



16453 - Measuring the Distance to SN Ia Host NGC 4457

Cycle: 28, 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) NGC-4457 ANY	ACS/WFC WFC3/UVIS	2	07-May-2021 11:02:51.0	yes
02	(1) NGC-4457 ANY	ACS/WFC WFC3/UVIS	2	07-May-2021 11:02:52.0	yes
03	(1) NGC-4457 ANY	ACS/WFC WFC3/UVIS	2	07-May-2021 11:02:53.0	yes
53	(1) NGC-4457 ANY	ACS/WFC WFC3/UVIS	2	07-May-2021 11:02:54.0	yes

8 Total Orbits Used

ABSTRACT

Proposal 16453 (STScI Edit Number: 1, Created: Friday, May 7, 2021 at 10:02:55 AM Eastern Standard Time) - Overview

The local measurement of the Hubble constant, H_0 , is now in tension with measurements from the distant universe by 4.4 sigma. The local H_0 value is based on using Type Ia Supernovae (SNe Ia) as standard candles, calibrated from a small sample (<20) of nearby galaxies and limited by the (in)frequency of SN Ia events. One of the biggest improvements we can make in measuring H_0 locally is to increase the number of calibrating systems.

A new SN Ia event has just occurred in the nearby galaxy NGC 4457, estimated to be at ~ 17 Mpc based on the light-curve. The host galaxy is close enough that a precision distance can be made using the tip of the red giant branch (TRGB) method. We propose ACS+WFC3 imaging of the resolved stars in the galaxy to precisely measure the distance and calibrate the SN Ia luminosity. A statistical sample of galaxies with SNe Ia and independent distance measurements is the ultimate goal for improving the local H_0 measurement and such a sample is only built galaxy-by-galaxy when a nearby SN Ia occurs. In this context, NGC 4457 is a high priority target for a precision TRGB distance measurement.

In addition, the host-galaxy NGC 4457 is a more massive galaxy with little recent star formation. These properties are unique among SNe Ia calibrating systems but common in galaxies in the Hubble flow. SNe Ia in massive hosts standardize to a luminosity up to 10% brighter than those in lower mass hosts, a potential source of systematic uncertainty in the SN Ia distance scale. The new TRGB distance will provide an independent distance to a SN Ia in a galaxy with such properties and enable a comparison with SN Ia luminosity offsets estimated from galaxy redshifts.

OBSERVING DESCRIPTION

The primary goal of this proposal is to measure the tip of the red giant branch (TRGB) distance to the galaxy NGC 4457 using optical imaging from the ACS camera of the halo stars and an additional halo field from WFC3 UVIS imaging. Orbit allocation = 6 (3 per filter) orbits which includes 6 primary ACS orbits and 6 coordinated parallel WFC3 orbits.

All visits are broken into 2 orbits. ACS/WFC exposure times are split between the F606W filter and the F814W. The coordinated parallel observations are to be obtained with the WFC UVIS camera with exposure times split between the F606W and F814W filters.

Small ditherings are performed between orbits in order to remove hot pixels, smooth the detector response, and provide some sub-pixel sampling of the PSF. We don't intend to cover the interchip gap. Ditherings are performed using POS-TARG and follow the 3-point pattern no. 13 with shifts of 2-5 pix in the x and y direction. After the first 3 orbits have completed a full dither pattern, we shift the field by ~ 10 pixels in the x direction and repeat the 3-point pattern no. 13.

