



18245 - Characterizing the Accreting Protoplanet Embedded in the Protoplanetary Disk

Cycle: 33, 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) IRAS-19205-0746	WFC3/UVIS	1	28-Apr-2026 15:00:53.0	yes
02	(2) TYC-5709-28-1	WFC3/UVIS	1	28-Apr-2026 15:00:55.0	yes

2 Total Orbits Used

ABSTRACT

The planetary growth rate, specifically the mass accretion rate, is a key parameter in planet formation, as it ultimately determines a planet's final mass. Traditionally, accretion rates have been estimated using hydrogen emission lines based on the accretion flow model, originally developed for stars. However, Aoyama et al. recently proposed the accretion shock model as an alternative mechanism for hydrogen line emission. For planetary-

mass objects, the shock model predicts accretion rates up to an order of magnitude higher than the flow model, making it crucial to determine which mechanism dominates.

We propose a joint JWST-HST observing program of the protoplanet WISPIT 2 b to distinguish between the two models using hydrogen line ratios. For the first time, this study will enable more accurate estimates of accretion rates in accreting planets embedded within protoplanetary disks. Our pilot observations pave the way for applying these models to characterize future discoveries with JWST and the ELTs.

OBSERVING DESCRIPTION

We request contemporaneous JWST and HST observations as described in Science Justification. While Pa-alpha and Pa-beta will be observed with JWST, H-beta will be observed with HST/WFC3. Below, we provide the observing description for the HST observations.

We propose a two-orbit campaign to observe the accreting planet WISPIT 2 b using the F487N filter. The C512C-SUB array of the WFC3/UVIS2 detector will be employed to minimize readout overheads. Since we will apply the Reference Star Differential Imaging (RDI) technique for PSF subtraction to mitigate self-subtraction, one orbit will be allocated to the target and the other to the reference star. We request that Visit-01 for the target (WISPIT 2 b) be fully scheduled within the JWST observing window. In contrast, Visit-02 for the reference star does not need to overlap with JWST observations.

Each orbit will consist of four 224 s exposures to improve spatial sampling (see below), resulting in a total integration time of 896 s per orbit in F487N. Note that the exposure time has been reduced from 720 s in the Phase I proposal to 224 s to avoid saturation. The expected SNR is 7, which is sufficient to achieve our science goals.

We adopt a four-point box dithering pattern to improve the spatial sampling of the images. The native pixel scale of 40 mas in the UVIS channel is undersampling for the spatial resolution of 70 mas in the F487N filter. The dithering distance will be half a pixel (20 mas) in either direction. At each dithering position, eight 28-second exposures will be taken to mitigate cosmic rays. The total integration times per orbit will be 896 s. The same procedure is applied to both the target and the reference star.

The background flux at the planets' locations is expected to be high because the planets are embedded in the bright stellar halo. Therefore, we choose to ignore the warnings regarding the FLASH levels and do not apply additional FLASH.

