18351 - A New Faint Companion to the Fornax Dwarf Galaxy?

Cycle: 34, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*
Dr. Teymoor Saifollahi (PI) (ESA Member) (Contact)	**Observatoire Astronomique de Strasbourg**
Prof. Ariane Lancon (CoI) (ESA Member)	Universite de Strasbourg I
Prof. Annette Ferguson (CoI) (ESA Member)	University of Edinburgh, Institute for Astronomy
Dr. Chiara Crociati (CoI) (ESA Member)	University of Edinburgh, Institute for Astronomy
Ms. Jess Howell (CoI) (ESA Member)	University of Edinburgh, Institute for Astronomy
Dr. Mattia Libralato (CoI) (ESA Member)	INAF - Osservatorio Astronomico di Padova
Dr. Nicolas Martin (CoI) (ESA Member)	Observatoire Astronomique de Strasbourg
Dr. Pierre-Alain Duc (CoI) (ESA Member)	Observatoire Astronomique de Strasbourg
Dr. Rodrigo Ibata (CoI) (ESA Member)	Universite de Strasbourg I
Dr. Karina Voggel (CoI) (ESA Member)	Observatoire Astronomique de Strasbourg
Dr. Michele Cantiello (CoI) (ESA Member)	INAF - Osservatorio Astronomico d'Abruzzo
Dr. Massimiliano Gatto (CoI) (ESA Member)	INAF - Osservatorio Astronomico di Capodimonte
Prof. Francine Marleau (CoI) (ESA Member)	University of Innsbruck
Dr. Michele Bellazzini (CoI) (ESA Member)	INAF - Osservatorio di Astrofisica e Scienza dello Spazio
Dr. Francesca Annibali (CoI) (ESA Member)	INAF - Osservatorio di Astrofisica e Scienza dello Spazio
Dr. Florian Niederhofer (CoI) (ESA Member)	Leibniz-Institut für Astrophysik Potsdam (AIP)
Dr. Soeren S. Larsen (CoI) (ESA Member)	Radboud University Nijmegen
Dr. Davide Massari (CoI) (ESA Member)	INAF - Osservatorio di Astrofisica e Scienza dello Spazio
David Valls-Gabaud (CoI) (ESA Member)	Observatoire de Paris
Dr. Joanna Diana Sakowska (CoI) (ESA Member)	Instituto de Astrofisica de Andalucia (IAA)
Dr. David Martinez-Delgado (CoI) (ESA Member)	Centro de Estudios de Fisica del Cosmos de Aragon

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) FORNAX-7	WFC3/UVIS	2	17-Aug-2026 12:00:29.0	yes
02	(1) FORNAX-7	WFC3/UVIS	2	17-Aug-2026 12:00:29.0	yes
03	(1) FORNAX-7	WFC3/UVIS	2	17-Aug-2026 12:00:30.0	yes

6 Total Orbits Used

ABSTRACT

Thanks to the unprecedented depth and precision of the Euclid wide-field survey, we have identified a new faint stellar system, resolved into individual stars, in the vicinity of the Fornax dSph galaxy, hereafter Fornax-7. The available data suggest that Fornax-7 may be physically associated with Fornax; however, they are insufficient to determine its nature conclusively.

The most effective approach to address this question is to obtain deep optical imaging with HST. Achieving photometric quality comparable to existing HST observations of Fornax globular clusters will allow us to (i) measure the distance to Fornax-7 with high precision and establish whether it is located at the distance of Fornax, and (ii) probe its stellar population in significantly greater detail than currently possible, providing strong constraints on its age and metallicity.

Fornax-7 may represent either a very remote star cluster associated with Fornax, a dwarf satellite of Fornax (i.e., a "satellite of a satellite"), or an independent ultra-faint galaxy in the Local Group. In all cases, it constitutes an exceptionally interesting system that probes the lowest-mass regime of galaxy formation and the structure of dwarf galaxy halos.

OBSERVING DESCRIPTION

Fornax-7 is a recently discovered faint and compact stellar system identified in deep Euclid imaging, located in the vicinity of the Fornax dwarf spheroidal galaxy. Current Euclid observations indicate that it is an old, metal-poor stellar population, but are insufficient to determine whether the system is physically associated with Fornax. If confirmed, Fornax-7 may represent either an extremely low-mass remote star cluster or a dark matter-dominated satellite of the Fornax dSph ("satellite of a satellite"). Alternatively, it could be an independent ultra-faint dwarf galaxy in the Local Group. The primary objective of this program is to obtain a deep F606W-F814W colour-magnitude diagram extending approximately 2.5 magnitudes below the main-sequence turn-off, enabling an accurate determination of the distance modulus and significantly improved constraints on the age and

metallicity of the stellar population. These observations will establish whether Fornax-7 is consistent with being associated with the Fornax dSph and provide the basis for distinguishing between the proposed scenarios.