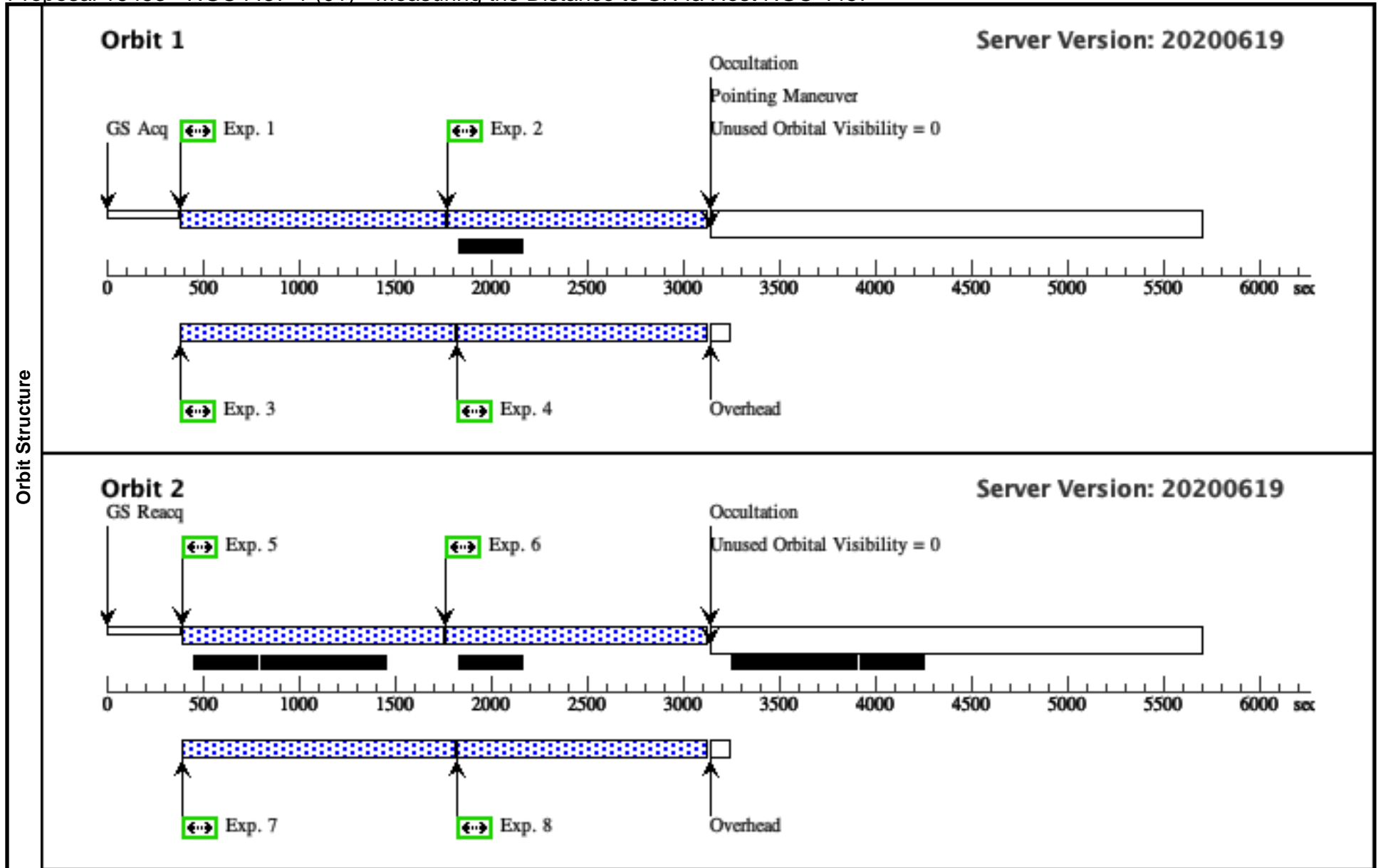
The first visit is requested with specific orient ranges. The orientation ranges have been chosen such that the primary observations are of a field in the halo of NGC 4457 while the coordinated parallels images cover an additional halo field of the target galaxy. Subsequent visits are requested to be obtained with the same ORIENT as the first visit in order to maximize the sky area covered at full depth and ensure precise alignments of the observations.

