



15173 - Linking Dynamical and Stellar Evolution in the Metal-Poor Globular Cluster M92

Cycle: 25, Proposal Category: GO

(UV Initiative)

(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	(2) M-92	ACS/WFC WFC3/UVIS	5	18-Dec-2018 20:00:25.0	yes

5 Total Orbits Used

ABSTRACT

We propose a 5 orbit HST program to acquire UV imaging at the center of the ancient, metal-poor globular cluster NGC 6341 (M92). Our program is designed to achieve two science goals with a single data set, 1.) to directly measure the diffusion of stars through the massive cluster's core, 2.) to pinpoint the phase of post main-sequence evolution at which $[Fe/H] = -2.3$ stars lose their mass. Our novel technique will achieve these goals by using the full power of WFC3's exquisite UV sensitivity at <0.3 microns combined with its high spatial resolution. We will uncover ~ 1000 newly-formed white dwarfs in the center of M92 and track how their spatial distribution changes as they get "older" on the cooling sequence. Having just experienced significant mass loss, the youngest remnants with ages <10 s of Myr will still be moving slowly like their $0.8 M_{\text{sun}}$ progenitors, whereas the "older" remnants with $t_{\text{cool}} > 100$ s Myr will be fully relaxed. Using the methodology we developed and successfully applied to 47 Tuc (Heyl et al. 2015a; 2015b), we will "watch" this dynamical evolution to measure the diffusion coefficient due to gravitational relaxation in the cluster's core and the past timing of stellar mass loss that was responsible for the current cluster mass segregation profile. M92 is the ideal target for this study as it complements our existing study of the relatively metal-rich cluster 47 Tuc; it has an extremely low metallicity of $[Fe/H] = -2.3$, very low foreground reddening ($E(B-V) = 0.02$), moderate concentration index, and a theoretically-expected relaxation timescale in its core of 90 Myr, which nicely splits the young and old white dwarfs that can be observed with Hubble.

OBSERVING DESCRIPTION

This is a 5 orbit program that we would like to execute in one block. The primary camera is HST/WFC3/UVIS and the parallel camera is ACS. We are using two filters in both instrument. The observations are sequenced to obtain 4 integrations on both cameras in each orbit, hiding all of the buffer dumps. This includes short integrations on WFC3/UVIS to mitigate saturation of bright sources. All observations are dithered. There are also orient constraints to line up the observations with one of the archival data sets from GO-13297 that have to be coadded to our data.