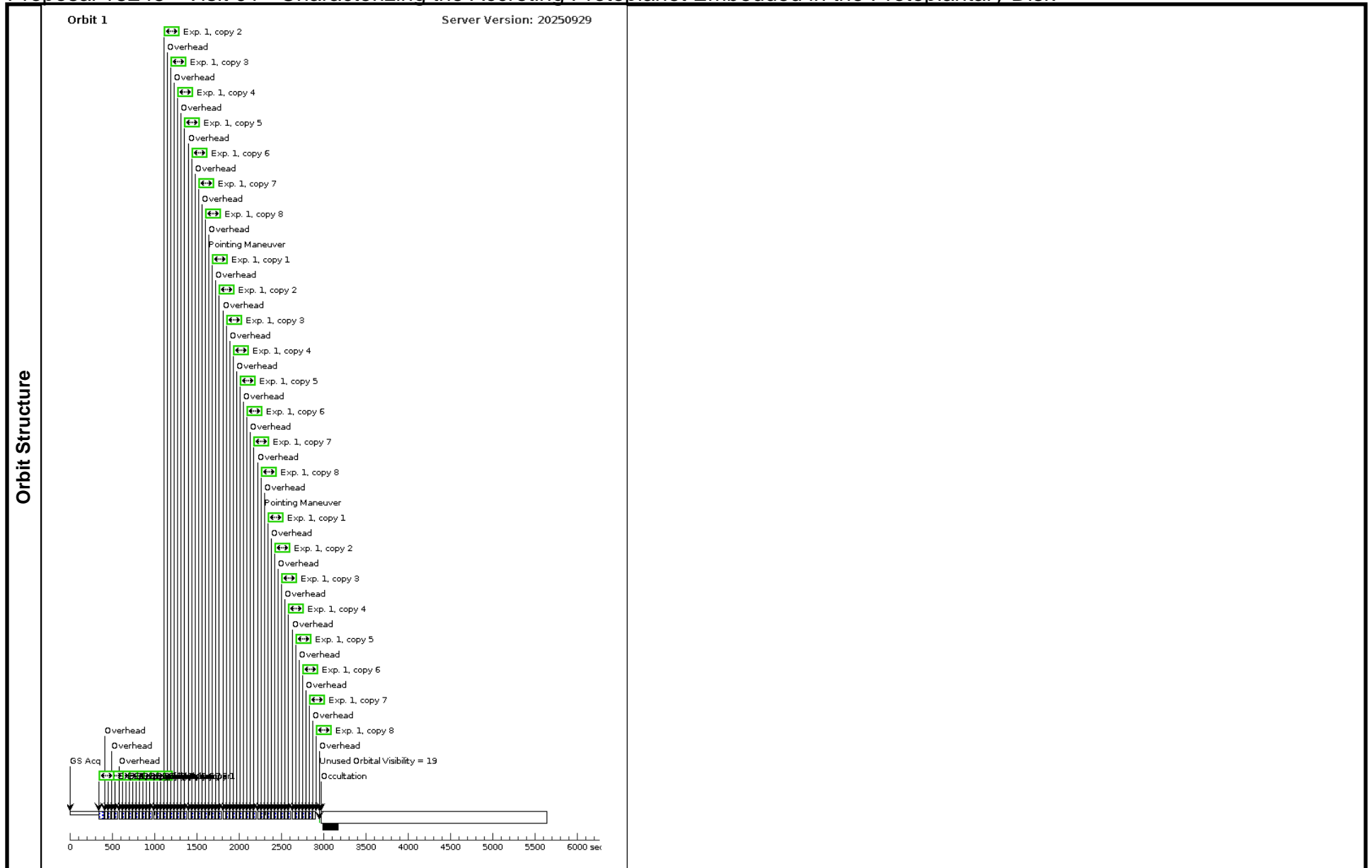
Proposal 18245 - Visit 01 - Characterizing the Accreting Protoplanet Embedded in the Protoplanetary Disk

Tue Apr 28 19:00:55 GMT 2026

Visit	Proposal 18245, Visit 01 Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: (none)					
	(Exposure 1 (Pattern 1, Exps 1-1 in Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser					
Diagnosics						
Patterns	#	Primary Pattern	Secondary Pattern	Exposures		
	(1)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.02 Line Spacing=0.02	Coordinate Frame=POS-TARG Pattern Orientation=0 Angle Between Sides=90 Center Pattern=false		(1)	
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	IRAS-19205-0746	RA: 19 23 17.0332 (290.8209717d) Dec: -07 40 55.08 (-7.68197d) Equinox: J2000	Proper Motion RA: 6.308 mas/yr Proper Motion Dec: -27.137999904880417 mas/yr Parallax: 0.0074649" Epoch of Position: 2000	V=11.197	Reference Frame: ICRS
<p><i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i></p> <p><i>SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.</i></p> <p><i>Category=STAR</i> <i>Description=[EXTRA-SOLAR PLANETARY SYSTEM]</i> <i>Extended=NO</i></p>						

Proposal 18245 - Visit 01 - Characterizing the Accreting Protoplanet Embedded in the Protoplanetary Disk

