18213 - Imaging of EP241021a during the flattening in the optical light curve: an exotic gamma-ray burst or a peculiar jetted tidal disruption event?

Cycle: 32, Proposal Category: GO/DD

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*
Dr. Luming Sun (PI) (Contact)	**Anhui Normal University**
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Dr. Ning Jiang (CoI)	University of Science and Technology of China
Dr. Chichuan Jin (CoI)	National Astronomical Observatories of China (NAOC)
Prof. Jane Dai (CoI)	University of Hong Kong
Dr. Weimin Yuan (CoI)	Chinese Academy of Sciences
Mr. Jiazheng Zhu (CoI)	University of Science and Technology of China
Lei Yang (CoI)	Anhui Normal University
Prof. Bing Zhang (CoI) (AdminUSPI)	University of Nevada - Las Vegas
Dr. Rongfeng Shen (CoI)	Sun Yat-Sen University

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) EP241021A (2) EP241021A-UVIS-CENTER	WFC3/IR WFC3/UVIS	2	26-Nov-2025 10:00:32.0	yes
51	(1) EP241021A	WFC3/IR	1	26-Nov-2025 10:00:32.0	yes

3 Total Orbits Used

ABSTRACT

Since the launch of EP, peculiar fast X-ray transients (FXT) have been discovered, blurring the boundaries between the properties of Gamma-ray bursts (GRB) and jetted tidal disruption events (TDE). One example is the FXT EP241021a at z=0.748, which shows an X-ray plateau with luminosities of several 10^44 erg/s lasting for ~10 days. The time duration of the plateau is far longer than all known GRBs, while it is similar to jetted TDEs. The plateau luminosity is two orders of magnitude lower than jetted TDEs, suggesting a possible origin of TDE by an intermediate-mass black hole. In addition, during the X-ray plateau, there is a clear optical rebrightening by two magnitudes, peaking at around -21 mag, which is also rarely seen. Recent ground-based observations show that the optical light curve no longer declines in accordance with the early power-law trend but flattens. The flattening may originate in the thermal radiation from the transient source, or the continuum of the host galaxy, neither of which was detected previously. We propose a new and timely imaging observation of EP241021a at a phase of ~200 days with HST WFC3/UVIS and WFC3/IR. Our intermediate goal is to distinguish between the possible origins of the optical flattening, based on whether the target is extended and whether the central position coincides with the transient position measured by VLBA. In either case, we can further tell an exotic GRB or a peculiar jetted TDE as the favored origin of EP241021a with the constraints on the positional offset and broad-band SED.

OBSERVING DESCRIPTION

We will observe EP241021a with WFC3/UVIS with F606W and F814W filters, and with WFC3/IR with F110W and F160W filters.

Visit

Proposal 18213, EP241021a (01), failed Wed Nov 26 15:00:33 GMT 2025

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR, WFC3/UVIS

Special Requirements: ORIENT 15D TO 16 D; BEFORE 30-NOV-2025:00:00:00

Comments: Observations of EP241021a in two UVIS fitlers and two IR filters

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=1.908 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=false		(3), (4)
(2)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112	Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false		(1)
(3)	Pattern Type=WFC3-UVIS-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.145 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(2)

