



# 16045 - COS observations of a very young massive star cluster in the blue compact dwarf galaxy NGC 5253

Cycle: 27, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

## INVESTIGATORS

<i>Name</i>	<i>Institution</i>	<i>E-Mail</i>
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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) NGC5253-CLUSTER-12 (2) OFFSET-STAR	COS/FUV COS/NUV	4	05-Dec-2019 18:03:28.0	yes
02	(1) NGC5253-CLUSTER-12 (2) OFFSET-STAR	COS/FUV COS/NUV	4	05-Dec-2019 18:03:30.0	yes

8 Total Orbits Used

## **ABSTRACT**

A high gas pressure environment is thought to be a prerequisite for both the formation of globular clusters in redshift  $> 2$  galaxies and young massive star clusters (YMCs) in the nearby universe. Such high pressures are rare in the quiescent disks of nearby galaxies and YMCs are usually confined to galaxy mergers, starburst dwarf galaxies and nuclear regions where pressures are high. Local YMCs are excellent analogs to the proto-GCs that are now being discovered at high redshift through gravitational lensing. Since JWST will obtain rest-frame UV spectra of star-forming clumps/proto-GCs in high redshift galaxies, it is essential to obtain FUV spectra of YMCs in nearby galaxies, while we still have access to the UV domain.

We have recently discovered a very young ( $< 1$  Myr) massive star cluster close to the starburst core of the blue compact dwarf galaxy NGC 5253. We are asking for mid-cycle time for FUV COS spectroscopy because finding such a rare, young cluster still associated with its natal molecular cloud and observable at FUV wavelengths is potentially unique. FUV spectra of this cluster will be an essential addition to current COS surveys of young clusters in nearby galaxies. We will perform a detailed investigation of both the stellar content and the cluster wind interaction with the interstellar medium. We will determine the age and obtain information on the IMF by searching for the signature of very massive stars. The COS FUV spectrum will act as a benchmark for high redshift studies by defining the FUV spectral characteristics of massive stars at the youngest ages, and the importance of early feedback on the ISM.

## **OBSERVING DESCRIPTION**

This program obtains COS spectroscopy of cluster #12 in NGC 5253 with the G130M and G160M gratings. The target is acquired using an offset star to ensure that cluster #12 is properly centered. The offset star is acquired via ACQ/IMAGE, the offset is performed and a short NUV imaging exposure of cluster #12 is taken using ACCUM. The first visit consists of TIME-TAG exposures with G130M/1291 (FP-POS 3,4) for 4 orbits and the second visit with G160M/1600 (FP-POS=1,2,3,4) for another 4 orbits. The exposure times are calculated to provide a S/N of 8 using WFC3/F275W=17.82, a SSP of 5 Myr and  $E(B-V)=0.28$ .

