14709 - HST/WFC3 Spectroscopy of < 400 AU Companions to Orion Young Stellar Objects

Cycle: 24, Proposal Category: GO

(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	(3) HOPS115	WFC3/IR	1	29-Jul-2016 14:59:09.0	yes
02	(4) HOPS138	WFC3/IR	1	29-Jul-2016 14:59:10.0	yes
03	(5) HOPS281	WFC3/IR	1	29-Jul-2016 14:59:11.0	yes
04	(6) HOPS24	WFC3/IR	1	29-Jul-2016 14:59:11.0	yes
05	(1) HOPS189	WFC3/IR	1	29-Jul-2016 14:59:12.0	yes
06	(2) HOPS79	WFC3/IR	1	29-Jul-2016 14:59:13.0	yes

6 Total Orbits Used

ABSTRACT

We propose WFC3 G141 grism spectroscopy of companions to young stellar objects (YSOs) in the Orion molecular cloud which were identified in a WFC3/HST 1.6 micron survey of 320 YSOs in Orion. We will target six close companions with separaitons < 400 AU which have F160W magnitudes between 17-19; these are too faint obtain spectra from ground-based telecopes using LGS AO. To determine spectral types and masses for these sources, we will use grism spectroscopy to detect broad water features in the photospheric spectrum. These observations are part of a coordinated spectroscopy campaign; the remaining companions have been/will be observed using spectrographs on ground-based telescopes as well as a HST (Cycle 22). These data will constrain the companion mass function at projected separations of 100-1000 AU from Orion young stellar objects. Given their faint magnitudes, as many as half of the companions may be below the Hydrogen burning limit. With spectra, we can determine whether or not there is an excess of sub-stellar companions relative to the field IMF at these separations; thereby testing whether the companions form from the fragmentation of the parental cloud or by fragmenation in protostellar disks. Furthermore, the HST survey showed that the observed fraction of stars with companions increases ~50% between low and high stellar density region in Orion; suggesting that the formation of multiple systems is dependent on the birth environment. With spectra, we can explore the physical mechanisms for this enhanced formation.

OBSERVING DESCRIPTION

G141 Grism Spectroscopy

Visit

Proposal 14709, Visit 01, implementation Fri Jul 29 18:59:13 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: ORIENT 239D TO 239 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=LINE	Coordinate Frame=POS-TARG		(1-2)
	Purpose=DITHER	Pattern Orientation=82.75		
	Number Of Points=2	Angle Between Sides=		
	Point Spacing=3.604	Center Pattern=false		
	Line Spacing=			

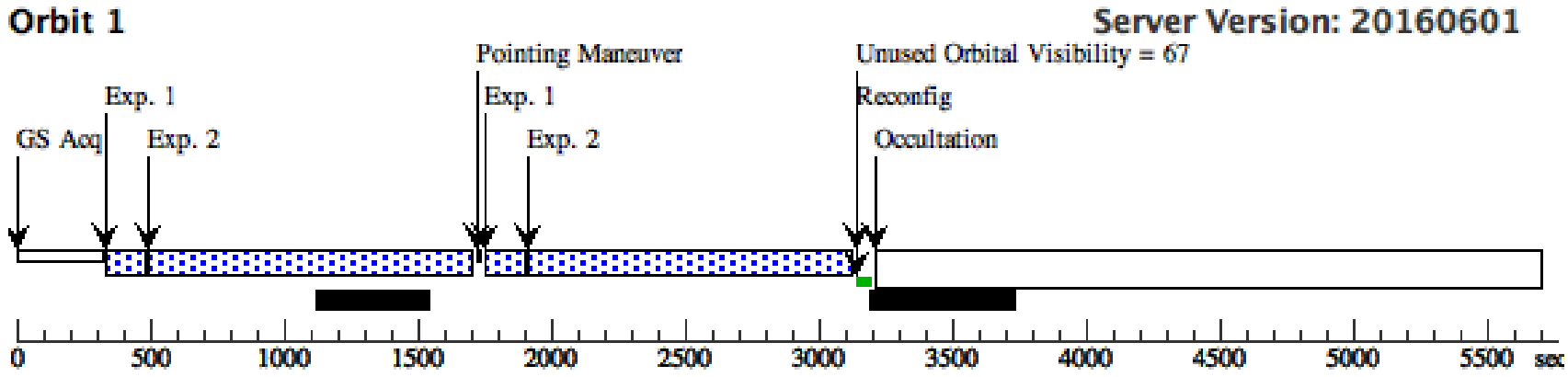
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	HOPS115	RA: 05 39 56.5243 (84.9855179d)		V=35	Reference Frame: ICRS
		Dec: -07 25 51.58 (-7.43099d)		F160W = 17.8	
		Equinox: J2000			