The observations consist of six HST orbits divided into three independent two-orbit visits: 1 visit in F606W (2 ORBITS IN TOTAL) and two visits in F814W (4 ORBITS IN TOTAL). The target is positioned on the WFC3/UVIS1 detector, well away from the inter-chip gap. Each visit consists of four science exposures of approximately 1200s (two exposures per orbit), providing a total integration time of about 4800 s per visit. A 5 arcsec box dither pattern is employed between successive exposures to improve cosmic-ray rejection, mitigate detector defects, and enhance image quality while keeping the target on the same detector. No UVIS post-flash is requested. ETC calculations predict a total natural background (sky + dark current) of approximately 58 e/pixel in F606W and 34 e/pixel in F814W for the adopted exposure times (~1200s), both exceeding the recommended minimum background of ~20 e/pixel for optimal CTE performance.

Visit

Proposal 18351, Fornax-7-Visit01 (01), implementation Mon Aug 17 16:00:30 GMT 2026

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=5.02 Line Spacing=5.02	Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false		(1)

Fixed Targets

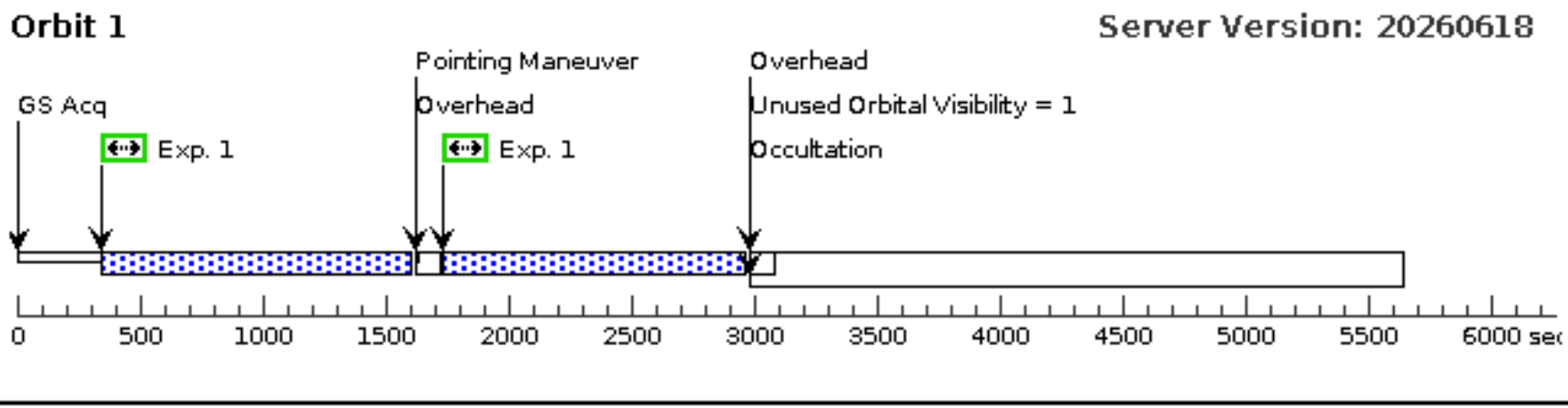
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	FORNAX-7	RA: 02 35 17.8000 (38.8241667d) Dec: -33 57 23.30 (-33.95647d) Equinox: J2000	Epoch of Position: 2000	V=21.1+/-0.2	Reference Frame: ICRS

