



6801 - Completing the control field observations of GO-1905

Cycle: 3, Proposal Category: DD

INVESTIGATORS

<i>Name</i>	<i>Institution</i>
Dr. Mario Giuseppe Guarcello (PI) (ESA Member)	INAF - Osservatorio Astronomico di Palermo
Dr. Andrew Winter (CoI) (ESA Member) (CoPI)	Queen Mary University of London
Dr. Kristina Monsch (CoI) (CoPI)	Smithsonian Institution Astrophysical Observatory
Dr. Amelia Maria Bayo (CoI) (ESA Member) (CoPI)	European Southern Observatory - Germany
Dr. Victor Almendros-Abad (CoI) (ESA Member) (CoPI)	INAF - Osservatorio Astronomico di Palermo
Dr. Koraljka Muzic (CoI) (ESA Member) (CoPI)	Instituto de Astrofisica e Ciencias do Espaco
Dr. Morten Andersen (CoI) (ESA Member) (CoPI)	European Southern Observatory - Germany
Dr. Mario Gennaro (CoI) (CoPI) (US Admin CoI)	Space Telescope Science Institute

OBSERVATIONS

<i>Folder</i>	<i>Observation</i>	<i>Label</i>	<i>Observing Template</i>	<i>Science Target</i>
Observation Folder				
	1	control field	NIRCam Imaging	(1) control_field
	2	control field	NIRCam Imaging	(1) control_field

ABSTRACT

The accepted program GO-1905 has the main objective of calculating the Initial Mass Function (IMF) of the supermassive star cluster Westerlund 1. This would allow for the first time to test the universality of the IMF and the formation efficiency of the brown dwarfs in a truly starburst environment, which is important to our capability of accounting for the unresolved stellar population of those galaxies experiencing intense epochs of star-formation, whose typical star-forming environment is in the form of supermassive clusters.

In order to derive the mass distribution of the stellar population of Westerlund 1, it is mandatory to use a control field to account for the foreground/background stellar population along the line of sight contaminating the loci of the cluster population in the various color-magnitude

diagrams. Unfortunately, among the chosen set of filters requested for the control field in GO-1905, only the observations in two filters (F115W and F277W) were performed, while F150W and F200W are deeper and with a more spatially uniform completeness. This does not allow us to obtain an accurate estimate of the very low-mass end of the IMF of the cluster.

We thus request new observations of the control field chosen for GO-1905 in the remaining filters (F150W, F200W, F356W, and F444W) adopting the same observing strategy used for GO-1905. Despite the very small amount of requested time (1.5 hours), this observation will have an enormous impact on our capability of deriving an accurate estimate of the IMF of Westerlund 1

OBSERVING DESCRIPTION

At the age of 5 Myr and with a total mass of some 10^5 solar masses, Westerlund 1 is the most massive young star cluster known in the Milky Way, and the closest example to the Sun of supermassive star clusters. Despite being an extreme and rare star forming environment in our Galaxy today, supermassive star clusters are common in the early Universe, in starburst and merging galaxies, and in epochs of intense star formation activity of the Milky Way. Westerlund 1 is therefore the best targets for extending our knowledge of star formation and early stellar evolution to the most energetic star-forming environment. This has motivated the MIRI and NIRCам observations of Westerlund 1 (GO-1905) as part of the EWOCS (Extended Westerlund 1 and 2 Open Clusters Survey) project.

The observations approved as GO-1905, now public, are designed in order to derive the Initial Mass Function (IMF) of Westerlund 1 into the brown dwarf (BD) regime. This is a topic of primary importance for both our understanding of star formation in different environments and for our capability of accounting for the unresolved low-mass stellar population in distant galaxies.

