



# 14494 - Peering to the Heart of Massive Star Birth. II. Completion of the Eight-Source Pilot Survey

Cycle: 23, 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) G028.37+00.07	WFC3/IR	1	09-Nov-2016 11:02:03.0	yes
11	(1) G028.37+00.07	WFC3/IR	1	09-Nov-2016 11:02:05.0	yes
02	(2) G032.03+00.05	WFC3/IR	1	09-Nov-2016 11:02:06.0	yes
03	(3) G045.47+0.05	WFC3/IR	1	09-Nov-2016 11:02:07.0	yes

4 Total Orbits Used

## ABSTRACT

We propose to complete a survey of 8 massive and intermediate-mass protostars with WFC3/IR to probe the J and H band continuum and Pa-beta and [FeII] emission lines. The protostar sample is already the subject of approved SOFIA-FORCAST observations from 10-40 microns, and an

awarded ALMA Cycle 3 time at 0.14 arcsecond resolution. Combined with sophisticated radiative transfer models, these observations are providing the most detailed constraints on the nature, luminosities, outflow cavity structures and distribution of surrounding dense core gas and dust of massive protostars. In the first round of Mid-Cycle 23, we were awarded time to observe 5 of the sources with HST, limited by the maximum orbits of Mid-Cycle programs. Here we propose to complete the survey of the remaining 3 sources.

The proposed HST observations have 3 main goals: (1) Detect and characterize J and H band continuum emission, arising from jet and outflow knot features and from emerging scattered light; (2) Detect and characterize Pa-beta and [FeII] line emission tracing ionized and FUV-illuminated regions, important diagnostics of the protostellar source and its outflow structure; (3) Search for lower-mass protostars clustered around the forming massive protostar. All of these objectives will help test massive star formation theories. The high sensitivity and resolution of WFC3/IR enables these observations to be carried out very efficiently. Mid-Cycle observations are important to have near contemporaneous observation with ALMA, and at similar resolution, since jet/outflow knots may have large proper motions, and to maximize the potential time baseline for a future HST study of jet/outflow motions.

## **OBSERVING DESCRIPTION**

This is very straight forward program.

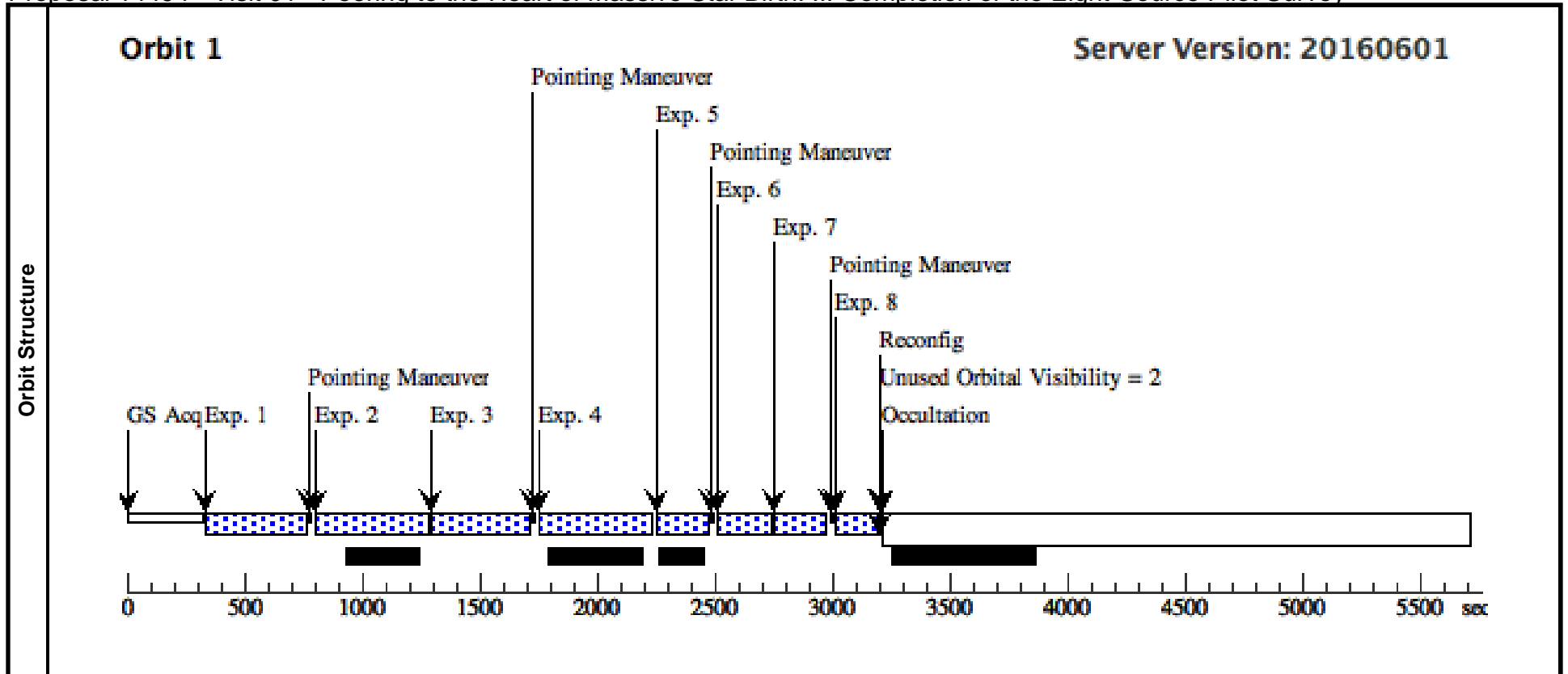
3 visits, each of them of one orbit, each of them on one of 3 independent targets (massive protostars).

