17898 - Compactness and accretion rates of QPE disks: Constraining models with XMM+HST

Cycle: 32, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*
Muryel Guolo (PI) (Contact)	**The Johns Hopkins University**
Dr. Thomas Wevers (CoI) (CoPI) (Contact)	Space Telescope Science Institute
Dr. Matt Nicholl (CoI) (ESA Member)	Queen's University Belfast
Mr. Andrew Mummery (CoI) (ESA Member)	University of Oxford
Dr. Suvi Gezari (CoI) (AdminUSPI)	Space Telescope Science Institute

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) ERO-QPE4	WFC3/UVIS	1	10-Mar-2025 12:00:10.0	yes
02	(3) ERO-QPE2	WFC3/UVIS	1	10-Mar-2025 12:00:11.0	yes
03	(2) RXJ1301	WFC3/UVIS	1	10-Mar-2025 12:00:11.0	yes

3 Total Orbits Used

ABSTRACT

We propose simultaneous X-ray and UV/optical observations of five Quasi-Periodic Eruption (QPEs) sources using XMM-Newton and Hubble Space Telescope. QPEs are believed to be produced by either accretion disk instabilities or interactions between orbiting bodies and massive black holes (or their accretion disks), and may provide a unique opportunity to study extreme mass ratio inspirals systems. Using

recently developed disk models, we will constrain key parameters such as Eddington ratios and disk sizes by modeling these sources full spectral energy distribution in their quiescent disk phase. These results will critically test competing models for QPE origins and provide valuable legacy data for this newly discovered class of transient phenomena.

OBSERVING DESCRIPTION

Multi-band WFC3/UVIS imaging observations of galactic nuclei.
1 orbit / source in which we use a 2 point dither pattern for each filter as recommended in the IHB.

For three of the sources (ERO-QPE4, ERO-QPE2 and RXJ1301) coordinated observations with XMM-Newton, with a separation of up to 120 days, is desired. For the other two sources (ERO-QPE3 and ERO-QPE1) the observations can be taken at any period of the cycle.

Visit

Proposal 17898, eRO-QPE4 (01), implementation Mon Mar 10 16:00:12 GMT 2025

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	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		(1), (2-3)

