



17854 - Late time constraints on a luminous LFBOT-TDE intermediate

Cycle: 31, Proposal Category: GO/DD

(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) AT2024PUZ	WFC3/IR WFC3/UVIS	2	14-Sep-2024 00:00:18.0	yes

2 Total Orbits Used

ABSTRACT

We request two orbits of Hubble Space Telescope/WFC3 imaging to measure the position and spectral energy distribution of an unprecedented optical transient. This event, AT 2024puz is one of the rare times where we are presented with something truly new: it is remarkably luminous in the optical ($\sim 1e45$ erg/s) and X-rays ($\sim 1e44$ erg/s) while being very fast (~ 20 days above half-peak) and persistently blue. It is located within a dwarf galaxy: from current constraints, it appears offset from the host center of light, although the sensitivity and resolution are not enough to be certain. AT 2024puz resembles either the slowest, most luminous fast blue optical transient (LFBOT), or a fast but luminous tidal disruption event (TDE).

Proposal 17854 (STScI Edit Number: 0, Created: Friday, September 13, 2024, 11:00:18PM Eastern Standard Time) - Overview

LFBOTs are a new, mysterious class of transients for which the trigger is unknown. One popular model is IMBH TDEs. AT 2024puz may represent the bridge between LFBOTs and more typical TDEs: it is consistent with being an LFBOT definitively produced by an IMBH TDE. However, it is also consistent with stellar LFBOT models. There are two questions that we must answer to distinguish between stellar LFBOT and TDE models for AT 2024puz: (1) where is AT 2024puz located within its host galaxy and (2) how does the late-time optical/UV emission evolve? If AT 2024puz is nuclear or located away from star formation, it may be a TDE. If it is off-nuclear and in a star-forming region, it may be associated with a massive star. The rate of the late-time optical/UV luminosity decline is predicted to be different for stellar and TDE models. These questions cannot be answered with ground based telescopes: HST imaging in four bands spanning the transient SED is required.

OBSERVING DESCRIPTION

These are observations of a candidate LFBOT - TDE intermediate spanning two orbits using WFC3/IR and WFC3/UVIS. The combined IR and UVIS observations will 1) measure the transient position (using UVIS/F336W and IR/F160W) and 2) measure the late-time transient SED (using UVIS/F606W and IR/F105W), to be performed at the beginning of the scheduling window on Sept 19 or at the latest by Oct 7 (making this a non-disruptive ToO).

Assuming the total observation time available (excluding overheads) is 2200s per orbit, our observations are as follows for a total of two orbits in a single visit:

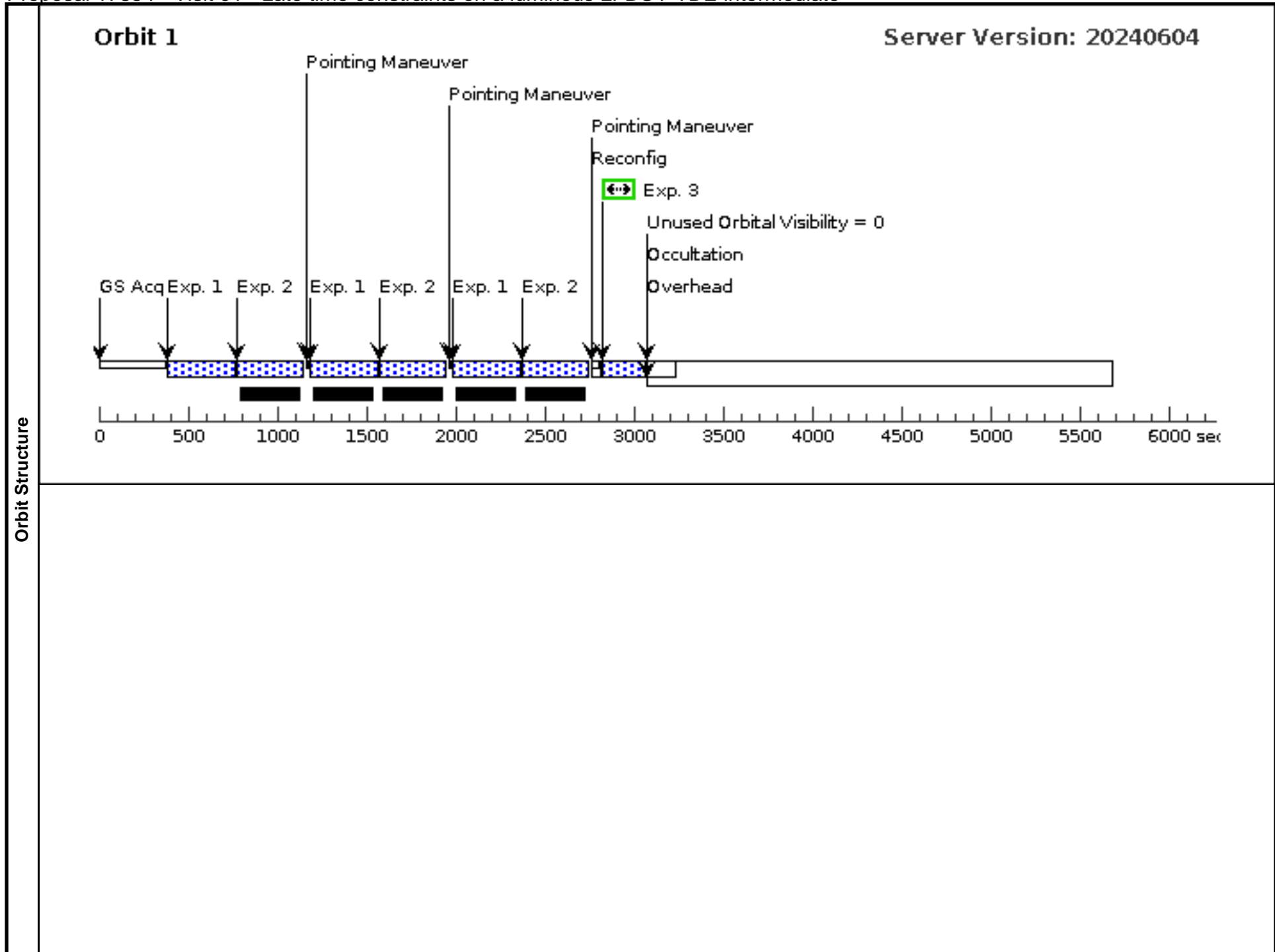
IR observations will include an 1100s observation (3-point dither) with F160W and an 1100s observation (3-point dither) with F105W.