Proposal 16453 - NGC4457-1 (01) - Measuring the Distance to SN Ia Host NGC 4457

Visit	Proposal 16453, NGC4457-1 (01), completed Fri May 07 15:02:55 GMT 2021 Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS, ACS/WFC Special Requirements: ORIENT 114D TO 135 D					
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes
(1)		NGC-4457	RA: 12 28 57.5947 (187.2399779d) Dec: +03 36 56.24 (3.61562d) Equinox: J2000		V=28.15	Reference Frame: NED
<i>Comments: This object was generated by the targetselector and retrieved from the NED database.</i> Category=EXT-STAR Description=[K III-I] Extended=NO						

Proposal 16453 - NGC4457-1 (01) - Measuring the Distance to SN Ia Host NGC 4457

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
Exposures	1	NGC4457-A (1) NGC-4457 CS-F606W-1	ACS/WFC, ACCUM, WFCENTER	F606W	CR-SPLIT=NO	POS TARG 0.0,0.0	Sequence 1-4 Non-Int in NGC4457-1 (01) Prime + Parallel Group 1-4 in Sequence 1-4 Non-Int in NGC4457-1 (01)	1173 Secs (1173 Secs) [==>]	[1]
	2	NGC4457-A (1) NGC-4457 CS-F814W-1	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO	POS TARG 0.0,0.0	Sequence 1-4 Non-Int in NGC4457-1 (01) Prime + Parallel Group 1-4 in Sequence 1-4 Non-Int in NGC4457-1 (01)	1173 Secs (1173 Secs) [==>]	[1]
	3	NGC4457-U ANY VIS-F606W-1	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W	CR-SPLIT=NO		Sequence 1-4 Non-Int in NGC4457-1 (01) Prime + Parallel Group 1-4 in Sequence 1-4 Non-Int in NGC4457-1 (01)	1250 Secs (1282 Secs) [==>1282.0 Secs]	[1]
	4	NGC4457-U ANY VIS-F814W-1	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W	CR-SPLIT=NO		Sequence 1-4 Non-Int in NGC4457-1 (01) Prime + Parallel Group 1-4 in Sequence 1-4 Non-Int in NGC4457-1 (01)	1250 Secs (1282 Secs) [==>1282.0 Secs]	[1]
	5	NGC4457-A (1) NGC-4457 CS-F606W-2	ACS/WFC, ACCUM, WFCENTER	F606W	CR-SPLIT=NO	POS TARG 0.115,0.125	Sequence 5-8 Non-Int in NGC4457-1 (01) Prime + Parallel Group 5-8 in Sequence 5-8 Non-Int in NGC4457-1 (01)	1173.5 Secs (1181.5 Secs) [==>1181.5 Secs]	[2]
	6	NGC4457-A (1) NGC-4457 CS-F814W-2	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO	POS TARG 0.115,0.125	Sequence 5-8 Non-Int in NGC4457-1 (01) Prime + Parallel Group 5-8 in Sequence 5-8 Non-Int in NGC4457-1 (01)	1173.5 Secs (1181.5 Secs) [==>1181.5 Secs]	[2]
	7	NGC4457-U ANY VIS-F606W-2	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W	CR-SPLIT=NO		Sequence 5-8 Non-Int in NGC4457-1 (01) Prime + Parallel Group 5-8 in Sequence 5-8 Non-Int in NGC4457-1 (01)	1250 Secs (1282 Secs) [==>1282.0 Secs]	[2]
	8	NGC4457-U ANY VIS-F814W-2	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W	CR-SPLIT=NO		Sequence 5-8 Non-Int in NGC4457-1 (01) Prime + Parallel Group 5-8 in Sequence 5-8 Non-Int in NGC4457-1 (01)	1250 Secs (1282 Secs) [==>1282.0 Secs]	[2]