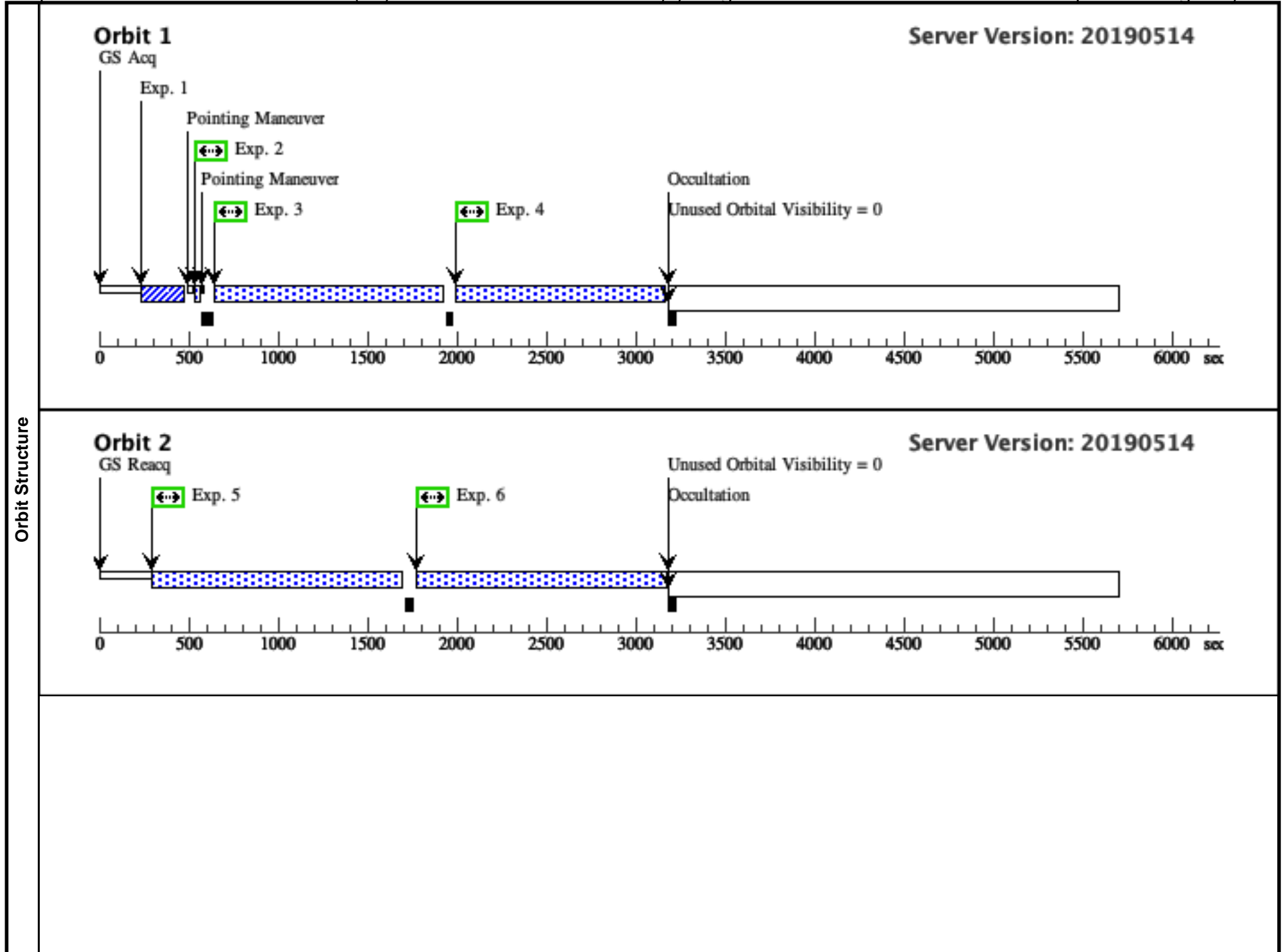
Proposal 16045 - Cluster 12-G130M (01) - COS observations of a very young massive star cluster in the blue compact dwarf galaxy N...