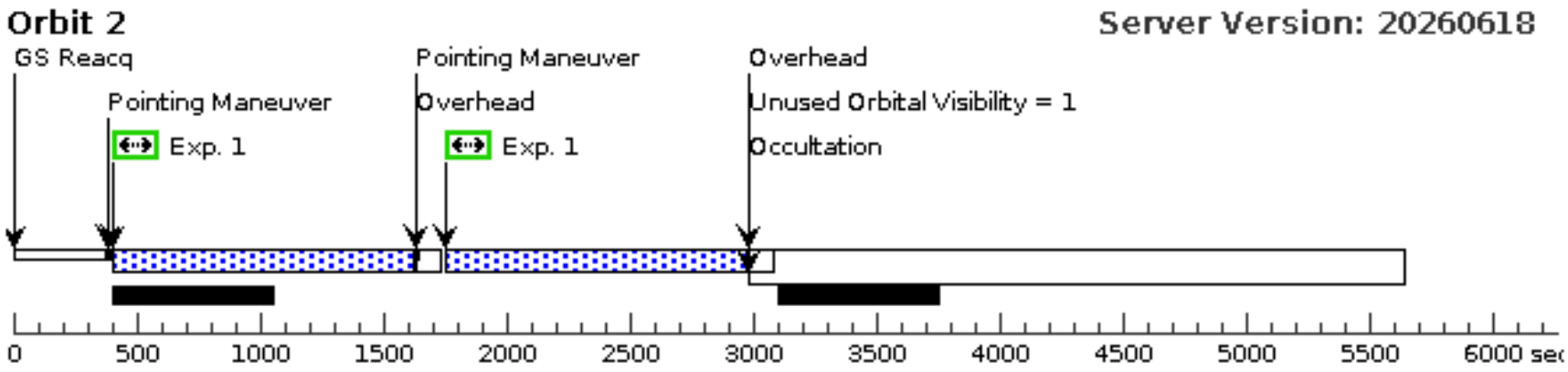
Comments: The object is "spatially extended", meaning that it is a collection of point sources within 30".
The V-band magnitude corresponds to the estimated total magnitude of the object.
Category=STELLAR CLUSTER
Description=[UNDESIGNATED]
Extended=YES

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Fornax-7-F606W-EXP1	(1) FORNAX-7	WFC3/UVIS, ACCUM, UVIS1-FIX	F606W			Pattern 1, Exps 1-1 in Fornax-7-Visit01 (01) (1)	1200 Secs (4914 Secs) *[==>1235.0 Secs (Pattern 1)]* *[==>1235.0 Secs (Pattern 2)]* *[==>1222.0 Secs (Pattern 3)]* *[==>1222.0 Secs (Pattern 4)]*	***[1]*** ***[2]***

Orbit Structure





Visit

Proposal 18351, Fornax-7-Visit02 (02), implementation Mon Aug 17 16:00:30 GMT 2026

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=5.02 Line Spacing=5.02	Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false		(1)

Fixed Targets

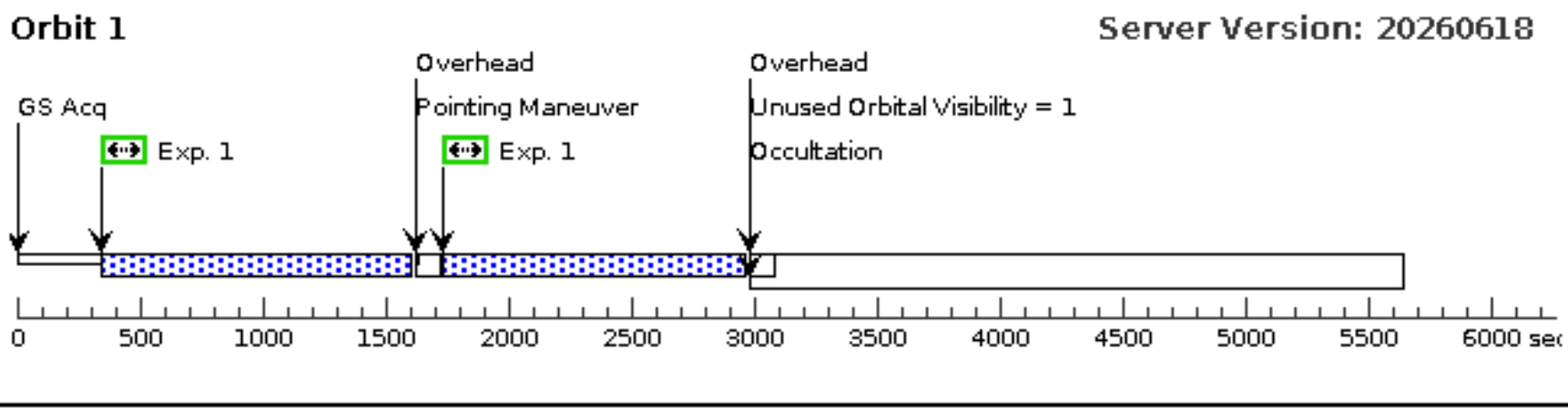
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	FORNAX-7	RA: 02 35 17.8000 (38.8241667d) Dec: -33 57 23.30 (-33.95647d) Equinox: J2000	Epoch of Position: 2000	V=21.1+/-0.2	Reference Frame: ICRS