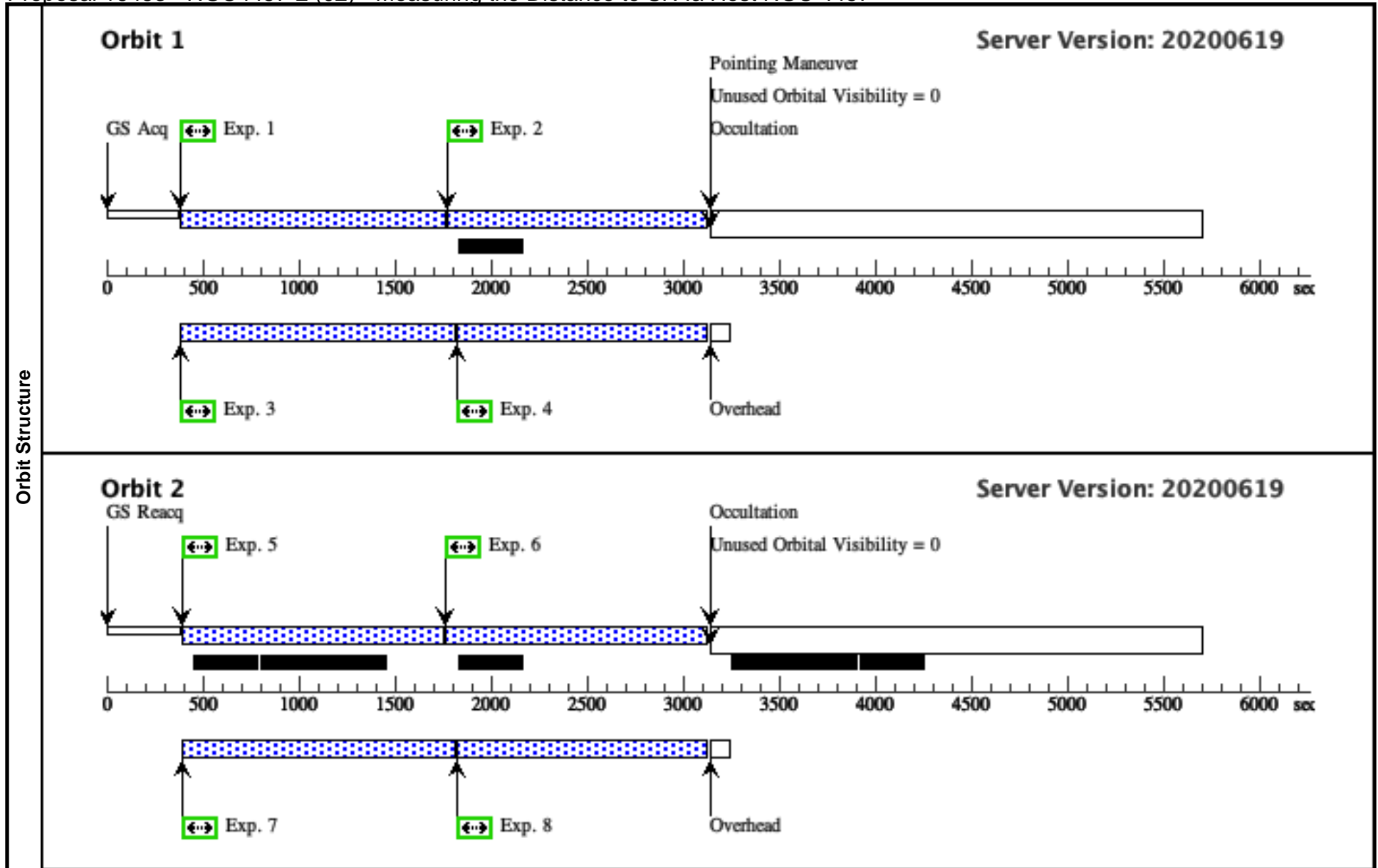


Proposal 16453 - NGC4457-2 (02) - Measuring the Distance to SN Ia Host NGC 4457

Visit	Proposal 16453, NGC4457-2 (02), completed Fri May 07 15:02:55 GMT 2021 Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS, ACS/WFC Special Requirements: SAME ORIENT AS 01					
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes
(1)		NGC-4457	RA: 12 28 57.5947 (187.2399779d) Dec: +03 36 56.24 (3.61562d) Equinox: J2000		V=28.15	Reference Frame: NED
	<i>Comments: This object was generated by the targetselector and retrieved from the NED database.</i> Category=EXT-STAR Description=[K III-I] Extended=NO					