For each orbit, the target is observed with WFC3/IR imaging in 4 filters.

Proposal 14494 - Visit 01 - Peering to the Heart of Massive Star Birth. II. Completion of the Eight-Source Pilot Survey

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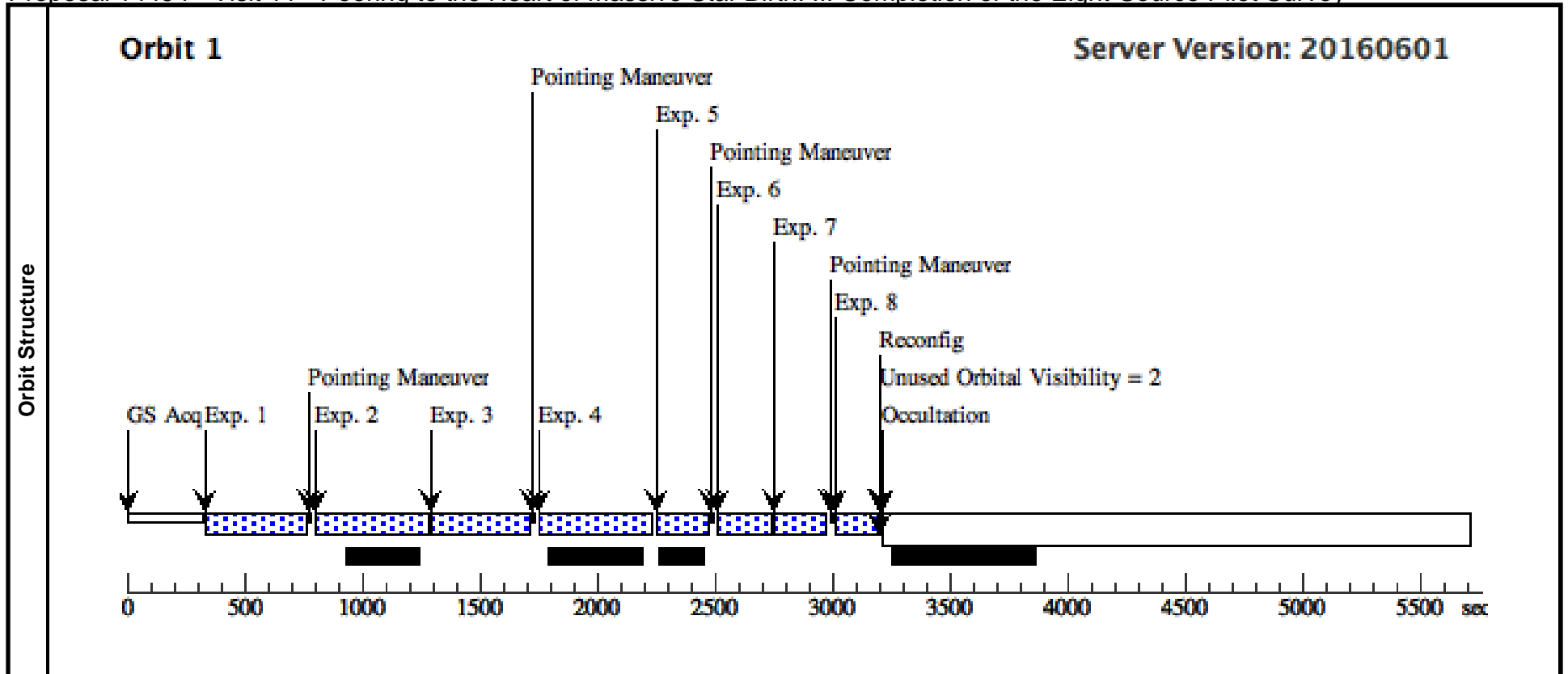
Fixed Targets	Visit									
	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	G028.37+00.07	RA: 18 42 58.1200 (280.7421667d) Dec: -04 13 57.51 (-4.23264d) Equinox: J2000		V=12	Reference Frame: ICRS				
	<i>Comments: Extended=YES</i>									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	F128N-a	(1) G028.37+00.07	WFC3/IR, MULTIACCUM, IR	F128N	NSAMP=10; SAMP-SEQ=STEP1 00	POS TARG -1.930,- 1.729		399.231646 Secs (399.232 Secs) [==>]	[1]
	2	F128N-b	(1) G028.37+00.07	WFC3/IR, MULTIACCUM, IR	F128N	NSAMP=10; SAMP-SEQ=SPAR S50	POS TARG 1.930,1. 729		452.93635 Secs (452.936 Secs) [==>]	[1]
	3	F164N-a	(1) G028.37+00.07	WFC3/IR, MULTIACCUM, IR	F164N	NSAMP=10; SAMP-SEQ=STEP1 00	POS TARG 1.930,1. 729		399.231646 Secs (399.232 Secs) [==>]	[1]
	4	F164N-b	(1) G028.37+00.07	WFC3/IR, MULTIACCUM, IR	F164N	NSAMP=10; SAMP-SEQ=SPAR S50	POS TARG -1.930,- 1.729		452.93635 Secs (452.936 Secs) [==>]	[1]
	5	F110W-a	(1) G028.37+00.07	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=5; SAMP-SEQ=SPAR S50	POS TARG -1.930,- 1.729		202.934095 Secs (202.934 Secs) [==>]	[1]
	6	F110W-b	(1) G028.37+00.07	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=9; SAMP-SEQ=STEP5 0	POS TARG 1.930,1. 729		199.231579 Secs (199.232 Secs) [==>]	[1]
	7	F160W-a	(1) G028.37+00.07	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=5; SAMP-SEQ=SPAR S50	POS TARG 1.930,1. 729		202.934095 Secs (202.934 Secs) [==>]	[1]
	8	F160W-b	(1) G028.37+00.07	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=8; SAMP-SEQ=STEP5 0	POS TARG -1.930,- 1.729		149.231128 Secs (149.231 Secs) [==>]	[1]



