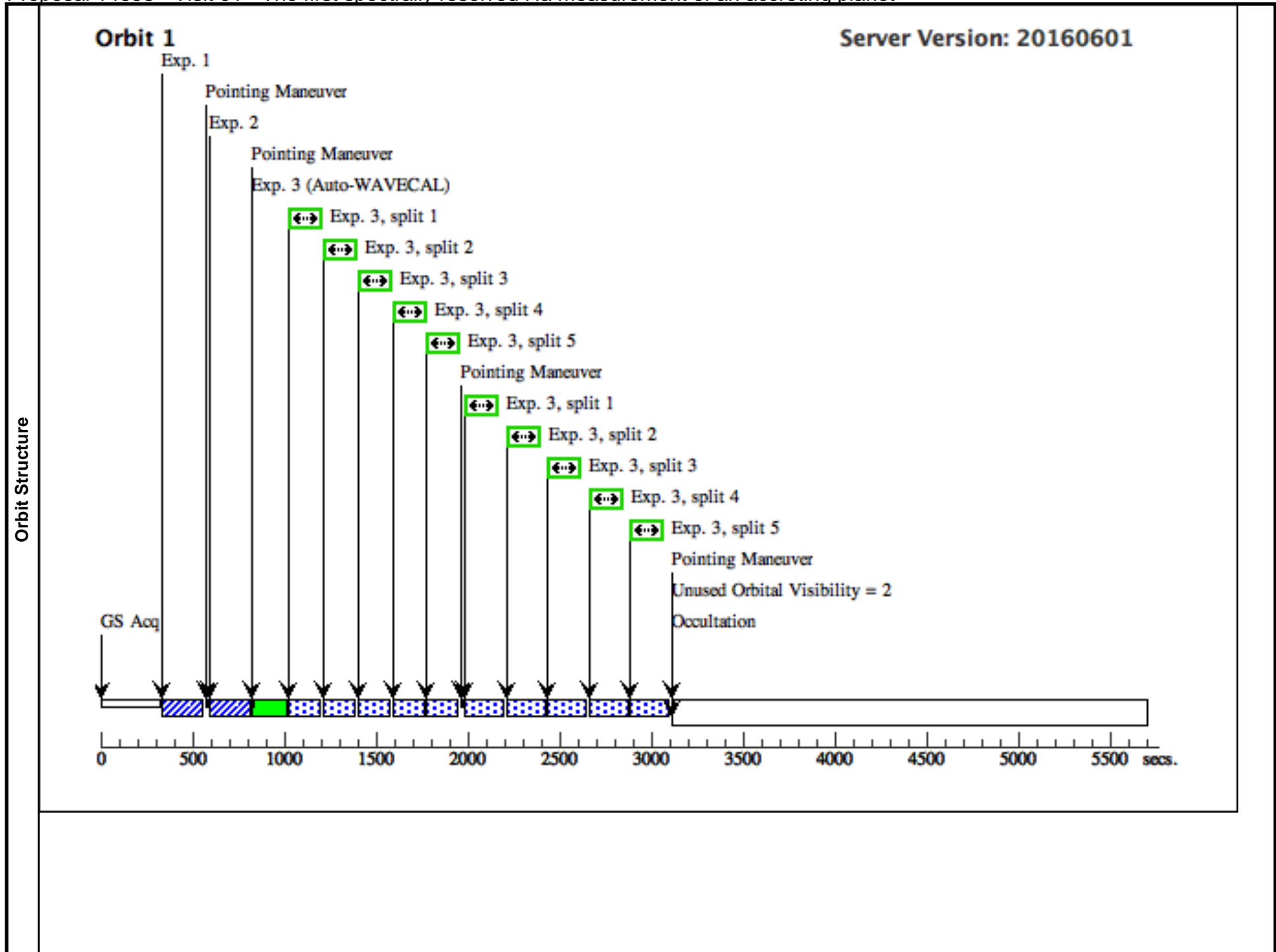
Using the Xshooter spectrum suggests that an exposure time of 0.2 s with the F28x50LP filter provides a similar margin against over- and underexposure. This also applies to the ACQ/PEAK exposure.