The study of the IMF in Westerlund 1 relies on the capability of accounting for the foreground/background stellar population contaminating the locus populated by cluster members in NIRCам color-color and color-magnitude diagrams. For such reason, PID-1905 also includes observations of a control field located at RA: 16:47:43.0 Dec: -46:03:47.0. The observations of the control field were performed with a similar strategy of those adopted for Westerlund 1, adopting the same set of wide filters. However, only observations with the F115W and F277W were done. This negatively impact the possibility capability of calculating the IMF of Westerlund 1 for the following reasons: 1) PID-1905 observations at F150W and F200W are deeper than those at F115W and F277W, being the only ones really useful to reach the brown dwarfs of the cluster; 2) 50% completeness at F150W and F200W is more uniform than in F115W and F277W across the field, 3) given the cluster age, some of the stellar population may have protoplanetary discs, whose emission is more prominent at longer wavelengths, requiring a multiband approach to estimate the IMF.

We thus request a short (1.5 hours) DDT NIRCам observation of the control field with the remaining set of filters, namely F150W, F200W, F356W,

and F444W. We point it out that despite the very short investment of observing time, such observation would have a profound impact for our capability of deriving the IMF of Westerlund 1, allowing us to fulfill one of the two main scientific objectives of GO-1905. We are aware of the fact that this request may be atypical with respect to the DDT criteria. However, the DDT avenue is the only way to take full advantage of this unique data set in reasonable time, and to fulfill the objective of obtaining the very low mass end of the IMF in the superstar cluster Westerlund 1.

Proposal 6801 - Targets - Completing the control field observations of GO-1905

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
	(1) <i>Comments:</i> <i>Category=Stellar Cluster</i> <i>Description=[Open star clusters]</i>	control_field	RA: 16 47 43.0000 (251.9291667d) Dec: -46 03 47.00 (-46.06306d) Equinox: J2000		

Proposal 6801 - Observation 1 - Completing the control field observations of GO-1905

Fri Feb 27 23:00:17 GMT 2026

Observation	<p>Proposal 6801, Observation 1: control field</p> <p>Diagnostic Status: Warning</p> <p>Observing Template: NIRCcam Imaging</p>									
Diagnostics	<p>(control field (Obs 1)) Warning (Form): By selecting Target Placement = Module Gap the target coordinates will not fall on any detector unless an appropriate Mosaic, set of Dithers or Offset Special Requirement is specified.</p> <p>(Visit 1:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p>									
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections			Miscellaneous		
	(1)	control_field	RA: 16 47 43.0000 (251.9291667d) Dec: -46 03 47.00 (-46.06306d) Equinox: J2000							
	<p><i>Comments:</i> <i>Category=Stellar Cluster</i> <i>Description=[Open star clusters]</i></p>									
Template	Module		Subarray			Target Placement				
	ALL		FULL			Module gap (large extended source)				
Dithers	#	Primary Dither Type		Primary Dithers	Subpixel Dither Type		Dither Size	Subpixel Positions		
	1	INTRAMODULE		4	STANDARD			1		
Spectral Elements	#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	Optional ETC ID
	1	F150W	F405N+F444W	BRIGHT2	2	1	4	4	171.788	
	2	F200W	F444W	BRIGHT2	2	1	4	4	171.788	
Special Requirements	<p>Before Date 25-APR-2025:00:00:00 Aperture PA Range 274.92542306 to 294.92542306 Degrees (V3 275.0 to 295.0)</p>									

Proposal 6801 - Observation 2 - Completing the control field observations of GO-1905