Proposal 14494 - Visit 11 - Peering to the Heart of Massive Star Birth. II. Completion of the Eight-Source Pilot Survey

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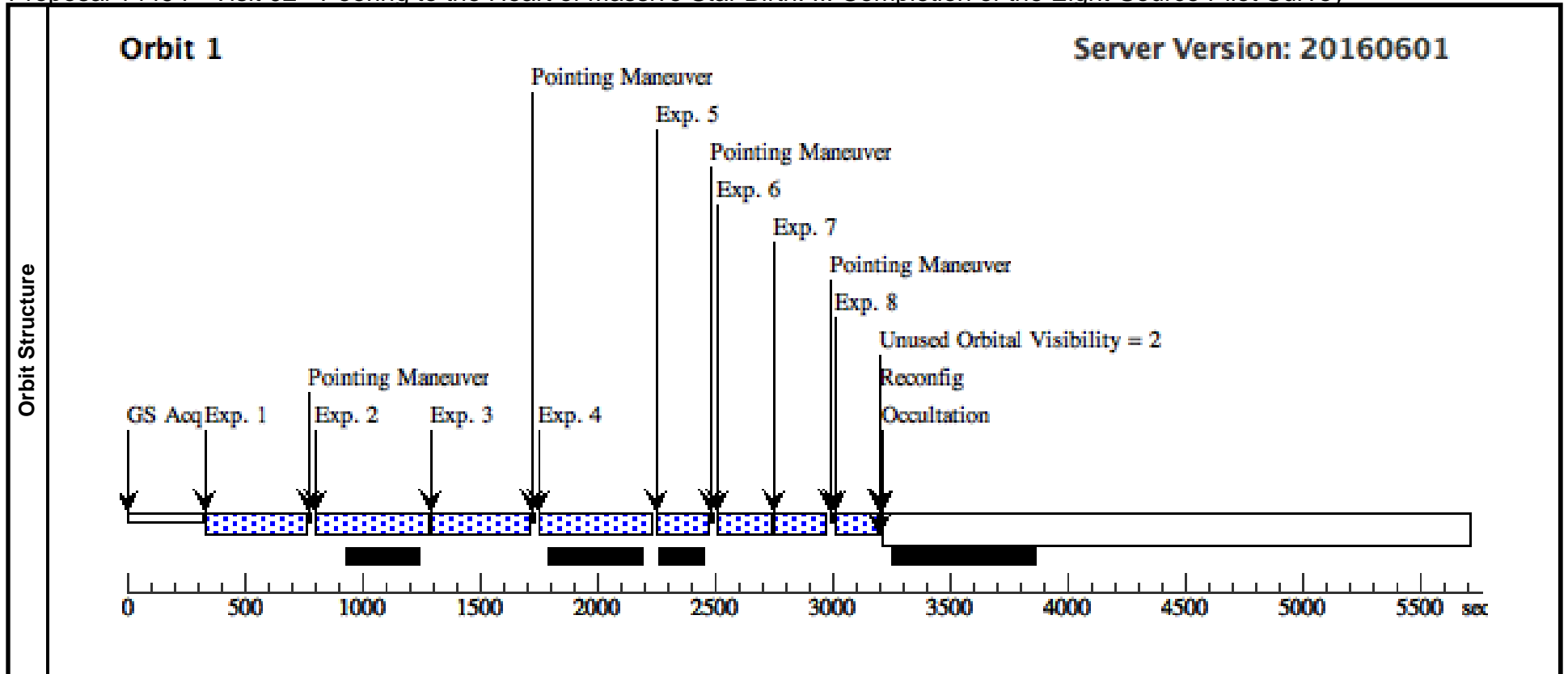
Visit	<b>Proposal 14494, Visit 11</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/IR Special Requirements: (none)									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
	(1)	G028.37+00.07	RA: 18 42 58.1200 (280.7421667d) Dec: -04 13 57.51 (-4.23264d) Equinox: J2000			V=12	Reference Frame: ICRS	<i>Comments: Extended=YES</i>		
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	F128N-a	(1) G028.37+00.07	WFC3/IR, MULTIACCUM, IR	F128N	NSAMP=10; SAMP-SEQ=STEP100	POS TARG -1.930,-1.729		399.231646 Secs (399.232 Secs) [==>]	[1]
	2	F128N-b	(1) G028.37+00.07	WFC3/IR, MULTIACCUM, IR	F128N	NSAMP=10; SAMP-SEQ=SPAR S50	POS TARG 1.930,1.729		452.93635 Secs (452.936 Secs) [==>]	[1]
	3	F164N-a	(1) G028.37+00.07	WFC3/IR, MULTIACCUM, IR	F164N	NSAMP=10; SAMP-SEQ=STEP100	POS TARG 1.930,1.729		399.231646 Secs (399.232 Secs) [==>]	[1]
	4	F164N-b	(1) G028.37+00.07	WFC3/IR, MULTIACCUM, IR	F164N	NSAMP=10; SAMP-SEQ=SPAR S50	POS TARG -1.930,-1.729		452.93635 Secs (452.936 Secs) [==>]	[1]
	5	F110W-a	(1) G028.37+00.07	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=5; SAMP-SEQ=SPAR S50	POS TARG -1.930,-1.729		202.934095 Secs (202.934 Secs) [==>]	[1]
	6	F110W-b	(1) G028.37+00.07	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=9; SAMP-SEQ=STEP50	POS TARG 1.930,1.729		199.231579 Secs (199.232 Secs) [==>]	[1]
	7	F160W-a	(1) G028.37+00.07	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=5; SAMP-SEQ=SPAR S50	POS TARG 1.930,1.729		202.934095 Secs (202.934 Secs) [==>]	[1]
	8	F160W-b	(1) G028.37+00.07	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=8; SAMP-SEQ=STEP50	POS TARG -1.930,-1.729		149.231128 Secs (149.231 Secs) [==>]	[1]



Proposal 14494 - Visit 02 - Peering to the Heart of Massive Star Birth. II. Completion of the Eight-Source Pilot Survey