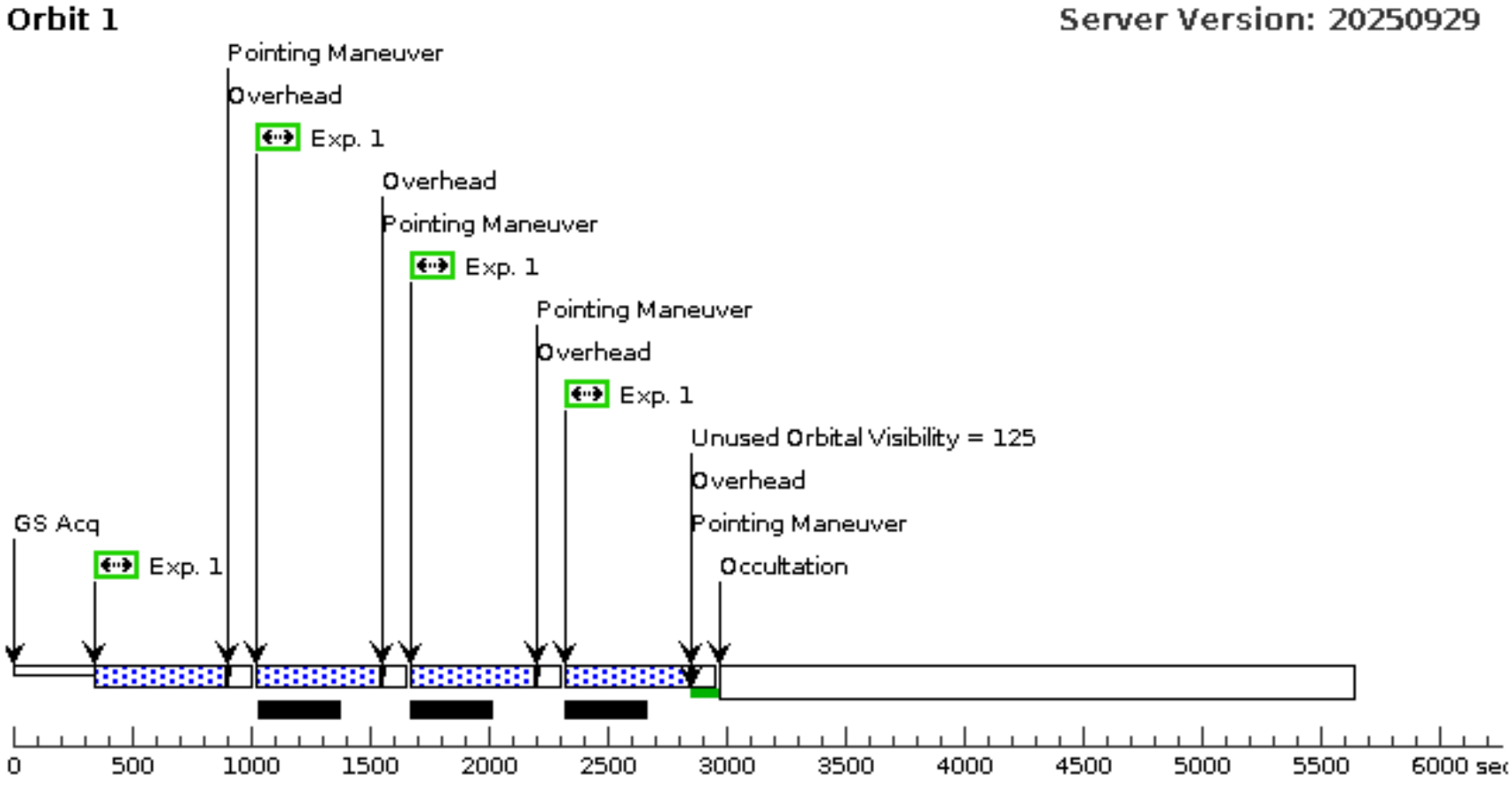
Fixed Targets

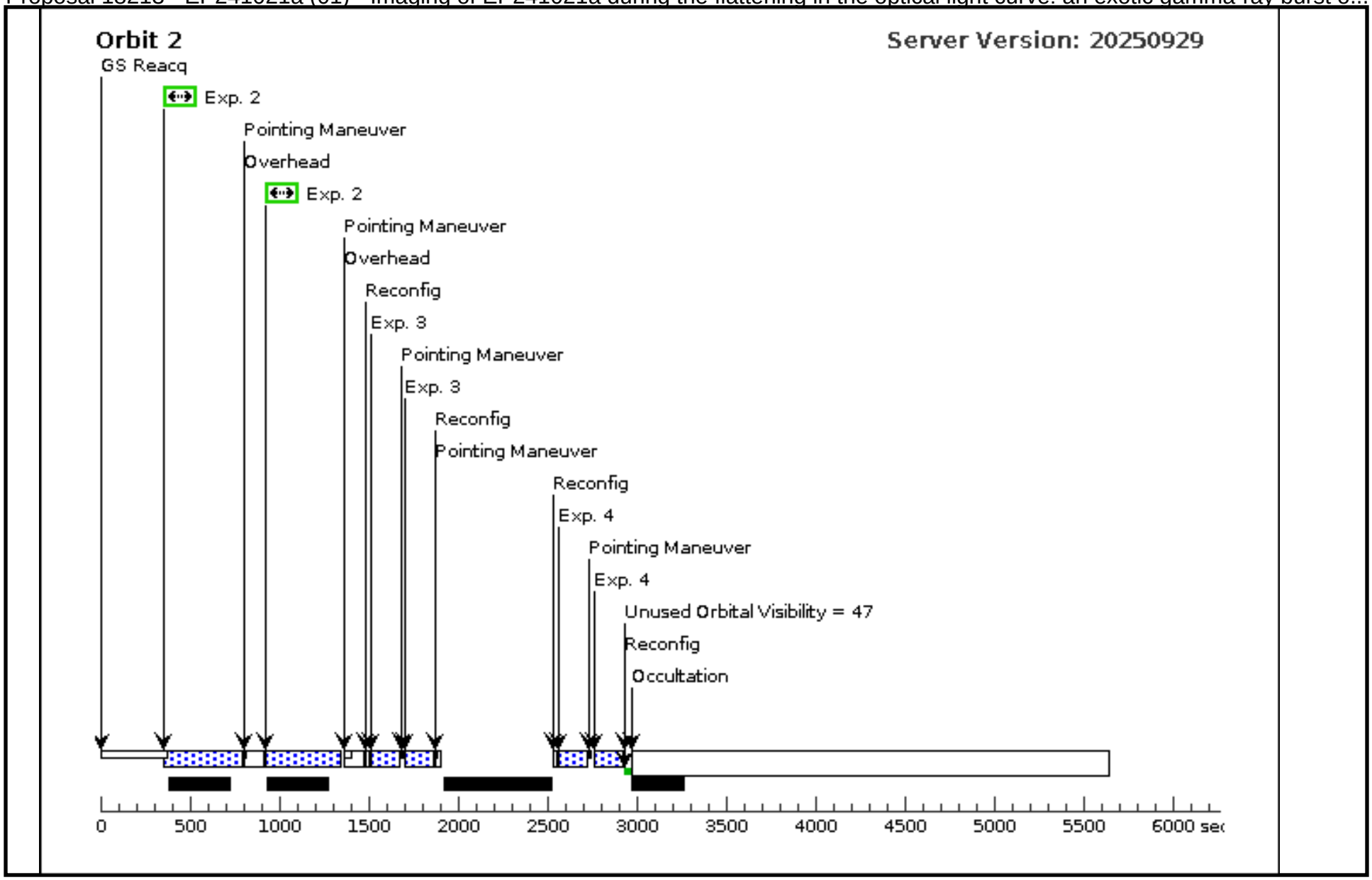
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	EP241021A	RA: 01 55 23.4322 (28.8476342d) Dec: +05 56 17.80 (5.93828d) Equinox: J2000		V=25	Reference Frame: ICRS
Comments: The position of the target, used in WFC3/IR observations *Category=GALAXY* *Description=[HIGH REDSHIFT GALAXY]*					
(2)	EP241021A-UVIS-CENTER	RA: 01 55 22.9000 (28.8454167d) Dec: +05 57 3.00 (5.95083d) Equinox: J2000		V=25	Reference Frame: ICRS
Comments: The center of the field of view that can observe four Gaia stars together with the target, used in WFC3/UVIS observations *Category=GALAXY* *Description=[HIGH REDSHIFT GALAXY]*					

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F606W	(2) EP241021A-UVIS-CENTER	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W			Pattern 2, Exps 1-1 in EP241021a (01) (2)	520 Secs (2080 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
2	F814W	(2) EP241021A-UVIS-CENTER	WFC3/UVIS, ACCUM, UVIS-CENTER	F814W	FLASH=7		Pattern 3, Exps 2-2 in EP241021a (01) (3)	420 Secs (840 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[2]***
3	F110W	(1) EP241021A	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=6; SAMP-SEQ=SPARS25		Pattern 1, Exps 3-3 in EP241021a (01) (1)	127.934866 Secs (255.87 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[2]***
4	F160W	(1) EP241021A	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=6; SAMP-SEQ=SPARS25		Pattern 1, Exps 4-4 in EP241021a (01) (1)	127.934866 Secs (255.87 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[2]***