Proposal 16453 - NGC4457-2 (02) - Measuring the Distance to SN Ia Host NGC 4457

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
Exposures	1	NGC4457-A (1) NGC-4457 CS-F606W-3	ACS/WFC, ACCUM, WFCENTER	F606W	CR-SPLIT=NO	POS TARG 0.231,0.249	Sequence 1-4 Non-Int in NGC4457-2 (02) Prime + Parallel Group 1-4 in Sequence 1-4 Non-Int in NGC4457-2 (02)	1173 Secs (1173 Secs) [==>]	[1]
	2	NGC4457-A (1) NGC-4457 CS-F814W-3	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO	POS TARG 0.231,0.249	Sequence 1-4 Non-Int in NGC4457-2 (02) Prime + Parallel Group 1-4 in Sequence 1-4 Non-Int in NGC4457-2 (02)	1173 Secs (1173 Secs) [==>]	[1]
	3	NGC4457-U ANY VIS-F606W-3	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W	CR-SPLIT=NO		Sequence 1-4 Non-Int in NGC4457-2 (02) Prime + Parallel Group 1-4 in Sequence 1-4 Non-Int in NGC4457-2 (02)	1250 Secs (1282 Secs) [==>1282.0 Secs]	[1]
	4	NGC4457-U ANY VIS-F814W-3	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W	CR-SPLIT=NO		Sequence 1-4 Non-Int in NGC4457-2 (02) Prime + Parallel Group 1-4 in Sequence 1-4 Non-Int in NGC4457-2 (02)	1250 Secs (1282 Secs) [==>1282.0 Secs]	[1]
	5	NGC4457-A (1) NGC-4457 CS-F606W-4	ACS/WFC, ACCUM, WFCENTER	F606W	CR-SPLIT=NO	POS TARG 0.5,0.0	Sequence 5-8 Non-Int in NGC4457-2 (02) Prime + Parallel Group 5-8 in Sequence 5-8 Non-Int in NGC4457-2 (02)	1182 Secs (1182 Secs) [==>]	[2]
	6	NGC4457-A (1) NGC-4457 CS-F814W-4	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO	POS TARG 0.5,0.0	Sequence 5-8 Non-Int in NGC4457-2 (02) Prime + Parallel Group 5-8 in Sequence 5-8 Non-Int in NGC4457-2 (02)	1182 Secs (1182 Secs) [==>]	[2]
	7	NGC4457-U ANY VIS-F606W-4	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W	CR-SPLIT=NO		Sequence 5-8 Non-Int in NGC4457-2 (02) Prime + Parallel Group 5-8 in Sequence 5-8 Non-Int in NGC4457-2 (02)	1250 Secs (1282 Secs) [==>1282.0 Secs]	[2]
	8	NGC4457-U ANY VIS-F814W-4	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W	CR-SPLIT=NO		Sequence 5-8 Non-Int in NGC4457-2 (02) Prime + Parallel Group 5-8 in Sequence 5-8 Non-Int in NGC4457-2 (02)	1250 Secs (1282 Secs) [==>1282.0 Secs]	[2]