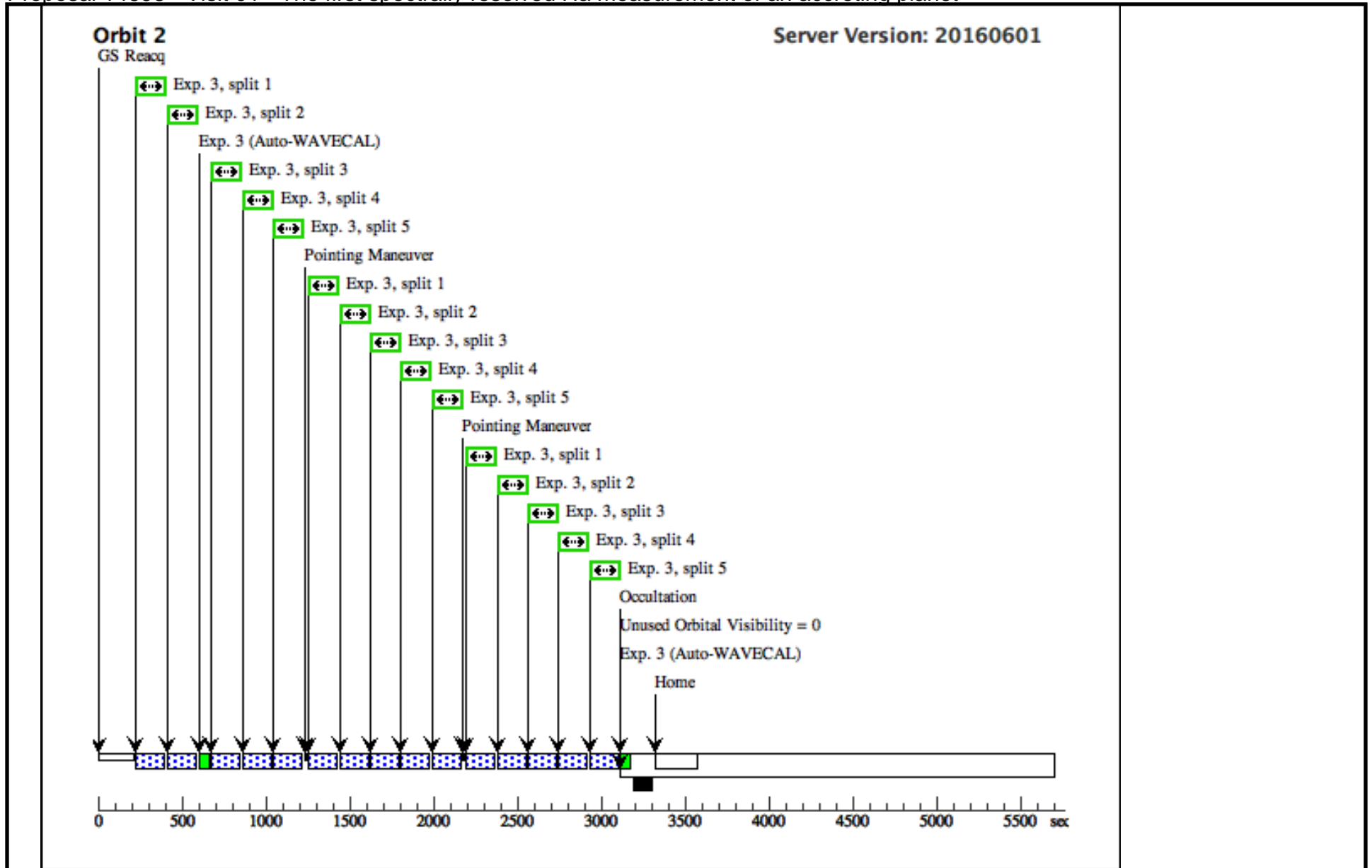
Proposal 14698 - Visit 01 - The first spectrally resolved Ha measurement of an accreting planet

Fri Jul 29 18:54:50 GMT 2016

<b>Visit</b>	<b>Proposal 14698, Visit 01</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: STIS/CCD Special Requirements: SCHED 60%; ORIENT 117D TO 121 D					
	<b>Patterns</b>	# (1)	<b>Primary Pattern</b> Pattern Type=STIS-ALONG-SLIT      Coordinate Frame=POS-TARG Purpose=DITHER                      Pattern Orientation=90.0 Number Of Points=5                  Angle Between Sides= Point Spacing=0.213                  Center Pattern=true Line Spacing=	<b>Secondary Pattern</b>	<b>Exposures</b> (3)	
<b>Fixed Targets</b>	# (1)	<b>Name</b> EM-LKCA-15	<b>Target Coordinates</b> RA: 04 39 17.8070 (69.8241958d) Dec: +22 21 3.26 (22.35091d) Equinox: J2000	<b>Targ. Coord. Corrections</b>	<b>Fluxes</b> V=12.03	<b>Miscellaneous</b> Reference Frame: ICRS
Comments: Coordinates are for 2016.8. Proper motion within one year is on the 10 mas level and can, therefore, be neglected here. The object was generated by the targetselector and retrieved from the SIMBAD database.						







Proposal 14698 - Visit 02 - The first spectrally resolved Ha measurement of an accreting planet

Fri Jul 29 18:54:50 GMT 2016

<b>Visit</b>	<b>Proposal 14698, Visit 02</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: STIS/CCD Special Requirements: SCHED 80%; ORIENT 297D TO 301 D					
	<b>Patterns</b>	<b>#</b>	<b>Primary Pattern</b>	<b>Secondary Pattern</b>	<b>Exposures</b>	
	(1)	Pattern Type=STIS-ALONG-SLIT      Coordinate Frame=POS-TARG Purpose=DITHER                      Pattern Orientation=90.0 Number Of Points=5                  Angle Between Sides= Point Spacing=0.213                Center Pattern=true Line Spacing=		(3)		
<b>Fixed Targets</b>	<b>#</b>	<b>Name</b>	<b>Target Coordinates</b>	<b>Targ. Coord. Corrections</b>	<b>Fluxes</b>	<b>Miscellaneous</b>
	(1)	EM-LKCA-15	RA: 04 39 17.8070 (69.8241958d) Dec: +22 21 3.26 (22.35091d) Equinox: J2000		V=12.03	Reference Frame: ICRS
	<i>Comments: Coordinates are for 2016.8. Proper motion within one year is on the 10 mas level and can, therefore, be neglected here.</i> <i>The object was generated by the targetselector and retrieved from the SIMBAD database.</i>					



Orbit Structure