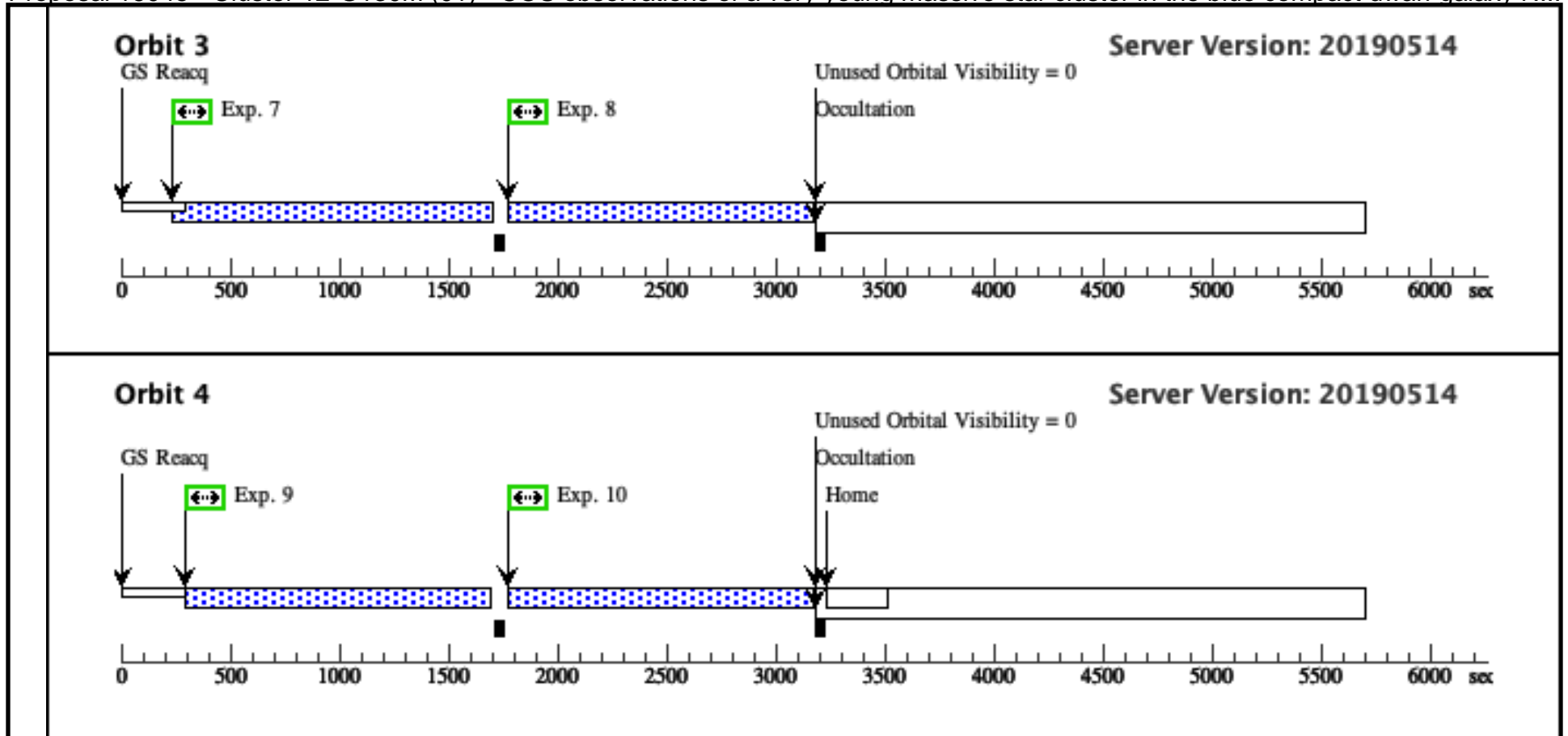
Thu Dec 05 23:03:30 GMT 2019

<b>Visit</b>	<b>Proposal 16045, Cluster 12-G130M (01)</b> <b>Diagnostic Status: Warning</b> Scientific Instruments: COS/FUV, COS/NUV Special Requirements: (none)																																		
	<b>Diagnosics</b> (Cluster 12-G130M (01)) Warning (Orbit Planner): INEFFICIENT ORDERING OF FP-POS POSITIONS																																		
<b>Fixed Targets</b>	<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>(1)</td> <td>NGC5253-CLUSTER-12</td> <td>Offset from OFFSET-STAR RA Offset: -2.153 Secs Dec Offset: -3.289 Arcsec</td> <td></td> <td>V=17.9 F275W=17.82</td> <td>Offset Position (NGC5253-CLUSTER-12)</td> </tr> <tr> <td colspan="6"> <i>Comments:</i>                      Category=STELLAR CLUSTER                      Description=[STAR FORMING REGION]                      Extended=NO                 </td> </tr> <tr> <td>(2)</td> <td>OFFSET-STAR</td> <td>RA: 13 39 58.2760 (204.9928167d) Dec: -31 38 19.78 (-31.63883d) Equinox: J2000</td> <td></td> <td>V=19.58 WFC3/UVIS F275W mag = 19.07</td> <td>Reference Frame: ICRS</td> </tr> <tr> <td colspan="6"> <i>Comments: Coords are from Gaia DR2. Quoted V mag is GAIA G band mag which is close to Johnson V.</i>                      Category=STAR                      Description=[UNDESIGNATED]                      Extended=NO                 </td> </tr> </tbody> </table>	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous	(1)	NGC5253-CLUSTER-12	Offset from OFFSET-STAR RA Offset: -2.153 Secs Dec Offset: -3.289 Arcsec		V=17.9 F275W=17.82	Offset Position (NGC5253-CLUSTER-12)	<i>Comments:</i> Category=STELLAR CLUSTER Description=[STAR FORMING REGION] Extended=NO						(2)	OFFSET-STAR	RA: 13 39 58.2760 (204.9928167d) Dec: -31 38 19.78 (-31.63883d) Equinox: J2000		V=19.58 WFC3/UVIS F275W mag = 19.07	Reference Frame: ICRS	<i>Comments: Coords are from Gaia DR2. Quoted V mag is GAIA G band mag which is close to Johnson V.</i> Category=STAR Description=[UNDESIGNATED] Extended=NO									
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Proposal 16045 - Cluster 12-G130M (01) - COS observations of a very young massive star cluster in the blue compact dwarf galaxy N...