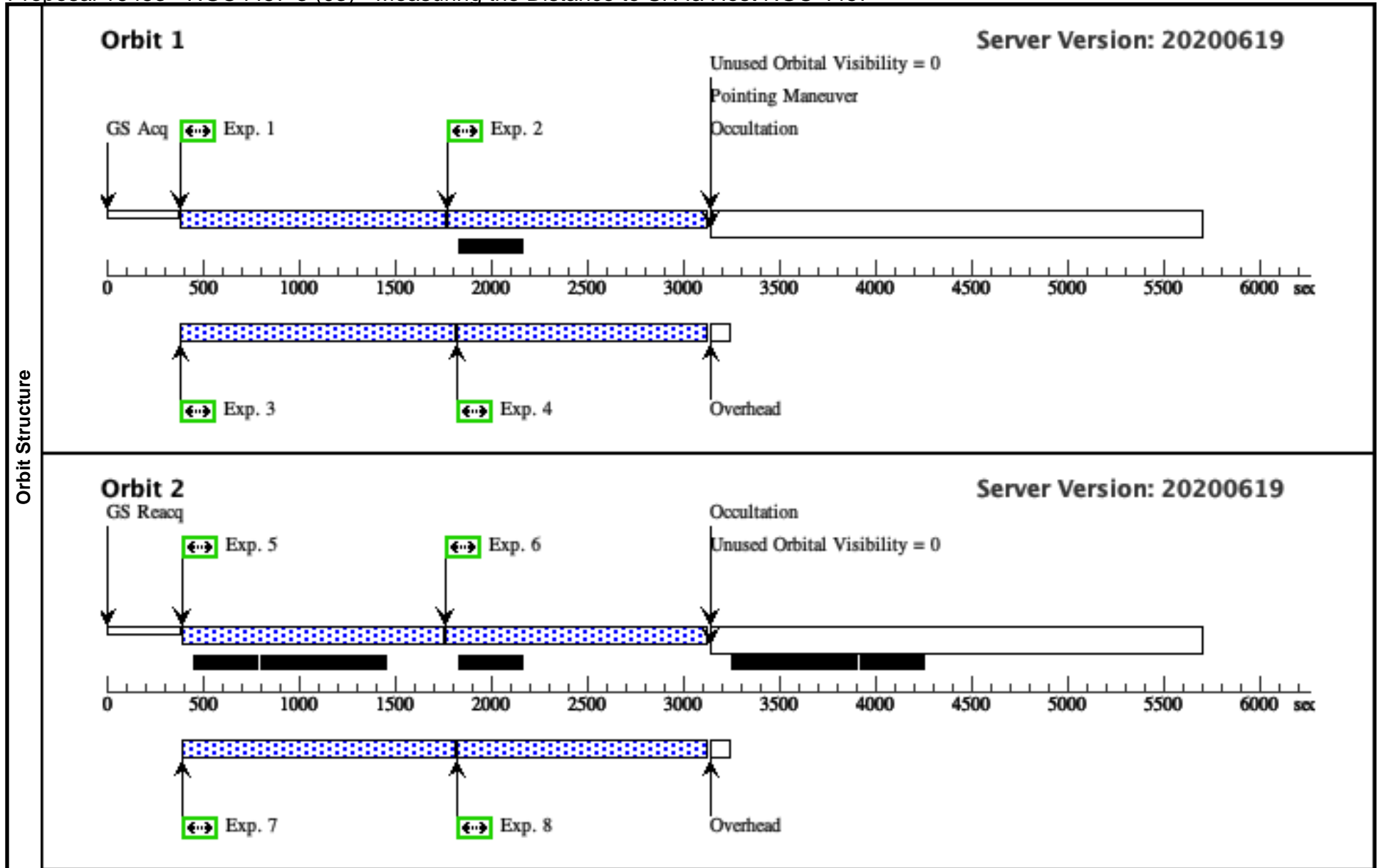


Proposal 16453 - NGC4457-3 (03) - Measuring the Distance to SN Ia Host NGC 4457

Visit	Proposal 16453, NGC4457-3 (03), failed Fri May 07 15:02:55 GMT 2021 Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS, ACS/WFC Special Requirements: SAME ORIENT AS 01					
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes
(1)		NGC-4457	RA: 12 28 57.5947 (187.2399779d) Dec: +03 36 56.24 (3.61562d) Equinox: J2000		V=28.15	Reference Frame: NED
<i>Comments: This object was generated by the targetselector and retrieved from the NED database.</i> Category=EXT-STAR Description=[K III-I] Extended=NO						