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(3) HOPS115	WFC3/IR, MULTIACCUM, GRISM1024	F160W	NSAMP=9; SAMP-SEQ=STEP25		Pattern 1, Exps 1-2 in Visit 01 (1)	124.231771 Secs (248.464 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	*[1]*
2		(3) HOPS115	WFC3/IR, MULTIACCUM, GRISM1024	G141	NSAMP=13; SAMP-SEQ=STEP200		Pattern 1, Exps 1-2 in Visit 01 (1)	1199.231335 Secs (2398.463 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	*[1]*

Orbit Structure



Visit

Proposal 14709, Visit 02, implementation Fri Jul 29 18:59:13 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: ORIENT 45D TO 45 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=LINE	Coordinate Frame=POS-TARG		(1-2)
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	Number Of Points=2	Angle Between Sides=		
	Point Spacing=3.604	Center Pattern=false		
	Line Spacing=			

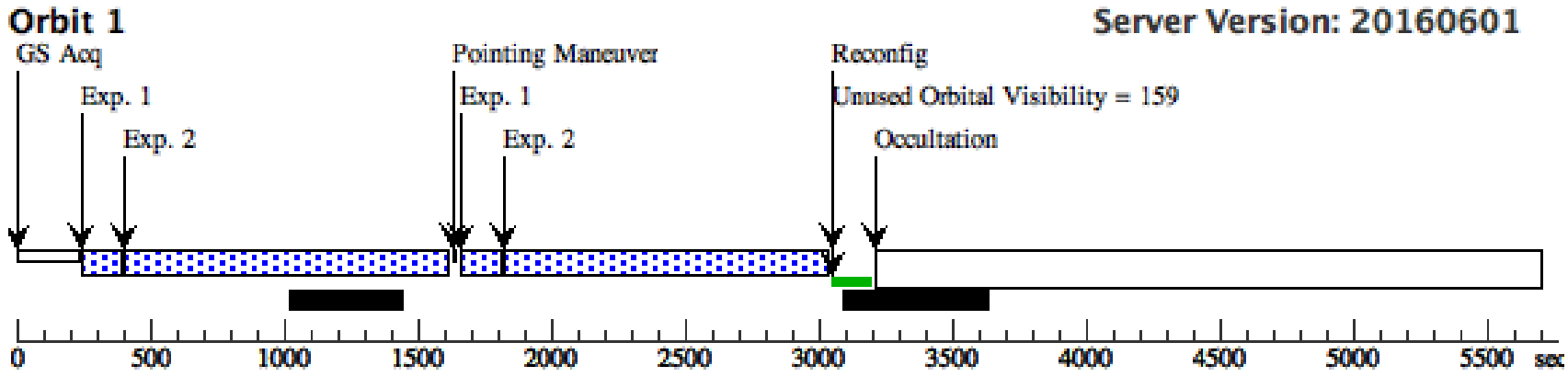
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(4)	HOPS138	RA: 05 38 48.3200 (84.7013333d)		V=35	Reference Frame: ICRS
		Dec: -07 02 43.70 (-7.04547d)		F160W = 20	
		Equinox: J2000			