UVIS observations will include an 1100s observation with F336W (3-point dither) and an 1100s observation with F606W (3-point dither).

Proposal 17854 - Visit 01 - Late time constraints on a luminous LFBOT-TDE intermediate

Sat Sep 14 04:00:18 GMT 2024

Visit	Proposal 17854, Visit 01, implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR, WFC3/UVIS Special Requirements: TOO RESPONSE TIME 24.0D									
	#	Primary Pattern	Secondary Pattern	Exposures						
Patterns	(1)	Pattern Type=WFC3-UVIS-DITHER- LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false	(3-4)						
	(2)	Pattern Type=WFC3-IR-DITHER- LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.605 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=false	(1-2)						
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	AT2024PUZ	RA: 17 31 20.6371 (262.8359879d) Dec: +53 24 14.94 (53.40415d) Equinox: J2000	Epoch of Position: 2000	V=25	Reference Frame: ICRS				
<i>Comments:</i> Category=UNIDENTIFIED Description=[ACCRETION DISK, ULTRAVIOLET EMITTER, WIND, X-RAY EMITTER] Extended=NO										
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(WFC3IR.i m.1935512)	(1) AT2024PUZ	WFC3/IR, MULTIACCUM, IR-UVIS-CENTER	F160W	NSAMP=15; SAMP-SEQ=SPAR S25		Pattern 2, Exps 1-2 in Visit 01 (2)	352.939501 Secs (1058.819 Secs)	
									[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)]	[1]
	2	(WFC3IR.i m.1935511)	(1) AT2024PUZ	WFC3/IR, MULTIACCUM, IR-UVIS-CENTER	F105W	NSAMP=15; SAMP-SEQ=SPAR S25		Pattern 2, Exps 1-2 in Visit 01 (2)	352.939501 Secs (1058.819 Secs)	
									[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)]	[1]
3	(WFC3UVI S.im.193551 0)	(1) AT2024PUZ	WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB	F336W	FLASH=20		Pattern 1, Exps 3-4 in Visit 01 (1)	364 Secs (1073 Secs)		
								[==>209.0 Secs (Pattern 1)] [==>664.0 Secs (Pattern 2)] [==>200.0 Secs (Pattern 3)]	[1] [2]	
4	(WFC3UVI S.im.193550 9)	(1) AT2024PUZ	WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB	F606W	FLASH=5		Pattern 1, Exps 3-4 in Visit 01 (1)	364 Secs (994 Secs)		
								[==>348.0 Secs (Pattern 1)] [==>346.0 Secs (Pattern 2)] [==>300.0 Secs (Pattern 3)]	[2]	



Orbit 2