Proposal 16453 - NGC4457-3 (03) - Measuring the Distance to SN Ia Host NGC 4457

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
Exposures	1	NGC4457-A (1) NGC-4457 CS-F606W-5	ACS/WFC, ACCUM, WFCENTER	F606W	CR-SPLIT=NO	POS TARG 0.615,0.125	Sequence 1-4 Non-Int in NGC4457-3 (03) Prime + Parallel Group 1-4 in Sequence 1-4 Non-Int in NGC4457-3 (03)	1209 Secs (1172 Secs) [==>1172.0 Secs]	[1]
	2	NGC4457-A (1) NGC-4457 CS-F814W-5	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO	POS TARG 0.615,0.125	Sequence 1-4 Non-Int in NGC4457-3 (03) Prime + Parallel Group 1-4 in Sequence 1-4 Non-Int in NGC4457-3 (03)	1210 Secs (1173 Secs) [==>1173.0 Secs]	[1]
	3	NGC4457-U ANY VIS-F606W-5	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W	CR-SPLIT=NO		Sequence 1-4 Non-Int in NGC4457-3 (03) Prime + Parallel Group 1-4 in Sequence 1-4 Non-Int in NGC4457-3 (03)	1250 Secs (1282 Secs) [==>1282.0 Secs]	[1]
	4	NGC4457-U ANY VIS-F814W-5	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W	CR-SPLIT=NO		Sequence 1-4 Non-Int in NGC4457-3 (03) Prime + Parallel Group 1-4 in Sequence 1-4 Non-Int in NGC4457-3 (03)	1250 Secs (1282 Secs) [==>1282.0 Secs]	[1]
	5	NGC4457-A (1) NGC-4457 CS-F606W-6	ACS/WFC, ACCUM, WFCENTER	F606W	CR-SPLIT=NO	POS TARG 0.731,0.249	Sequence 5-8 Non-Int in NGC4457-3 (03) Prime + Parallel Group 5-8 in Sequence 5-8 Non-Int in NGC4457-3 (03)	1173 Secs (1182 Secs) [==>1182.0 Secs]	[2]
	6	NGC4457-A (1) NGC-4457 CS-F814W-6	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO	POS TARG 0.731,0.249	Sequence 5-8 Non-Int in NGC4457-3 (03) Prime + Parallel Group 5-8 in Sequence 5-8 Non-Int in NGC4457-3 (03)	1173 Secs (1182 Secs) [==>1182.0 Secs]	[2]
	7	NGC4457-U ANY VIS-F606W-6	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W	CR-SPLIT=NO		Sequence 5-8 Non-Int in NGC4457-3 (03) Prime + Parallel Group 5-8 in Sequence 5-8 Non-Int in NGC4457-3 (03)	1250 Secs (1282 Secs) [==>1282.0 Secs]	[2]
	8	NGC4457-U ANY VIS-F814W-6	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W	CR-SPLIT=NO		Sequence 5-8 Non-Int in NGC4457-3 (03) Prime + Parallel Group 5-8 in Sequence 5-8 Non-Int in NGC4457-3 (03)	1250 Secs (1282 Secs) [==>1282.0 Secs]	[2]