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
Exposures	1	ACQ-offset star (1395867)	(2) OFFSET-STAR	COS/NUV, ACQ/IMAGE, PSA	MIRRORA			13.0 Secs (13 Secs) [==>]	[1]
	<i>Comments: Used F275W mag and O5V SED with E(B-V)=0</i>								
	2	NUV image of cluster 12 (1395870)	(1) NGC5253-CLUS TER-12	COS/NUV, ACCUM, PSA	MIRRORA			18.0 Secs (18 Secs) [==>]	[1]
	<i>Comments: Used F275W mag =17.82, SSP 5 Myr SED with E(B-V)=0.28. NUV image of cluster and surrounding field.</i>								
	3	G130M-exp 1 (1395247)	(1) NGC5253-CLUS TER-12	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FLASH=YES; FP-POS=3; BUFFER-TIME=50 16		1114 Secs (1114 Secs) [==>]	[1]
	4	G130M-exp 2 (1395247)	(1) NGC5253-CLUS TER-12	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FLASH=YES; FP-POS=3; BUFFER-TIME=50 16		1123 Secs (1123 Secs) [==>]	[1]
	5	G130M-exp 3 (1395247)	(1) NGC5253-CLUS TER-12	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FLASH=YES; FP-POS=4; BUFFER-TIME=50 16		1347 Secs (1347 Secs) [==>]	[2]
	6	G130M-exp 4 (1395247)	(1) NGC5253-CLUS TER-12	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FLASH=YES; FP-POS=4; BUFFER-TIME=50 16		1346 Secs (1346 Secs) [==>]	[2]
	7	G130M-exp 5 (1395247)	(1) NGC5253-CLUS TER-12	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FLASH=YES; FP-POS=3; BUFFER-TIME=50 16		1347 Secs (1347 Secs) [==>]	[3]
	8	G130M-exp 6 (1395247)	(1) NGC5253-CLUS TER-12	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FLASH=YES; FP-POS=3; BUFFER-TIME=50 16		1346 Secs (1346 Secs) [==>]	[3]
9	G130M-exp 7 (1395247)	(1) NGC5253-CLUS TER-12	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FLASH=YES; FP-POS=4; BUFFER-TIME=50 16		1347 Secs (1347 Secs) [==>]	[4]	
10	G130M-exp 8 (1395247)	(1) NGC5253-CLUS TER-12	COS/FUV, TIME-TAG, PSA	G130M 1291 A	FLASH=YES; FP-POS=4; BUFFER-TIME=50 16		1346 Secs (1346 Secs) [==>]	[4]	





Proposal 16045 - Cluster 12-G160M (02) - COS observations of a very young massive star cluster in the blue compact dwarf galaxy N...