Fixed Targets

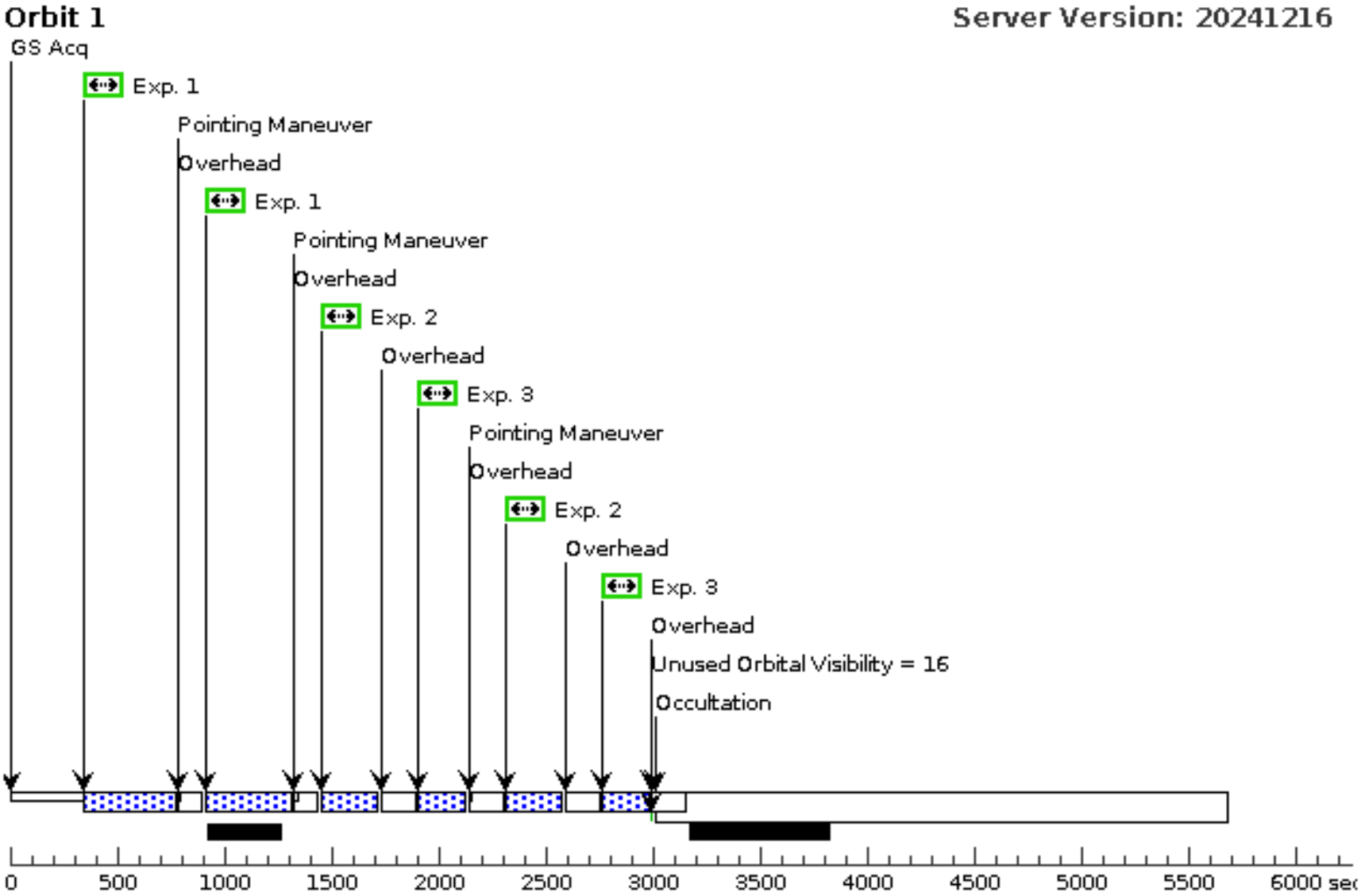
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	ERO-QPE4	RA: 04 45 33.8000 (71.3908333d) Dec: -10 12 4.70 (-10.20131d) Equinox: J2000		V=15.85+/-0.1	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[ACCRETION DISK, NUCLEUS]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) ERO-QPE4	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F225W	FLASH=20		Pattern 1, Exps 1-1 in eRO-QPE4 (01) (1)	400 Secs (800 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	 ***[1]***
2		(1) ERO-QPE4	WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB	F438W	FLASH=16		Pattern 1, Exps 2-3 in eRO-QPE4 (01) (1)	240 Secs (480 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	 ***[1]***
3		(1) ERO-QPE4	WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB	F625W	FLASH=15		Pattern 1, Exps 2-3 in eRO-QPE4 (01) (1)	200 Secs (400 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	 ***[1]***

Orbit Structure



Visit

Proposal 17898, eRO-QPE2 (02), implementation Mon Mar 10 16:00:12 GMT 2025

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	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		(1), (2)