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(4) HOPS138	WFC3/IR, MULTIACCUM, GRISM1024	F160W	NSAMP=9; SAMP-SEQ=STEP25	GS ACQ SCENARIO ONEB1B3	Pattern 1, Exps 1-2 in Visit 02 (1)	124.231771 Secs (248.464 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	*[1]*
2		(4) HOPS138	WFC3/IR, MULTIACCUM, GRISM1024	G141	NSAMP=13; SAMP-SEQ=STEP200		Pattern 1, Exps 1-2 in Visit 02 (1)	1199.231335 Secs (2398.463 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	*[1]*

Orbit Structure



Visit

Proposal 14709, Visit 03, implementation Fri Jul 29 18:59:13 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: ORIENT 27.5D TO 27.5 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=LINE	Coordinate Frame=POS-TARG		(1-2)
	Purpose=DITHER	Pattern Orientation=82.75		
	Number Of Points=2	Angle Between Sides=		
	Point Spacing=3.604	Center Pattern=false		
	Line Spacing=			

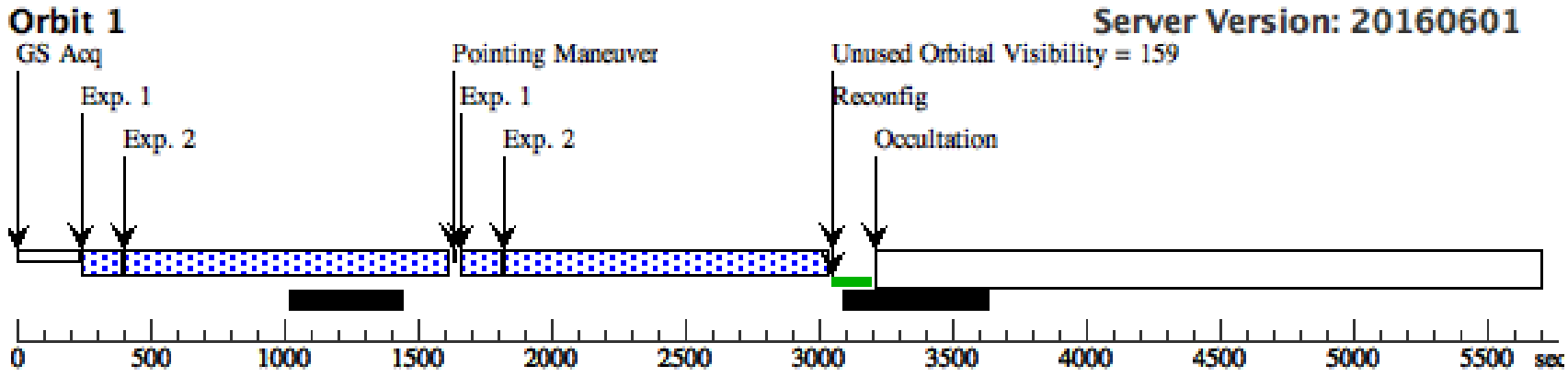
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(5)	HOPS281	RA: 05 40 24.6226 (85.1025942d)		V=35	Reference Frame: ICRS
		Dec: -07 43 8.07 (-7.71891d)		F160W = 17.3	
		Equinox: J2000			

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(5) HOPS281	WFC3/IR, MULTIACCUM, GRISM1024	F160W	NSAMP=9; SAMP-SEQ=STEP25	GS ACQ SCENARIO ONEB1B3	Pattern 1, Exps 1-2 in Visit 03 (1)	124.231771 Secs (248.464 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	*[1]*
2		(5) HOPS281	WFC3/IR, MULTIACCUM, GRISM1024	G141	NSAMP=13; SAMP-SEQ=STEP200		Pattern 1, Exps 1-2 in Visit 03 (1)	1199.231335 Secs (2398.463 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	*[1]*