Thu Dec 05 23:03:31 GMT 2019

Visit	Proposal 16045, Cluster 12-G160M (02) Diagnostic Status: No Diagnostics Scientific Instruments: COS/FUV, COS/NUV Special Requirements: (none)					
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes
		(1)	NGC5253-CLUSTER-12	Offset from OFFSET-STAR RA Offset: -2.153 Secs Dec Offset: -3.289 Arcsec		V=17.9 F275W=17.82
	(2)	OFFSET-STAR	RA: 13 39 58.2760 (204.9928167d) Dec: -31 38 19.78 (-31.63883d) Equinox: J2000		V=19.58 WFC3/UVIS F275W mag = 19. 07	Reference Frame: ICRS
		<i>Comments: Coords are from Gaia DR2. Quoted V mag is GAIA G band mag which is close to Johnson V.</i> Category=STAR Description=[UNDESIGNATED] Extended=NO				

Proposal 16045 - Cluster 12-G160M (02) - COS observations of a very young massive star cluster in the blue compact dwarf galaxy N...

Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	ACQ-offset star (1395867)	(2) OFFSET-STAR	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				13.0 Secs (13 Secs)	
									[==>]	[1]
	<i>Comments: Used F275W mag and O5V SED with E(B-V)=0</i>									
	2	NUV image of cluster 12 (1395870)	(1) NGC5253-CLUS TER-12	COS/NUV, ACCUM, PSA	MIRRORA				18.0 Secs (18 Secs)	
									[==>]	[1]
	<i>Comments: Used F275W mag =17.82, SSP 5 Myr SED with E(B-V)=0.28. NUV image of cluster and surrounding field.</i>									
	3	G160M-exp 1 (1396091)	(1) NGC5253-CLUS TER-12	COS/FUV, TIME-TAG, PSA	G160M 1600 A	FLASH=YES; FP-POS=1; BUFFER-TIME=17 944			1100 Secs (1100 Secs)	
									[==>]	[1]
	4	G160M-exp 2 (1396091)	(1) NGC5253-CLUS TER-12	COS/FUV, TIME-TAG, PSA	G160M 1600 A	FLASH=YES; FP-POS=1; BUFFER-TIME=17 944			1100 Secs (1100 Secs)	
								[==>]	[1]	
5	G160M-exp 3 (1396091)	(1) NGC5253-CLUS TER-12	COS/FUV, TIME-TAG, PSA	G160M 1600 A	FLASH=YES; FP-POS=2; BUFFER-TIME=17 944			1356 Secs (1356 Secs)		
								[==>]	[2]	
6	G160M-exp 4 (1396091)	(1) NGC5253-CLUS TER-12	COS/FUV, TIME-TAG, PSA	G160M 1600 A	FLASH=YES; FP-POS=2; BUFFER-TIME=17 944			1356 Secs (1356 Secs)		
								[==>]	[2]	
7	G160M-exp 5 (1396091)	(1) NGC5253-CLUS TER-12	COS/FUV, TIME-TAG, PSA	G160M 1600 A	FLASH=YES; FP-POS=3; BUFFER-TIME=17 944			1356 Secs (1356 Secs)		
								[==>]	[3]	
8	G160M-exp 6 (1396091)	(1) NGC5253-CLUS TER-12	COS/FUV, TIME-TAG, PSA	G160M 1600 A	FLASH=YES; FP-POS=3; BUFFER-TIME=17 944			1356 Secs (1356 Secs)		
								[==>]	[3]	
9	G160M-exp 7 (1396091)	(1) NGC5253-CLUS TER-12	COS/FUV, TIME-TAG, PSA	G160M 1600 A	FLASH=YES; FP-POS=4; BUFFER-TIME=17 944			1356 Secs (1356 Secs)		
								[==>]	[4]	
10	G160M-exp 7 (1396091)	(1) NGC5253-CLUS TER-12	COS/FUV, TIME-TAG, PSA	G160M 1600 A	FLASH=YES; FP-POS=4; BUFFER-TIME=17 944			1356 Secs (1356 Secs)		
								[==>]	[4]	