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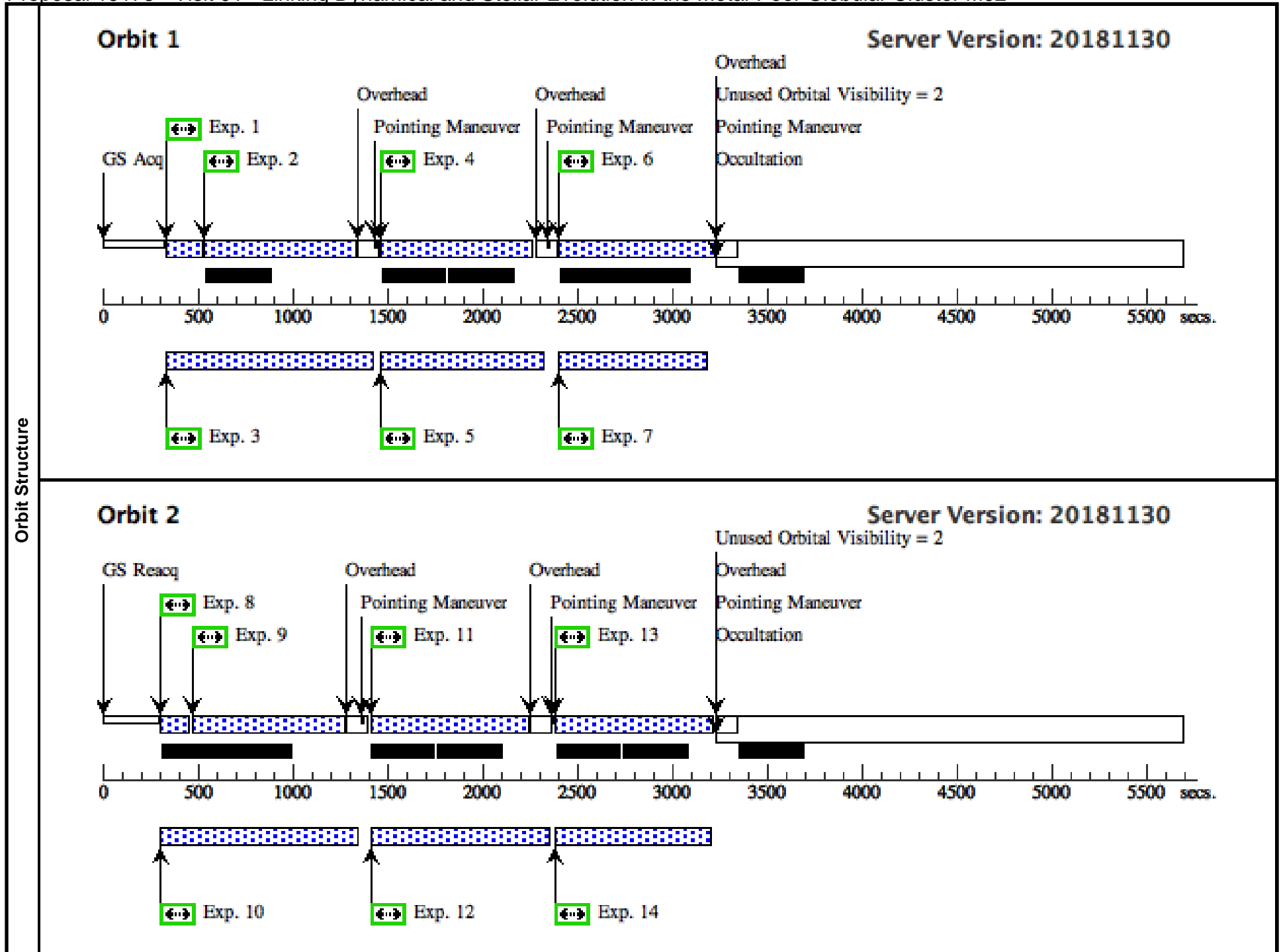
Visit	Proposal 15173, Visit 01, implementation Wed Dec 19 01:00:27 GMT 2018 Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS, ACS/WFC Special Requirements: ORIENT 49D TO 51 D; ORIENT 139D TO 141 D												
	Fixed Targets	<table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Target Coordinates</th> <th>Targ. Coord. Corrections</th> <th>Fluxes</th> <th>Miscellaneous</th> </tr> </thead> <tbody> <tr> <td>(2)</td> <td>M-92</td> <td> RA: 17 17 7.3900 (259.2807917d) Dec: +43 08 9.40 (43.13594d) Equinox: J2000 </td> <td></td> <td>V=6.52</td> <td>Reference Frame: SIMBAD</td> </tr> </tbody> </table> <p><i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> Category=STELLAR CLUSTER Description=[GLOBULAR CLUSTER]</p>	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous	(2)	M-92	RA: 17 17 7.3900 (259.2807917d) Dec: +43 08 9.40 (43.13594d) Equinox: J2000		V=6.52
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#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
Exposures	1	(2) M-92	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W	FLASH=12	POS TARG 0,-15	Prime + Parallel Group 1-3 in Visit 01	30 Secs (30 Secs)	[=>30.0 Secs]	[1]
	2	(2) M-92	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W	FLASH=12	POS TARG 0,-15	Prime + Parallel Group 1-3 in Visit 01	820 Secs (800 Secs)	[=>800.0 Secs]	[1]
	3	(2) M-92	ACS/WFC, ACCUM, WFC	F435W			Prime + Parallel Group 1-3 in Visit 01	800 Secs (880 Secs)	[=>880.0 Secs]	[1]
	4	(2) M-92	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W	FLASH=12	POS TARG 0.158,-1 5.070	Prime + Parallel Group 4-5 in Visit 01	810 Secs (800 Secs)	[=>800.0 Secs]	[1]
	5	(2) M-92	ACS/WFC, ACCUM, WFC	F435W			Prime + Parallel Group 4-5 in Visit 01	700 Secs (740 Secs)	[=>740.0 Secs]	[1]
	6	(2) M-92	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W	FLASH=12	POS TARG 0.099,-1 5.165	Prime + Parallel Group 6-7 in Visit 01	830 Secs (820 Secs)	[=>820.0 Secs]	[1]
	7	(2) M-92	ACS/WFC, ACCUM, WFC	F435W			Prime + Parallel Group 6-7 in Visit 01	700 Secs (660 Secs)	[=>660.0 Secs]	[1]