Orbit Structure



Visit

Proposal 14709, Visit 04, implementation Fri Jul 29 18:59:13 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: ORIENT 344.5D TO 344.5 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=LINE	Coordinate Frame=POS-TARG		(1-2)
	Purpose=DITHER	Pattern Orientation=82.75		
	Number Of Points=2	Angle Between Sides=		
	Point Spacing=3.604	Center Pattern=false		
	Line Spacing=			

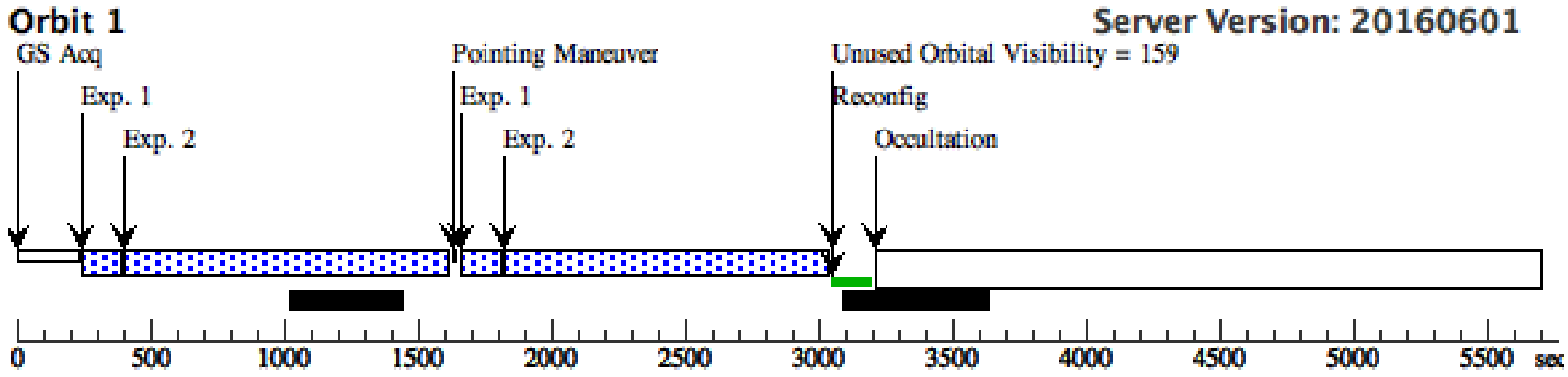
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(6)	HOPS24	RA: 05 34 46.9294 (83.6955392d)		V=35	Reference Frame: ICRS
		Dec: -05 44 51.15 (-5.74754d)		F160W = 17.3	
		Equinox: J2000			

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(6) HOPS24	WFC3/IR, MULTIACCUM, GRISM1024	F160W	NSAMP=9; SAMP-SEQ=STEP25	GS ACQ SCENARIO ONEB1B3	Pattern 1, Exps 1-2 in Visit 04 (1)	124.231771 Secs (248.464 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	*[1]*
2		(6) HOPS24	WFC3/IR, MULTIACCUM, GRISM1024	G141	NSAMP=13; SAMP-SEQ=STEP200		Pattern 1, Exps 1-2 in Visit 04 (1)	1199.231335 Secs (2398.463 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	*[1]*

Orbit Structure



Visit

Proposal 14709, Visit 05, implementation Fri Jul 29 18:59:13 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: ORIENT 314D TO 314 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=LINE	Coordinate Frame=POS-TARG		(1-2)
	Purpose=DITHER	Pattern Orientation=82.75		
	Number Of Points=2	Angle Between Sides=		
	Point Spacing=3.604	Center Pattern=false		
	Line Spacing=			

