17525 - Improving the Orbit of Queta: Enabling Observations with the Lucy Spacecraft

Cycle: 31, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*
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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) EURYBATES	WFC3/UVIS	1	01-Aug-2024 15:00:35.0	yes
51	(2) EURYBATES-COPY	WFC3/UVIS	1	01-Aug-2024 15:00:36.0	yes

2 Total Orbits Used

ABSTRACT

(3548) Eurybates will be the first Trojan asteroid to be explored in situ when the Lucy spacecraft flies by it in August 2027. The possibility of close-up study of Eurybates' satellite, Queta, offers a unique opportunity to test whether Eurybates' unusual properties are tied to its collisional history and, more broadly, how collisional evolution shapes small body populations. It is critical to reduce the orbital uncertainty and improve knowledge of the relative position of Queta as soon as possible to enable planning for the best angular resolution and lighting conditions in the brief window when spacecraft observations can be made. With a single orbit we can reduce the positional uncertainty for Queta by almost a factor of two - which translates to a roughly equivalent gain in resolution for observations with a given angular coverage. As a secondary objective, we will collect

astrometric information from trailed stars in the full UVIS aperture to improve predictions for future stellar occultations. HST is required because Queta is 8.7 magnitudes fainter than Eurybates and will be observed at a separation of approximately 0.5 arcsec - an observational regime that is unique to Hubble.

OBSERVING DESCRIPTION

Single orbit observation timed to occur when Eurybates' satellite Queta is more than 0.4 arcsec from Eurybates but is also away from elongation. This geometry gives the best discrimination between different possible orbits and hence the most improvement in knowledge of the orbit, in particular, the orbital period. The window is selected to meet this requirement.

Visit

Proposal 17525, Visit 01, failed

Thu Aug 01 19:00:37 GMT 2024

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS

Special Requirements: BETWEEN 27-JAN-2024:00:00:00 AND 27-JAN-2024:22:00:00; BETWEEN 13-FEB-2024:00:00:00 AND 14-FEB-2024:12:00:00; BETWEEN 28-JAN-2024:01:00:00 AND 28-JAN-2024:06:00:00; BETWEEN 05-MAR-2024:00:00:00 AND 06-MAR-2024:12:00:00; VISIBILITY INTERVAL NO GYRO BIAS UPDATE ON MOVING TARGET

Diagnostics

(Visit 01) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 01) Informational (Form): The Visit Planner and Spike may produce different schedulability results.

Solar System Targets

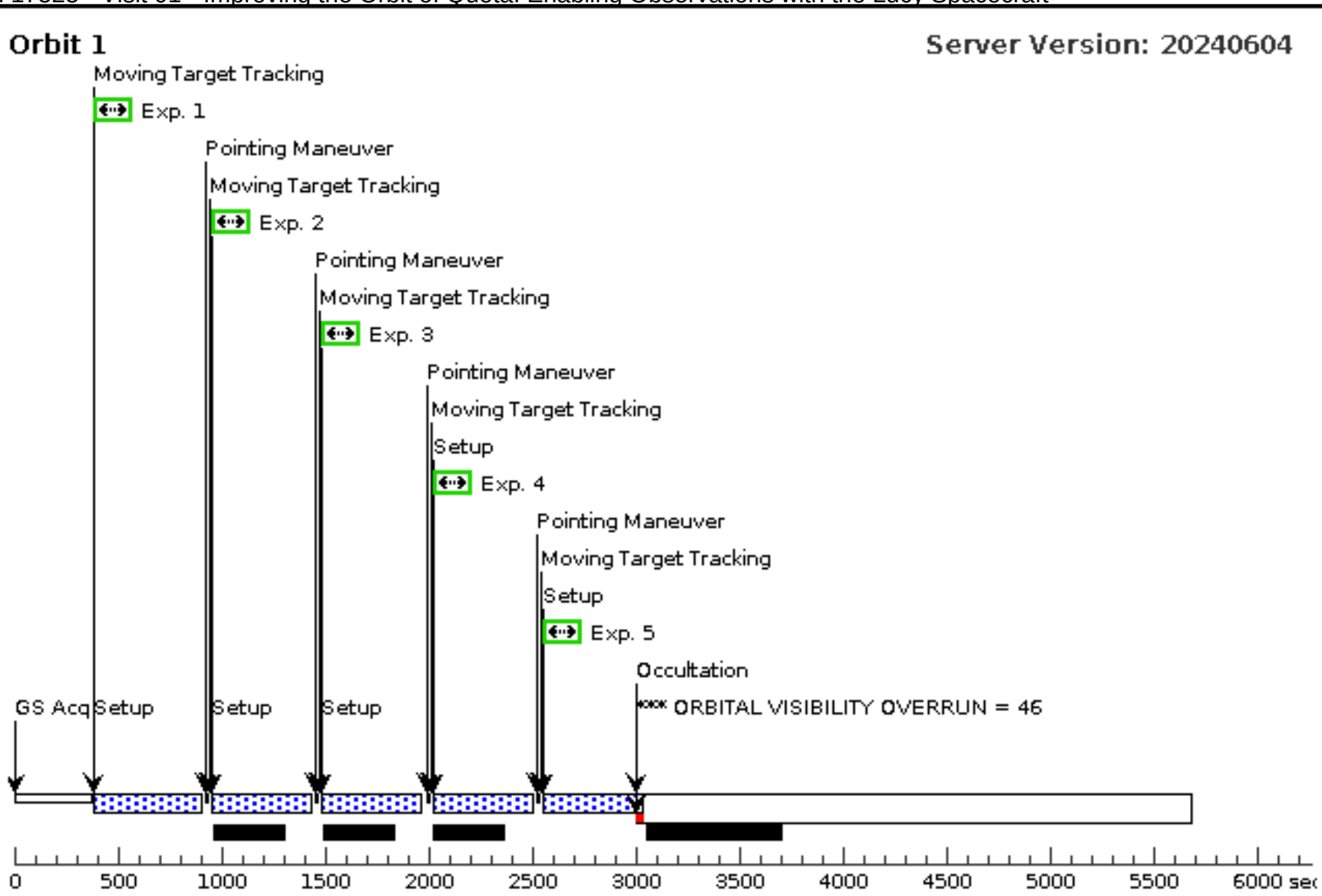
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	EURYBATES	TYPE=ASTEROID,A=5.194825660909952,E=0.08892019463262771,I=8.05897310596958,O=43.53959194136358,W=27.42986950746389,M=279.393486820639,EQUINOX=J2000,EPOCH=05-AUG-2019:00:00:00,EpochTimeScale=TDB				EARTH