	8	(2) M-92	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W	FLASH=12	POS TARG -0.120,-15.358	Prime + Parallel Group 8-10 in Visit 01	30 Secs (30 Secs)	[=>30.0 Secs]	[2]
	9	(2) M-92	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W	FLASH=12	POS TARG -0.120,-15.358	Prime + Parallel Group 8-10 in Visit 01	870 Secs (805 Secs)	[=>805.0 Secs]	[2]
	10	(2) M-92	ACS/WFC, ACCUM, WFC	F435W			Prime + Parallel Group 8-10 in Visit 01	900 Secs (920 Secs)	[=>920.0 Secs]	[2]
	11	(2) M-92	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W	FLASH=12	POS TARG -0.6,-15.50	Prime + Parallel Group 11-12 in Visit 01	870 Secs (835 Secs)	[=>835.0 Secs]	[2]
	12	(2) M-92	ACS/WFC, ACCUM, WFC	F435W			Prime + Parallel Group 11-12 in Visit 01	800 Secs (820 Secs)	[=>820.0 Secs]	[2]
	13	(2) M-92	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W	FLASH=12	POS TARG -1.1,-15.71	Prime + Parallel Group 13-14 in Visit 01	870 Secs (835 Secs)	[=>835.0 Secs]	[2]
	14	(2) M-92	ACS/WFC, ACCUM, WFC	F435W			Prime + Parallel Group 13-14 in Visit 01	740 Secs (700 Secs)	[=>700.0 Secs]	[2]
	15	(2) M-92	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W	FLASH=12	POS TARG 0,-17.21	Prime + Parallel Group 15-17 in Visit 01	30 Secs (30 Secs)	[=>30.0 Secs]	[3]
	16	(2) M-92	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W	FLASH=12	POS TARG 0,-17.21	Prime + Parallel Group 15-17 in Visit 01	870 Secs (805 Secs)	[=>805.0 Secs]	[3]
	17	(2) M-92	ACS/WFC, ACCUM, WFC	F435W			Prime + Parallel Group 15-17 in Visit 01	900 Secs (920 Secs)	[=>920.0 Secs]	[3]
	18	(2) M-92	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W	FLASH=12	POS TARG 0.158,-1 7.28	Prime + Parallel Group 18-19 in Visit 01	870 Secs (835 Secs)	[=>835.0 Secs]	[3]
	19	(2) M-92	ACS/WFC, ACCUM, WFC	F435W			Prime + Parallel Group 18-19 in Visit 01	800 Secs (820 Secs)	[=>820.0 Secs]	[3]
	20	(2) M-92	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W	FLASH=12	POS TARG 0.099,-1 7.375	Prime + Parallel Group 20-21 in Visit 01	870 Secs (835 Secs)	[=>835.0 Secs]	[3]
	21	(2) M-92	ACS/WFC, ACCUM, WFC	F435W			Prime + Parallel Group 20-21 in Visit 01	740 Secs (700 Secs)	[=>700.0 Secs]	[3]
	22	(2) M-92	WFC3/UVIS, ACCUM, UVIS-CENTER	F275W	FLASH=12	POS TARG 0,-15	Prime + Parallel Group 22-24 in Visit 01	30 Secs (30 Secs)	[=>30.0 Secs]	[4]

