15495 - An HST proper-motion and spectral study of the optical jet in 4C +00.58

Cycle: 26, 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) 4C00.58	ACS/WFC	1	30-Dec-2018 10:00:24.0	yes

1 Total Orbits Used

ABSTRACT

We have recently discovered a remarkably detailed optical jet in the nearby radio galaxy 4C 00.58, which we consider a 'moderate power' hybrid-source analog to the archetypal jets M87 and 3C 273. The unusual 'X-shaped' large-scale radio morphology of this source is thought to be the result of a recent merger-induced reorientation, and the jet displays a remarkable series of 'cannonball' ejections clearly detected in radio through X-rays. The clarity of the optical features and nearness of the source make it an ideal target for a prospective HST proper-motions study. Previous HST proper-motion studies which revealed superluminal motions in M87 and 3C 264 relied on archival WFPC2 observations and long observing

baselines. With the high astrometric precision possible with an all-ACS/WFC imaging study, we can reach 0.5c accuracy with a time baseline of 4 years, requiring only a single additional orbit in cycles 24 and 26, in combination with our existing ACS/WFC imaging from 2015. We also request complimentary near-UV observations (WFC3/UVIS F225W) in order to map the spectral evolution of the knots and hotspot and allow better constraints on the emission mechanisms and physical parameters in the jet.

OBSERVING DESCRIPTION

This is an imaging project for the optical jet located in nearby elliptical galaxy 4C +00.58. The ACS/WFC F606W observations are identical in setup to the previous imaging done in cycles 22 and 24. The imaging in all three epochs (22,24,26) in the F606W filter are part of a proper-motions monitoring project. In addition, two orbits of WFC3/UVIS imaging in F225W were taken in cycle 24, in order to measure the synchrotron spectrum of the resolved knots in the jet.

For the ACS/WFC imaging, we use a 5-point dithering pattern which covers the chip gap, optimized to sample the PSF. ORIENT constraints are included as a caution against possible saturation spikes from the bright quasar core over-running the jet. While the core was not saturated in previous imaging with similar exposure times, quasar cores are known to be variable.

Visit

Proposal 15495, ACS-optical (01), implementation Sun Dec 30 15:00:25 GMT 2018

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: ORIENT 2.5D TO 47.5 D; ORIENT 92.5D TO 137.5 D; ORIENT 182.5D TO 227.5 D; ORIENT 272.5D TO 317.5 D

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	4C00.58	RA: 16 06 12.7300 (241.5530417d)		V=17.5	Reference Frame: SIMBAD
	Alt Name1: 1603+001	Dec: +00 00 27.36 (.00760d)			
		Equinox: J2000			

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=GALAXY
Description=[JET, QUASAR, RADIO GALAXY]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) 4C00.58	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 0,0		390 Secs (390 Secs)	
								[==>]	***[1]***
2		(1) 4C00.58	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 0.15914, 0.23969		390 Secs (390 Secs)	
								[==>]	***[1]***
3		(1) 4C00.58	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 0.31641, 0.08319		390 Secs (390 Secs)	
								[==>]	***[1]***
4		(1) 4C00.58	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 0.07990, 4.19413		390 Secs (390 Secs)	
								[==>]	***[1]***
5		(1) 4C00.58	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 0.28771, 4.28896		390 Secs (390 Secs)	
								[==>]	***[1]***

Orbit Structure