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(2330427)	(1) IRAS-19205-074 6	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F487N		POS TARG 0,0	Pattern 1, Exps 1-1 i n Visit 01 (1)	28 Secs X 8 (896 Secs)	
Exposures	[==>(Pattern 1, Copy 1)] [==>(Pattern 1, Copy 2)] [==>(Pattern 1, Copy 3)] [==>(Pattern 1, Copy 4)] [==>(Pattern 1, Copy 5)] [==>(Pattern 1, Copy 6)] [==>(Pattern 1, Copy 7)] [==>(Pattern 1, Copy 8)] [==>(Pattern 2, Copy 1)] [==>(Pattern 2, Copy 2)] [==>(Pattern 2, Copy 3)] [==>(Pattern 2, Copy 4)] [==>(Pattern 2, Copy 5)] [==>(Pattern 2, Copy 6)] [==>(Pattern 2, Copy 7)] [==>(Pattern 2, Copy 8)] [==>(Pattern 3, Copy 1)] [==>(Pattern 3, Copy 2)] [==>(Pattern 3, Copy 3)] [==>(Pattern 3, Copy 4)] [==>(Pattern 3, Copy 5)] [==>(Pattern 3, Copy 6)] [==>(Pattern 3, Copy 7)] [==>(Pattern 3, Copy 8)] [==>(Pattern 4, Copy 1)] [==>(Pattern 4, Copy 2)] [==>(Pattern 4, Copy 3)] [==>(Pattern 4, Copy 4)] [==>(Pattern 4, Copy 5)] [==>(Pattern 4, Copy 6)] [==>(Pattern 4, Copy 7)] [==>(Pattern 4, Copy 8)]								[1]



Proposal 18245 - Visit 02 - Characterizing the Accreting Protoplanet Embedded in the Protoplanetary Disk

Tue Apr 28 19:00:56 GMT 2026

Visit	Proposal 18245, Visit 02 Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: AFTER 01 BY 0 Orbits TO 1 Orbits					
	(Exposure 1 (Pattern 1, Exps 1-1 in Visit 02)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser					
Diagnosics						
Patterns	#	Primary Pattern	Secondary Pattern	Exposures		
	(1)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.02 Line Spacing=0.02 Coordinate Frame=POS-TARG Pattern Orientation=0 Angle Between Sides=90 Center Pattern=false		(1)		
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(2)	TYC-5709-28-1	RA: 19 21 47.6414 (290.4485058d) Dec: -07 57 3.78 (-7.95105d) Equinox: J2000	Proper Motion RA: -7.756 mas/yr Proper Motion Dec: 1.346 mas/yr Parallax: 6.826E-4" Epoch of Position: 2000	V=11.31	Reference Frame: ICRS
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM. Category=STAR Description=[K III-I] Extended=NO						

Proposal 18245 - Visit 02 - Characterizing the Accreting Protoplanet Embedded in the Protoplanetary Disk

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(2330427)	(2) TYC-5709-28-1	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F487N		POS TARG 0,0	Pattern 1, Exps 1-1 i n Visit 02 (1)	28 Secs X 8 (896 Secs)	
Exposures	[==>(Pattern 1, Copy 1)] [==>(Pattern 1, Copy 2)] [==>(Pattern 1, Copy 3)] [==>(Pattern 1, Copy 4)] [==>(Pattern 1, Copy 5)] [==>(Pattern 1, Copy 6)] [==>(Pattern 1, Copy 7)] [==>(Pattern 1, Copy 8)] [==>(Pattern 2, Copy 1)] [==>(Pattern 2, Copy 2)] [==>(Pattern 2, Copy 3)] [==>(Pattern 2, Copy 4)] [==>(Pattern 2, Copy 5)] [==>(Pattern 2, Copy 6)] [==>(Pattern 2, Copy 7)] [==>(Pattern 2, Copy 8)] [==>(Pattern 3, Copy 1)] [==>(Pattern 3, Copy 2)] [==>(Pattern 3, Copy 3)] [==>(Pattern 3, Copy 4)] [==>(Pattern 3, Copy 5)] [==>(Pattern 3, Copy 6)] [==>(Pattern 3, Copy 7)] [==>(Pattern 3, Copy 8)] [==>(Pattern 4, Copy 1)] [==>(Pattern 4, Copy 2)] [==>(Pattern 4, Copy 3)] [==>(Pattern 4, Copy 4)] [==>(Pattern 4, Copy 5)] [==>(Pattern 4, Copy 6)] [==>(Pattern 4, Copy 7)] [==>(Pattern 4, Copy 8)]								[1]