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Visit	Proposal 14494, Visit 02, completed Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR Special Requirements: (none)									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
	(2)	G032.03+00.05	RA: 18 49 37.0500 (282.4043750d) Dec: -00 46 50.22 (-.78062d) Equinox: J2000			V=12	Reference Frame: ICRS			
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	F128N-a	(2) G032.03+00.05	WFC3/IR, MULTIACCUM, IR	F128N	NSAMP=10; SAMP-SEQ=STEP1 00	POS TARG -1.930,- 1.729		399.231646 Secs (399.232 Secs) [==>]	[1]
	2	F128N-b	(2) G032.03+00.05	WFC3/IR, MULTIACCUM, IR	F128N	NSAMP=10; SAMP-SEQ=SPAR S50	POS TARG 1.930,1. 729		452.93635 Secs (452.936 Secs) [==>]	[1]
	3	F164N-a	(2) G032.03+00.05	WFC3/IR, MULTIACCUM, IR	F164N	NSAMP=10; SAMP-SEQ=STEP1 00	POS TARG 1.930,1. 729		399.231646 Secs (399.232 Secs) [==>]	[1]
	4	F164N-b	(2) G032.03+00.05	WFC3/IR, MULTIACCUM, IR	F164N	NSAMP=10; SAMP-SEQ=SPAR S50	POS TARG -1.930,- 1.729		452.93635 Secs (452.936 Secs) [==>]	[1]
	5	F110W-a	(2) G032.03+00.05	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=5; SAMP-SEQ=SPAR S50	POS TARG -1.930,- 1.729		202.934095 Secs (202.934 Secs) [==>]	[1]
	6	F110W-b	(2) G032.03+00.05	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=9; SAMP-SEQ=STEP5 0	POS TARG 1.930,1. 729		199.231579 Secs (199.232 Secs) [==>]	[1]
	7	F160W-a	(2) G032.03+00.05	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=5; SAMP-SEQ=SPAR S50	POS TARG 1.930,1. 729		202.934095 Secs (202.934 Secs) [==>]	[1]
	8	F160W-b	(2) G032.03+00.05	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=8; SAMP-SEQ=STEP5 0	POS TARG -1.930,- 1.729		149.231128 Secs (149.231 Secs) [==>]	[1]



Proposal 14494 - Visit 03 - Peering to the Heart of Massive Star Birth. II. Completion of the Eight-Source Pilot Survey

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Fixed Targets	Visit									
	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(3)	G045.47+0.05	RA: 19 14 25.7400 (288.6072500d) Dec: -11 09 25.90 (-11.15719d) Equinox: J2000		V=12	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	F128N-a	(3) G045.47+0.05	WFC3/IR, MULTIACCUM, IR	F128N	NSAMP=10; SAMP-SEQ=STEP1 00	POS TARG -1.930,- 1.729		399.231646 Secs (399.232 Secs) [==>]	[1]
	2	F128N-b	(3) G045.47+0.05	WFC3/IR, MULTIACCUM, IR	F128N	NSAMP=10; SAMP-SEQ=SPAR S50	POS TARG 1.930,1. 729		452.93635 Secs (452.936 Secs) [==>]	[1]
	3	F164N-a	(3) G045.47+0.05	WFC3/IR, MULTIACCUM, IR	F164N	NSAMP=10; SAMP-SEQ=STEP1 00	POS TARG 1.930,1. 729		399.231646 Secs (399.232 Secs) [==>]	[1]
	4	F164N-b	(3) G045.47+0.05	WFC3/IR, MULTIACCUM, IR	F164N	NSAMP=10; SAMP-SEQ=SPAR S50	POS TARG -1.930,- 1.729		452.93635 Secs (452.936 Secs) [==>]	[1]
	5	F110W-a	(3) G045.47+0.05	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=5; SAMP-SEQ=SPAR S50	POS TARG -1.930,- 1.729		202.934095 Secs (202.934 Secs) [==>]	[1]
	6	F110W-b	(3) G045.47+0.05	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=9; SAMP-SEQ=STEP5 0	POS TARG 1.930,1. 729		199.231579 Secs (199.232 Secs) [==>]	[1]
	7	F160W-a	(3) G045.47+0.05	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=5; SAMP-SEQ=SPAR S50	POS TARG 1.930,1. 729		202.934095 Secs (202.934 Secs) [==>]	[1]
	8	F160W-b	(3) G045.47+0.05	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=8; SAMP-SEQ=STEP5 0	POS TARG -1.930,- 1.729		149.231128 Secs (149.231 Secs) [==>]	[1]