Orbit Structure




Orbit 2
Server Version: 20250929
GS Reacq
Exp. 2
Pointing Maneuver
Overhead
Exp. 2
Pointing Maneuver
Overhead
Reconfig
Exp. 3
Pointing Maneuver
Exp. 3
Reconfig
Pointing Maneuver
Reconfig
Exp. 4
Pointing Maneuver
Exp. 4
Unused Orbital Visibility = 47
Reconfig
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000 sec

Visit

Proposal 18213, EP241021a re-observation (51), pi Wed Nov 26 15:00:33 GMT 2025

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

Comments: Observations of EP241021a in two UVIS fitlers and two IR filters - repeat of last four exposures

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=1.908 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)	EP241021A	RA: 01 55 23.4322 (28.8476342d) Dec: +05 56 17.80 (5.93828d) Equinox: J2000		V=25	Reference Frame: ICRS

Comments: The position of the target, used in WFC3/IR observations
Category=GALAXY
Description=[HIGH REDSHIFT GALAXY]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F110W	(1) EP241021A	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=6; SAMP-SEQ=SPARS25		Pattern 1, Exps 1-1 in EP241021a re-observation (51) (1)	127.934866 Secs (255.87 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	*[1]*
2	F160W	(1) EP241021A	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=6; SAMP-SEQ=SPARS25		Pattern 1, Exps 2-2 in EP241021a re-observation (51) (1)	127.934866 Secs (255.87 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	*[1]*

Orbit Structure