Fixed Targets

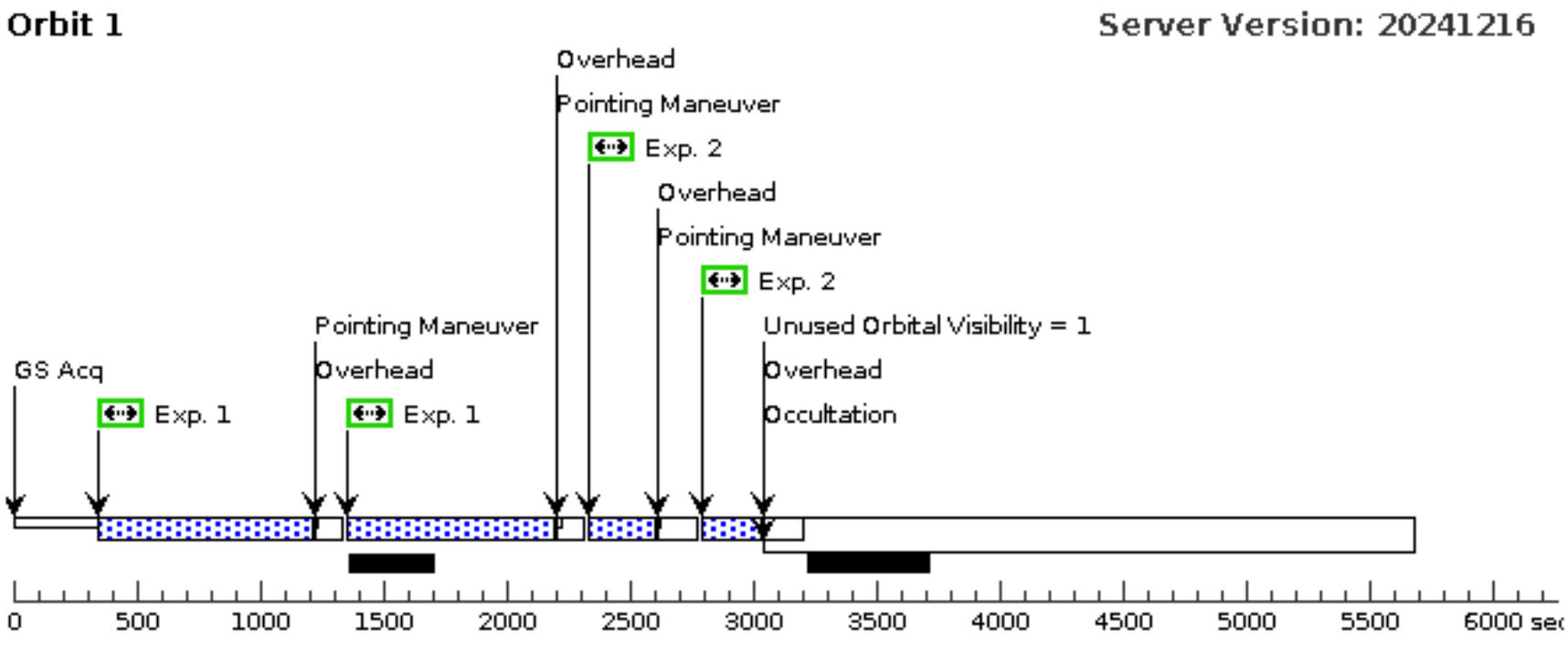
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	ERO-QPE2	RA: 02 34 48.9700 (38.7040417d) Dec: -44 19 31.60 (-44.32544d) Equinox: J2000		V=16.85+/-0.1	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[ACCRETION DISK, NUCLEUS]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(3) ERO-QPE2	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F225W	FLASH=20		Pattern 1, Exps 1-1 in eRO-QPE2 (02) (1)	840 Secs (1680 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	 ***[1]***
2		(3) ERO-QPE2	WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB	F625W	FLASH=15		Pattern 1, Exps 2-2 in eRO-QPE2 (02) (1)	245 Secs (490 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	 ***[1]***

Orbit Structure



Visit

Proposal 17898, RXJ1301 (03), implementation Mon Mar 10 16:00:12 GMT 2025

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	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		(1), (2-3)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	RXJ1301	RA: 13 02 0.1400 (195.5005833d) Dec: +27 46 57.90 (27.78275d) Equinox: J2000		V=17.1+/-0.1	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[ACCRETION DISK, NUCLEUS]

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(WFC3UVIS.im.1947767)	(2) RXJ1301	WFC3/UVIS, ACCUM, UVIS2-C1K1C-CTE	F225W	FLASH=20		Pattern 1, Exps 1-1 in RXJ1301 (03) (1)	595 Secs (1190 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[1]***
2		(2) RXJ1301	WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB	F438W	FLASH=20		Pattern 1, Exps 2-3 in RXJ1301 (03) (1)	140 Secs (280 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[1]***
3		(2) RXJ1301	WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB	F625W	FLASH=20		Pattern 1, Exps 2-3 in RXJ1301 (03) (1)	110 Secs (220 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[1]***

Orbit Structure