Comments: V-mag is expected brightness of the satellite. Eurybates is 8.5 mags brighter and will saturate. This is expected and consistent with previous observations that have successfully recovered the faint satellite. Description=Trojan asteroid with a satellite

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) EURYBATES	WFC3/UVIS, ACCUM, UVIS2	F350LP			Sequence 1-5 Non-Int in Visit 01	370 Secs (370 Secs)	
								[==>]	***[1]***
2		(1) EURYBATES	WFC3/UVIS, ACCUM, UVIS2	F350LP		POS TARG 0.1719,0.1837	Sequence 1-5 Non-Int in Visit 01	370 Secs (370 Secs)	
								[==>]	***[1]***
3		(1) EURYBATES	WFC3/UVIS, ACCUM, UVIS2	F350LP		POS TARG 0.3437,0.3674	Sequence 1-5 Non-Int in Visit 01	370 Secs (370 Secs)	
								[==>]	***[1]***
4		(1) EURYBATES	WFC3/UVIS, ACCUM, UVIS2	F350LP		POS TARG 0.4760,0.5286	Sequence 1-5 Non-Int in Visit 01	370 Secs (370 Secs)	
								[==>]	***[1]***
5		(1) EURYBATES	WFC3/UVIS, ACCUM, UVIS2	F350LP		POS TARG 0.6544,0.6796	Sequence 1-5 Non-Int in Visit 01	370 Secs (370 Secs)	
								[==>]	***[1]***

Orbit Structure



Visit

Proposal 17525, Visit 51, pi Thu Aug 01 19:00:37 GMT 2024

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS

Special Requirements: BETWEEN 04-MAY-2024:19:30:00 AND 04-MAY-2024:23:59:59; BETWEEN 05-MAY-2024:03:00:00 AND 05-MAY-2024:12:00:00; BETWEEN 04-MAY-2024:13:30:00 AND 04-MAY-2024:18:00:00; BETWEEN 02-MAY-2024:00:00:00 AND 03-MAY-2024:00:00:00; BETWEEN 27-MAY-2024:06:00:00 AND 28-MAY-2024:02:00:00; BETWEEN 28-MAY-2024:09:00:00 AND 28-MAY-2024:23:59:00; BETWEEN 22-JAN-2025:12:00:00 AND 23-JAN-2025:18:00:00; BETWEEN 07-FEB-2025:06:00:00 AND 08-FEB-2025:12:00:00; BETWEEN 02-MAR-2025:12:00:00 AND 03-MAR-2025:18:00:00; VISIBILITY INTERVAL NO GYRO BIAS UPDATE ON MOVING TARGET

Diagnostics

(Visit 51) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 51) Informational (Form): The Visit Planner and Spike may produce different schedulability results.

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(2)	EURYBATES-COPY	TYPE=ASTEROID,A=5.194825660909952,E=0.08892019463262771,I=8.05897310596958,O=43.53959194136358,W=27.42986950746389,M=279.393486820639,EQUINOX=J2000,EPOCH=05-AUG-2019:00:00:00,EpochTimeScale=TDB				EARTH

Comments: V-mag is expected brightness of the satellite. Eurybates is 8.5 mags brighter and will saturate. This is expected and consistent with previous observations that have successfully recovered the faint satellite. Description=Trojan asteroid with a satellite

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(2) EURYBATES-COPY	WFC3/UVIS, ACCUM, UVIS2	F350LP			Sequence 1-5 Non-Int in Visit 51	370 Secs (370 Secs)	
								[==>]	***[1]***
2		(2) EURYBATES-COPY	WFC3/UVIS, ACCUM, UVIS2	F350LP		POS TARG 0.1719,0.1837	Sequence 1-5 Non-Int in Visit 51	370 Secs (370 Secs)	
								[==>]	***[1]***
3		(2) EURYBATES-COPY	WFC3/UVIS, ACCUM, UVIS2	F350LP		POS TARG 0.3437,0.3674	Sequence 1-5 Non-Int in Visit 51	370 Secs (370 Secs)	
								[==>]	***[1]***
4		(2) EURYBATES-COPY	WFC3/UVIS, ACCUM, UVIS2	F350LP		POS TARG 0.4760,0.5286	Sequence 1-5 Non-Int in Visit 51	370 Secs (370 Secs)	
								[==>]	***[1]***
5		(2) EURYBATES-COPY	WFC3/UVIS, ACCUM, UVIS2	F350LP		POS TARG 0.6544,0.6796	Sequence 1-5 Non-Int in Visit 51	370 Secs (370 Secs)	
								[==>]	***[1]***

Orbit Structure