



15079 - Spectroscopic characterization of a newly detected young planet right outside a circumbinary transition disk

Cycle: 25, 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) V-CS-CHA	WFC3/IR	1	02-May-2018 18:06:11.0	yes

1 Total Orbits Used

ABSTRACT

Direct high-contrast imaging has discovered a number of substellar companions to date. Most of them are located at large separations of 10s or 100s of au. The formation of such massive objects with several Jupiter masses at the large distances at which they reside is not well understood by planet formation models. The formation timescales of such planets is much larger than the typical disk dissipation time. Most of the detected substellar companions are located in old, typically >10Myr, systems where we can only study the remnants of the circumstellar disks in the form of debris belts.

Proposal 15079 (STScI Edit Number: 3, Created: Wednesday, May 2, 2018 5:06:12 PM EST) - Overview

We detected for the first time a planet in a young (2 Myr) system right outside of a dust and gas rich circumbinary disk, which we also resolve in (polarized) scattered light using the extreme adaptive optics Imager SPHERE at the ESO Very Large Telescope. We already confirmed that the object is co-moving with the primary star and now ask for follow up spectroscopy with the sole instrument capable of it, HST/WFC3, to firmly derive its mass.

OBSERVING DESCRIPTION

The aim of the proposal is to obtain a spectrum with the WFC3/IR G141 grism of a newly discovered planetary mass object located outside the circumplanetary disk of the CS Cha system.

Observing strategy: The companion is located at 1.32 arcsec from the central system, and at a position angle of 261.69 degrees. The central system is much brighter than the target (J=9 mag and J=19 mag, respectively) thus the observations are challenging. We cannot observe both targets simultaneously since the contrast of WFC3/IR is not enough, therefore we must put the central bright system outside the field of view, and position the companion in the cross-dispersion direction at the inner edge of the detector. We have thus given as coordinates for the target an offset position. Studies have shown that the width of the cross-dispersion profile ranges from about 1.3 to 1.6 pixel (FWHM) with the G141 grism. Even if the spectrum of the bright target will appear in the detector, we will anyway be able to separate the two spectra thanks to the high spatial resolution of WFC3.

To position the object in the cross-dispersion direction we must have an orientation of ca. 40-60 degrees, or ca. 210-230 degrees. We specified only the latter as this is the inclination available at the next observation window. If not schedulable in October, we would like to specify 40-60 degrees, but then we have to change the pointing.

Exposure time and orbit planning: The target is known to be a very low mass object, with spectral type later than M9.5, and with J=19 mag. We have performed ETC calculation using the G141 grism and we obtain a S/N=10 at 1.4micron, the minimum requirement, in 200s, while a more reliable S/N=30 with an exposure of 1330s. Furthermore, we must perform a direct image of the target, possibly at each dither position. We thus plan to perform a default two dither positions pattern with a sequence of one short (150s) image, and one spectrum exposed for 1350s at each dither position. Including overheads, this pattern will fit into one 60 minutes orbit, which is the estimated orbital visibility reported by the APT for this target.

Proposal 15079 - Visit 01 - Spectroscopic characterization of a newly detected young planet right outside a circumbinary transition disk

Wed May 02 22:06:12 GMT 2018

Visit	Proposal 15079, Visit 01, implementation				
	Diagnostic Status: No Diagnostics				
	Scientific Instruments: WFC3/IR				
	Special Requirements: ORIENT 200D TO 200 D				

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	V-CS-CHA	RA: 11 02 29.4474 (165.6226975d) Dec: -77 32 16.21 (-77.53784d) Equinox: J2000		V=11.69	Reference Frame: SIMBAD
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>					
	Category=STAR Description=[PRE-MAIN SEQUENCE STAR, T TAURI STAR]					

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(1) V-CS-CHA	(1) V-CS-CHA	WFC3/IR, MULTIACCUM, GRISM1024	F140W	SAMP-SEQ=STEP2 5; NSAMP=8	POS TARG -1.7244 552201979368,51.66 366241717134; GS ACQ SCENARI O BASE1B3		99.231256 Secs (99.231 Secs) [==>]	[1]
	2	(1) V-CS-CHA	(1) V-CS-CHA	WFC3/IR, MULTIACCUM, GRISM1024	G141	NSAMP=14; SAMP-SEQ=STEP2 00	POS TARG -1.7244 552201979368,51.66 366241717134		1399.231402 Secs (1399.231 Secs) [==>]	[1]
	3	(1) V-CS-CHA	(1) V-CS-CHA	WFC3/IR, MULTIACCUM, GRISM1024	F140W	SAMP-SEQ=STEP2 5; NSAMP=8			99.231256 Secs (99.231 Secs) [==>]	[1]
	4	(1) V-CS-CHA	(1) V-CS-CHA	WFC3/IR, MULTIACCUM, GRISM1024	G141	NSAMP=14; SAMP-SEQ=STEP2 00			1399.231402 Secs (1399.231 Secs) [==>]	[1]

