



10552 - The distance of the Orion Nebula Cluster

Cycle: 14, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

Proposal 10552 - Overview

<i>Visit</i>	<i>Targets</i>	<i>Configurations</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(2) ORI-PARALLAX2 (1) ORI-PARALLAX1	ACS/WFC	2	13-May-2005 15:20:49.0	yes
02	(2) ORI-PARALLAX2 (1) ORI-PARALLAX1	ACS/WFC	2	13-May-2005 13:58:06.0	yes

4 Total Orbits Used

ABSTRACT

The HST Treasury program on the Orion Nebula, currently in execution, has surprisingly found that background sources are easily detected by HST at long wavelengths through selected fields within the nebula. We propose to use these background sources as a reference system to measure the trigonometric parallax of the Orion Nebula cluster. Using ACS in the F850LP filter and with a modest investment of HST time, we will reduce the error on the ~500pc distance of the Orion Nebula to ~15pc, or less, improving by a factor ~6 over current estimates. Our new value will have a major impact on star formation studies, allowing to determine with high accuracy the absolute luminosity of the cluster members and all derived stellar parameters (ages, masses, mass accretion rates...). Our current understanding of a great range of phenomena associated to the star formation activity in Orion will also benefit from an improved distance estimate.

OBSERVING DESCRIPTION

We observe a field within the Orion Nebula at two epochs ~6 months apart to measure the parallax of the Orion Nebula Cluster against the background stars. Each epoch corresponds to a visit of 2 consecutive orbits, where we take long and short exposures. We opted for the F814W filter, which has better PSF and field distortion calibration than the similar F850LP. The two visits are identical and at the same target point, with aperture at the center of the ACS/WFC. The orient angles of the telescope are 40 and 248 degrees for the two visits.

ADDITIONAL COMMENTS

Proposal 10552 - Overview

For our scientific goal it is important to maximize the time difference between the two visits, which should be as close as possible to 6 months. The current planning assumes 2 gyro mode. This forces us to schedule the observations around Aug 15, 2005 (ORIENT=248) and around Jan 20, 2006 (ORIENT=40deg), approximately 5 months apart. At these dates the ORIENT angles are strongly constrained and turn out to be different by more than 180deg. Thus, the corners of the ACS field are not imaged both times, reducing the number of sourcers useful to estimate the parallax. If three gyro mode becomes available either in one of both visits, we would like to replan this program to increase the time/parallactic baseline and equalize the telescope ORIENT angles.

Proposal 10552 - Visit 01 - The distance of the Orion Nebula Cluster

Mon Jun 20 15:21:14 GMT 2005

Visit	Proposal 10552, Visit 01 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: ORIENT 248.0D TO 248.0 D									
	Patterns	#	Primary Pattern			Secondary Pattern			Exposures	
		(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=3.2 Line Spacing=3.2	Coordinate Frame=POS-TARG Pattern Orientation=19.9 Angle Between Sides=97.4 Center Pattern=false					(3), (5)	
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	ORI-PARALLAX1	RA: 05 35 24.1000 (83.8504167d) Dec: -05 30 53.00 (-5.51472d) Equinox: J2000 Plate Id: (?)		V=18.0+/-5.0	Coordinate Source: HST_IMAGE				
	(2)	ORI-PARALLAX2	RA: 05 35 26.1000 (83.8587500d) Dec: -05 30 57.00 (-5.51583d) Equinox: J2000 Plate Id: (?)		V=18.0+/-5.0	Coordinate Source: HST_IMAGE				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	Parallax 248 short1	(1) ORI-PARALLA X1	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO; GAIN=2			20.0 Secs [==>]	[1]
	2	Parallax 248 long1	(1) ORI-PARALLA X1	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO; GAIN=2			360.0 Secs [==>]	[1]
	3	Parallax 248 Dither 1	(1) ORI-PARALLA X1	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO; GAIN=2		Pattern 3-3 (1)	170.0 Secs [==>360.0 Secs (Pattern 1)] [==>360.0 Secs (Pattern 2)] [==>360.0 Secs (Pattern 3)] [==>360.0 Secs (Pattern 4)]	[1]
	4	Parallax 248 short2	(2) ORI-PARALLA X2	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO; GAIN=2			20.0 Secs [==>]	[2]
	5	Parallax 248 Dither 2	(2) ORI-PARALLA X2	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO; GAIN=2		Pattern 5-5 (1)	170.0 Secs [==>360.0 Secs (Pattern 1)] [==>360.0 Secs (Pattern 2)] [==>360.0 Secs (Pattern 3)] [==>360.0 Secs (Pattern 4)]	[2]
6	Parallax 248 short3	(2) ORI-PARALLA X2	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO; GAIN=2	SAME POS AS 5		20.0 Secs [==>]	[2]	

Proposal 10552 - Visit 02 - The distance of the Orion Nebula Cluster

Mon Jun 20 15:21:15 GMT 2005

Visit	Proposal 10552, Visit 02 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: ORIENT 40.0D TO 40.0 D									
	Patterns	#	Primary Pattern			Secondary Pattern			Exposures	
		(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=3.2 Line Spacing=3.2	Coordinate Frame=POS-TARG Pattern Orientation=19.9 Angle Between Sides=97.4 Center Pattern=false					(3), (5)	
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	ORI-PARALLAX1	RA: 05 35 24.1000 (83.8504167d) Dec: -05 30 53.00 (-5.51472d) Equinox: J2000 Plate Id: (?)		V=18.0+/-5.0	Coordinate Source: HST_IMAGE				
	(2)	ORI-PARALLAX2	RA: 05 35 26.1000 (83.8587500d) Dec: -05 30 57.00 (-5.51583d) Equinox: J2000 Plate Id: (?)		V=18.0+/-5.0	Coordinate Source: HST_IMAGE				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	Parallax 40 s hort1	(1) ORI-PARALLA X1	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO; GAIN=2			20.0 Secs [==>]	[1]
	2	Parallax 40 1 ong1	(1) ORI-PARALLA X1	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO; GAIN=2			360.0 Secs [==>]	[1]
	3	Parallax 40 dither1	(1) ORI-PARALLA X1	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO; GAIN=2		Pattern 3-3 (1)	170.0 Secs [==>360.0 Secs (Pattern 1)] [==>360.0 Secs (Pattern 2)] [==>360.0 Secs (Pattern 3)] [==>360.0 Secs (Pattern 4)]	[1]
	4	Parallax 40 s hort2	(2) ORI-PARALLA X2	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO; GAIN=2			20.0 Secs [==>]	[2]
	5	Parallax 40 Dither2	(2) ORI-PARALLA X2	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO; GAIN=2		Pattern 5-5 (1)	170.0 Secs [==>360.0 Secs (Pattern 1)] [==>360.0 Secs (Pattern 2)] [==>360.0 Secs (Pattern 3)] [==>360.0 Secs (Pattern 4)]	[2]
	6	Parallax 40 s hort3	(2) ORI-PARALLA X2	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO; GAIN=2	SAME POS AS 5		20.0 Secs [==>]	[2]