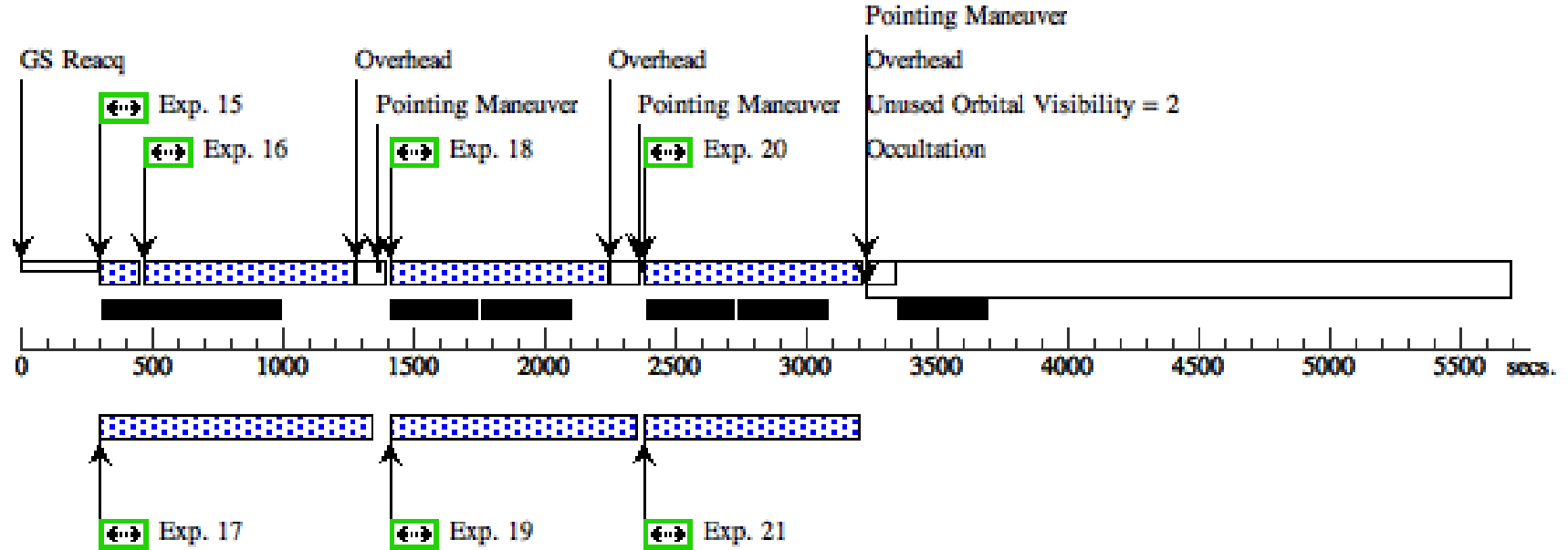
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23	(2) M-92	WFC3/UVIS, ACCUM, UVIS-CENTER	F275W	FLASH=12	POS TARG 0,-15	Prime + Parallel Group 22-24 in Visit 01	870 Secs (800 Secs) [=>800.0 Secs]	[4]
24	(2) M-92	ACS/WFC, ACCUM, WFC	F555W			Prime + Parallel Group 22-24 in Visit 01	900 Secs (920 Secs) [=>920.0 Secs]	[4]
25	(2) M-92	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W	FLASH=12	POS TARG -0.7,-17.10	Prime + Parallel Group 25-26 in Visit 01	860 Secs (805 Secs) [=>805.0 Secs]	[4]
26	(2) M-92	ACS/WFC, ACCUM, WFC	F555W			Prime + Parallel Group 25-26 in Visit 01	800 Secs (820 Secs) [=>820.0 Secs]	[4]
27	(2) M-92	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W	FLASH=12	POS TARG -0.4,-16.80	Prime + Parallel Group 27-28 in Visit 01	840 Secs (815 Secs) [=>815.0 Secs]	[4]
28	(2) M-92	ACS/WFC, ACCUM, WFC	F555W			Prime + Parallel Group 27-28 in Visit 01	700 Secs (680 Secs) [=>680.0 Secs]	[4]
29	(2) M-92	WFC3/UVIS, ACCUM, UVIS-CENTER	F275W	FLASH=12	POS TARG 0.158,-16.303	Prime + Parallel Group 29-31 in Visit 01	30 Secs (30 Secs) [=>30.0 Secs]	[5]
30	(2) M-92	WFC3/UVIS, ACCUM, UVIS-CENTER	F275W	FLASH=12	POS TARG 0.158,-16.303	Prime + Parallel Group 29-31 in Visit 01	870 Secs (800 Secs) [=>800.0 Secs]	[5]
31	(2) M-92	ACS/WFC, ACCUM, WFC	F555W			Prime + Parallel Group 29-31 in Visit 01	900 Secs (980 Secs) [=>980.0 Secs]	[5]
32	(2) M-92	WFC3/UVIS, ACCUM, UVIS-CENTER	F275W	FLASH=12	POS TARG 0.099,-16.398	Prime + Parallel Group 32-33 in Visit 01	850 Secs (815 Secs) [=>815.0 Secs]	[5]
33	(2) M-92	ACS/WFC, ACCUM, WFC	F555W			Prime + Parallel Group 32-33 in Visit 01	800 Secs (800 Secs) [=>800.0 Secs]	[5]
34	(2) M-92	WFC3/UVIS, ACCUM, UVIS-CENTER	F275W	FLASH=12	POS TARG -0.060,-16.531	Prime + Parallel Group 34-35 in Visit 01	860 Secs (825 Secs) [=>825.0 Secs]	[5]
35	(2) M-92	ACS/WFC, ACCUM, WFC	F555W			Prime + Parallel Group 34-35 in Visit 01	740 Secs (700 Secs) [=>700.0 Secs]	[5]



Orbit 3

Server Version: 20181130



Orbit 4

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