Proposal 16453 - NGC4457-3 (53) - Measuring the Distance to SN Ia Host NGC 4457

Visit	Proposal 16453, NGC4457-3 (53) Fri May 07 15:02:55 GMT 2021 Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS, ACS/WFC Special Requirements: SAME ORIENT AS 01												
	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>(1)</td> <td>NGC-4457</td> <td> RA: 12 28 57.5947 (187.2399779d) Dec: +03 36 56.24 (3.61562d) Equinox: J2000 </td> <td></td> <td>V=28.15</td> <td>Reference Frame: NED</td> </tr> </tbody> </table> <p><i>Comments: This object was generated by the targetselector and retrieved from the NED database.</i> Category=EXT-STAR Description=[K III-I] Extended=NO</p>	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous	(1)	NGC-4457	RA: 12 28 57.5947 (187.2399779d) Dec: +03 36 56.24 (3.61562d) Equinox: J2000		V=28.15
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous								
(1)	NGC-4457	RA: 12 28 57.5947 (187.2399779d) Dec: +03 36 56.24 (3.61562d) Equinox: J2000		V=28.15	Reference Frame: NED								

Proposal 16453 - NGC4457-3 (53) - Measuring the Distance to SN Ia Host NGC 4457

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
Exposures	1	NGC4457-A (1) NGC-4457 CS-F606W-5	ACS/WFC, ACCUM, WFCENTER	F606W	CR-SPLIT=NO	POS TARG 0.615,0.125	Sequence 1-4 Non-Int in NGC4457-3 (53) Prime + Parallel Group 1-4 in Sequence 1-4 Non-Int in NGC4457-3 (53)	1209 Secs (1172 Secs) [==>1172.0 Secs]	[1]
	2	NGC4457-A (1) NGC-4457 CS-F814W-5	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO	POS TARG 0.615,0.125	Sequence 1-4 Non-Int in NGC4457-3 (53) Prime + Parallel Group 1-4 in Sequence 1-4 Non-Int in NGC4457-3 (53)	1210 Secs (1173 Secs) [==>1173.0 Secs]	[1]
	3	NGC4457-U ANY VIS-F606W-5	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W	CR-SPLIT=NO		Sequence 1-4 Non-Int in NGC4457-3 (53) Prime + Parallel Group 1-4 in Sequence 1-4 Non-Int in NGC4457-3 (53)	1250 Secs (1282 Secs) [==>1282.0 Secs]	[1]
	4	NGC4457-U ANY VIS-F814W-5	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W	CR-SPLIT=NO		Sequence 1-4 Non-Int in NGC4457-3 (53) Prime + Parallel Group 1-4 in Sequence 1-4 Non-Int in NGC4457-3 (53)	1250 Secs (1282 Secs) [==>1282.0 Secs]	[1]
	5	NGC4457-A (1) NGC-4457 CS-F606W-6	ACS/WFC, ACCUM, WFCENTER	F606W	CR-SPLIT=NO	POS TARG 0.731,0.249	Sequence 5-8 Non-Int in NGC4457-3 (53) Prime + Parallel Group 5-8 in Sequence 5-8 Non-Int in NGC4457-3 (53)	1173 Secs (1182 Secs) [==>1182.0 Secs]	[2]
	6	NGC4457-A (1) NGC-4457 CS-F814W-6	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO	POS TARG 0.731,0.249	Sequence 5-8 Non-Int in NGC4457-3 (53) Prime + Parallel Group 5-8 in Sequence 5-8 Non-Int in NGC4457-3 (53)	1173 Secs (1182 Secs) [==>1182.0 Secs]	[2]
	7	NGC4457-U ANY VIS-F606W-6	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W	CR-SPLIT=NO		Sequence 5-8 Non-Int in NGC4457-3 (53) Prime + Parallel Group 5-8 in Sequence 5-8 Non-Int in NGC4457-3 (53)	1250 Secs (1282 Secs) [==>1282.0 Secs]	[2]
	8	NGC4457-U ANY VIS-F814W-6	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W	CR-SPLIT=NO		Sequence 5-8 Non-Int in NGC4457-3 (53) Prime + Parallel Group 5-8 in Sequence 5-8 Non-Int in NGC4457-3 (53)	1250 Secs (1282 Secs) [==>1282.0 Secs]	[2]