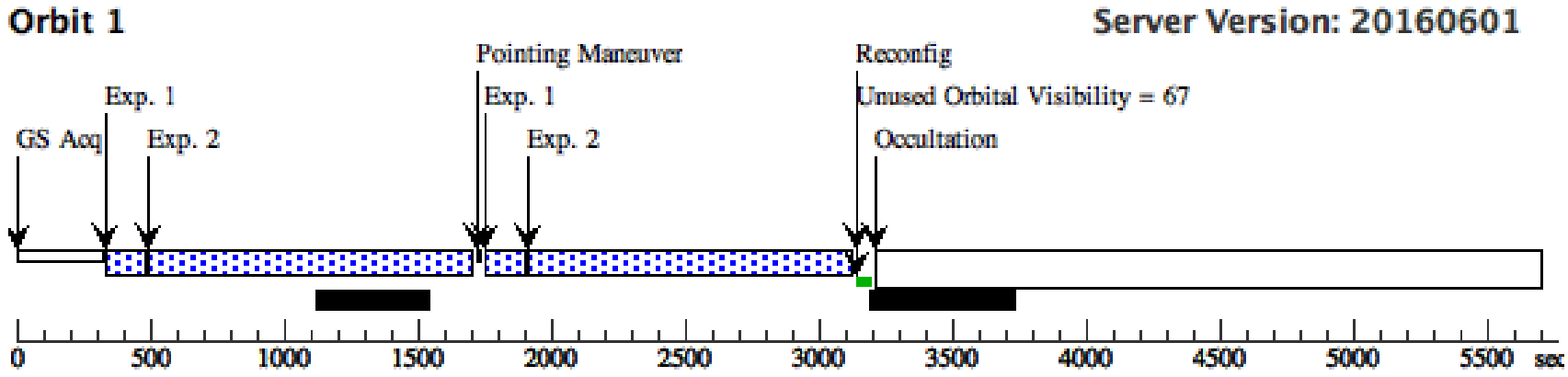
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HOPS189	RA: 05 35 30.9089 (83.8787871d)		V=35	Reference Frame: ICRS
		Dec: -06 26 31.99 (-6.44222d)		F160W = 16.7	
		Equinox: J2000			

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) HOPS189	WFC3/IR, MULTIACCUM, GRISM1024	F160W	NSAMP=9; SAMP-SEQ=STEP25	GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-2 in Visit 05 (1)	124.231771 Secs (248.464 Secs)	
								[==>(Pattern 1)]	*[1]*
								[==>(Pattern 2)]	
2		(1) HOPS189	WFC3/IR, MULTIACCUM, GRISM1024	G141	NSAMP=13; SAMP-SEQ=STEP200		Pattern 1, Exps 1-2 in Visit 05 (1)	1199.231335 Secs (2398.463 Secs)	
								[==>(Pattern 1)]	*[1]*
								[==>(Pattern 2)]	

Orbit Structure



Visit

Proposal 14709, Visit 06, implementation Fri Jul 29 18:59:14 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: ORIENT 45D TO 50 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=LINE	Coordinate Frame=POS-TARG		(1-2)
	Purpose=DITHER	Pattern Orientation=82.75		
	Number Of Points=2	Angle Between Sides=		
	Point Spacing=3.604	Center Pattern=false		
	Line Spacing=			

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	HOPS79	RA: 05 35 27.8330 (83.8659708d)		V=35	Reference Frame: ICRS
		Dec: -05 05 36.28 (-5.09341d)		F160W = 18.8	
		Equinox: J2000			

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(2) HOPS79	WFC3/IR, MULTIACCUM, GRISM1024	F160W	NSAMP=9; SAMP-SEQ=STEP25	GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-2 in Visit 06 (1)	124.231771 Secs (248.464 Secs)	
								[==>(Pattern 1)] *[==>(Pattern 2)]*	*[1]*
2		(2) HOPS79	WFC3/IR, MULTIACCUM, GRISM1024	G141	NSAMP=13; SAMP-SEQ=STEP200		Pattern 1, Exps 1-2 in Visit 06 (1)	1199.231335 Secs (2398.463 Secs)	
								[==>(Pattern 1)] *[==>(Pattern 2)]*	*[1]*

Orbit Structure