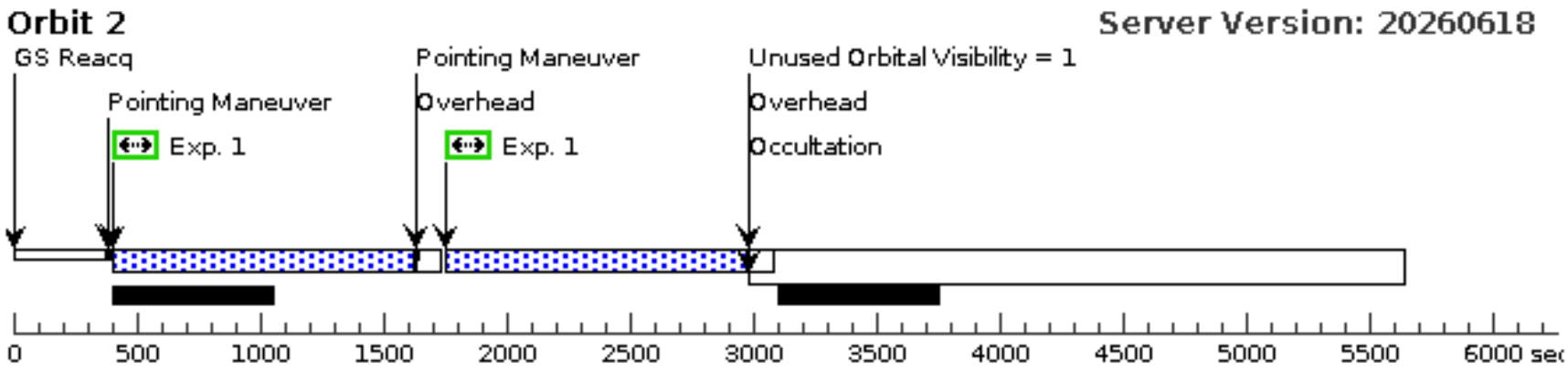
Comments: The object is "spatially extended", meaning that it is a collection of point sources within 30".
The V-band magnitude corresponds to the estimated total magnitude of the object.
Category=STELLAR CLUSTER
Description=[UNDESIGNATED]
Extended=YES

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Fornax-7-F814W-EXP1	(1) FORNAX-7	WFC3/UVIS, ACCUM, UVIS1-FIX	F814W			Pattern 1, Exps 1-1 in Fornax-7-Visit02 (02) (1)	1200 Secs (4914 Secs)	
								[==>1235.0 Secs (Pattern 1)] *[==>1235.0 Secs (Pattern 2)]*	***[1]***
								[==>1222.0 Secs (Pattern 3)] *[==>1222.0 Secs (Pattern 4)]*	***[2]***

Orbit Structure





Visit

Proposal 18351, Fornax-7-Visit03 (03), implementation Mon Aug 17 16:00:30 GMT 2026

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-BOX	Coordinate Frame=POS-TARG		(1)
	Purpose=DITHER	Pattern Orientation=23.884		
	Number Of Points=4	Angle Between Sides=81.785		
	Point Spacing=5.02	Center Pattern=false		
	Line Spacing=5.02			

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	FORNAX-7	RA: 02 35 17.8000 (38.8241667d)	Epoch of Position: 2000	V=21.1+/-0.2	Reference Frame: ICRS
		Dec: -33 57 23.30 (-33.95647d)			
		Equinox: J2000			

Comments: The object is "spatially extended", meaning that it is a collection of point sources within 30".
The V-band magnitude corresponds to the estimated total magnitude of the object.
Category=STELLAR CLUSTER
Description=[UNDESIGNATED]
Extended=YES

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Fornax-7-F814W-EXP1	(1) FORNAX-7	WFC3/UVIS, ACCUM, UVIS1-FIX	F814W			Pattern 1, Exps 1-1 in Fornax-7-Visit03 (03) (1)	1200 Secs (4914 Secs)	
								[==>1235.0 Secs (Pattern 1)]	***[1]***
								[==>1235.0 Secs (Pattern 2)]	
								[==>1222.0 Secs (Pattern 3)]	***[2]***
								[==>1222.0 Secs (Pattern 4)]	

Orbit Structure