15443 - Unveiling the Nature of Fossil Groups of Galaxies with XMM-Newton-HST

Cycle: 25, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) RX-J10074257+3800462	ACS/WFC	3	25-Jan-2018 20:01:26.0	yes

3 Total Orbits Used

ABSTRACT

Fossil groups present a puzzle to theories of structure formation. Despite the low number of bright galaxies, their high velocity dispersions and high T X seem to indicate cluster-like gravitational potential wells. The measured concentration parameters seem to be high indicating early formation epochs but some recent observations contradict that scenario. We propose a discriminatory test, using intracluster light to mass ratio, combining short XMM and HST observations for a classic massive fossil group. We will use a newly developed method for measuring ICL that is independent of arbitrary assumptions about light distribution and that has provided new robust results. This test will allow us to set independent constraints on formation mechanisms and ages of these peculiar (but numerous) systems.

OBSERVING DESCRIPTION

We based our estimation of the exposure times on our previous experience in Jimenez-Teja & Dupke (2016,2018) with the HST ACS and the CICLE algorithm. In this work CICLE has been successfully applied to the dynamically very active Pandora system (Abell 2744), formed by 4 merging clusters, fact that made the calculation of the ICL fraction a highly complex task. Note that this FG (z=0.112) is 3 times closer than the Pandora cluster and has been specially selected to be as relaxed as possible, so the determination of the ICL fraction with ACS data would be straighforward. The CICLE method does not rely on arbitrary cut-off or assumptions on the light distribution of galaxies, but only relies on the information contained in the data, studying the two-dimensional distribution of the light and using the change of intensity curvature to determine where the galaxy ends and the ICL starts.

For this reason high quality imaging is required, as that from ACS/WFC. We need a S/N of ~2.5-3 to obtain results of similar precision (or better) that those we obtained for Pandora. To achieve this S/N in the images of this FG with the F606W filter, ACS ETC estimates a number of 2-3 orbits, which is what we requested. In Jimenez-Teja & Dupke 2016 we found that the CICLE yielded a high ICL fraction in the F814W filter for the cluster Abell 2744, which was consistent with other works in the literature. Given the lower redshift of RX-J10074257+3800462, a bluer filter was preferable to study the ICL in this Fossil Group proposed here. Furthermore, in Jimenez-Teja & Dupke 2018, we performed a multiwavelength analysis of the ICL fraction in a larger sample of eleven clusters, observing that the ICL fraction color gradient in the F435W and F606W filters was the most representative figure to characterize the dynamical state (merging or relaxed) of the systems. The objectives of this proposal can be significant enhanced by that extra information as well, since not just the age of the system but its current dynamical state could be ascertained. Therefore, we request that one of 3 orbits approved to us be used with F435W to verity the color gradient and the other 2 with F606W. Despite the small reduction in significance from the F606W filter observation, the result will be much more informative.

Visit

Proposal 15443, Visit (01), implementation Fri Jan 26 01:01:27 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: (none)

Comments: all 3 orbits

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=4 Point Spacing=3.034 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.29 Angle Between Sides= Center Pattern=false		(1-3)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	RX-J10074257+3800462	RA: 10 07 42.5304 (151.9272100d) Dec: +38 00 46.62 (38.01295d) Equinox: J2000	Epoch of Position: 2000	V=15.9	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the NED database.This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=CLUSTER OF GALAXIES
Description=[GROUP]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F606W1	(1) RX-J10074257+3800462	ACS/WFC, ACCUM, WFC	F606W			Pattern 1, Exps 1-3 in Visit (01) (1)	500 Secs (2222 Secs)	
								[==>535.0 Secs (Pattern 1)] *[==>535.0 Secs (Pattern 2)]*	***[1]***
								[==>584.0 Secs (Pattern 3)]	***[2]***
								[==>568.0 Secs (Pattern 4)]	***[3]***
2	F606W2	(1) RX-J10074257+3800462	ACS/WFC, ACCUM, WFC	F606W			Pattern 1, Exps 1-3 in Visit (01) (1)	500 Secs (2271 Secs)	
								[==>535.0 Secs (Pattern 1)]	***[1]***
								[==>584.0 Secs (Pattern 2)] *[==>584.0 Secs (Pattern 3)]*	***[2]***
								[==>568.0 Secs (Pattern 4)]	***[3]***
3	F435W	(1) RX-J10074257+3800462	ACS/WFC, ACCUM, WFC	F435W			Pattern 1, Exps 1-3 in Visit (01) (1)	500 Secs (2255 Secs)	
								[==>535.0 Secs (Pattern 1)]	***[1]***
								[==>584.0 Secs (Pattern 2)]	***[2]***
								[==>568.0 Secs (Pattern 3)] *[==>568.0 Secs (Pattern 4)]*	***[3]***

Orbit Structure