Fri Feb 27 23:00:17 GMT 2026

Observation	<p>Proposal 6801, Observation 2: control field</p> <p>Diagnostic Status: Warning</p> <p>Observing Template: NIRCcam Imaging</p> <p><i>Comments: WOPR copy of obs. 1 -- the Fine Guidance Sensor (FGS) team found that the failed acquisition was caused by the guide-star count rates being much lower than expected, likely related to the high reddening of stars in this crowded star cluster field. Potential remedies to the problem are being investigated, but the repeat visit will not be scheduled until this is resolved.</i></p>																																							
Diagnostics	<p>(control field (Obs 2)) Warning (Form): By selecting Target Placement = Module Gap the target coordinates will not fall on any detector unless an appropriate Mosaic, set of Dithers or Offset Special Requirement is specified.</p> <p>(Visit 2:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p> <p>(Visit 2:1) Informational (Form): Visit schedulable, but most scheduling windows are when JWST is pointed in direction of greatest micrometeoroid impact risk. This is likely due to scheduling special requirements.</p>																																							
Fixed Targets	<table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Target Coordinates</th> <th>Targ. Coord. Corrections</th> <th>Miscellaneous</th> </tr> </thead> <tbody> <tr> <td>(1)</td> <td>control_field</td> <td>RA: 16 47 43.0000 (251.9291667d) Dec: -46 03 47.00 (-46.06306d) Equinox: J2000</td> <td></td> <td></td> </tr> </tbody> </table> <p><i>Comments: Category=Stellar Cluster Description=[Open star clusters]</i></p>										#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous	(1)	control_field	RA: 16 47 43.0000 (251.9291667d) Dec: -46 03 47.00 (-46.06306d) Equinox: J2000																						
#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous																																				
(1)	control_field	RA: 16 47 43.0000 (251.9291667d) Dec: -46 03 47.00 (-46.06306d) Equinox: J2000																																						
Template	<table border="1"> <thead> <tr> <th>Module</th> <th>Subarray</th> <th>Target Placement</th> </tr> </thead> <tbody> <tr> <td>ALL</td> <td>FULL</td> <td>Module gap (large extended source)</td> </tr> </tbody> </table>										Module	Subarray	Target Placement	ALL	FULL	Module gap (large extended source)																								
Module	Subarray	Target Placement																																						
ALL	FULL	Module gap (large extended source)																																						
Dithers	<table border="1"> <thead> <tr> <th>#</th> <th>Primary Dither Type</th> <th>Primary Dithers</th> <th>Subpixel Dither Type</th> <th>Dither Size</th> <th>Subpixel Positions</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>INTRAMODULE</td> <td>4</td> <td>STANDARD</td> <td></td> <td>1</td> </tr> </tbody> </table>										#	Primary Dither Type	Primary Dithers	Subpixel Dither Type	Dither Size	Subpixel Positions	1	INTRAMODULE	4	STANDARD		1																		
#	Primary Dither Type	Primary Dithers	Subpixel Dither Type	Dither Size	Subpixel Positions																																			
1	INTRAMODULE	4	STANDARD		1																																			
Spectral Elements	<table border="1"> <thead> <tr> <th>#</th> <th>Short Filter</th> <th>Long Filter</th> <th>Readout Pattern</th> <th>Groups/Int</th> <th>Integrations/Exp</th> <th>Total Integrations</th> <th>Total Dithers</th> <th>Total Exposure Time</th> <th>Optional ETC ID</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>F150W</td> <td>F405N+F444W</td> <td>BRIGHT2</td> <td>2</td> <td>1</td> <td>4</td> <td>4</td> <td>171.788</td> <td></td> </tr> <tr> <td>2</td> <td>F200W</td> <td>F444W</td> <td>BRIGHT2</td> <td>2</td> <td>1</td> <td>4</td> <td>4</td> <td>171.788</td> <td></td> </tr> </tbody> </table>										#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	Optional ETC ID	1	F150W	F405N+F444W	BRIGHT2	2	1	4	4	171.788		2	F200W	F444W	BRIGHT2	2	1	4	4	171.788	
#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	Optional ETC ID																															
1	F150W	F405N+F444W	BRIGHT2	2	1	4	4	171.788																																
2	F200W	F444W	BRIGHT2	2	1	4	4	171.788																																
Special Requirements	<p>Aperture PA Range 286.68142306 to 286.68142306 Degrees (V3 286.756 to 286.756)</p> <p>On Hold FGS team looking at mitigation strategies.</p>																																							