



1666 - Validating JWST's in-orbit clock accuracy

Cycle: 1, Proposal Category: GO

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OBSERVATIONS

<i>Folder</i>	<i>Observation</i>	<i>Label</i>	<i>Observing Template</i>	<i>Science Target</i>
Observation Folder				
	1	Time Series Mode	NIRCam Time Series	(1) NAME-ZTF-J153932.16+502738.8
	3	Time Series Mode	NIRCam Time Series	(1) NAME-ZTF-J153932.16+502738.8

ABSTRACT

JWST, despite not being designed for observing high time-resolution phenomena, can be an unparalleled tool for such studies, opening wide the sub-second infrared timescale regime, if timing systematics can be controlled. Rapid time-domain studies, such as lag measurements in accreting sources and Solar System occultations, require both precise inter-frame timing and knowing when a time series begins to an absolute accuracy significantly below 0.5 s.

With this calibration proposal, we will support rapid time-domain studies, by measuring the mission clock calibration and drift between commanded resets from the ground (down to an ~40 ms level). Even if the clock only reaches its ground-based accuracy requirement of 0.5 s, we will deliver a technique that provides a factor of ~5 improvement with a minimal calibration overhead. The science-deliverables will be useful for a broad cross-section of the time-domain community.

OBSERVING DESCRIPTION

Aim

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Time-series NIRCAM observation of an eclipsing double white dwarf binary with a well-measured ephemeris. The aim is to use this as a timing calibrator to validate the clock accuracy down to ~40 ms, a factor of ~13 better than the baseline clock requirement of ~0.5 s over 12 hours. Our proposed observations will provide a low-overhead technique to calibrate down to ~100 ms (5x better than baseline requirement) for community users.

Strategy

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JWST Proposal 1666 (Created: Wednesday, May 10, 2023 at 12:00:31 PM Eastern Standard Time) - Overview

12 hours (charged time) contiguous time series F070 imaging of the target ZTF J1539 in SUB160P. Effective integration time is ~11 s.

We propose to observe contiguously between ground contact clock resets. This will enable searches for clock drifts.

We have been in contact with the mission team at STScI (K. Stevenson, J. Stansberry), and in addition with the Time Series Observations Group (N. Nikolov) through the Helpdesk, checking that there is no conflict with other planned in-orbit calibrations (see INC0160577). We will be happy to work with the mission and instrument teams to refine the observing strategy herein, if desired.

Proposal 1666 - Targets - Validating JWST's in-orbit clock accuracy

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
	(1)	NAME-ZTF- J153932.16+502738.8	RA: 15 39 32.1533 (234.8839721d) Dec: +50 27 38.72 (50.46076d) Equinox: J2000	Proper Motion RA: -3.5741593224163906E-4 sec of time/yr Proper Motion Dec: -0.003822999951808015 arcsec/yr Epoch of Position: 2015.5	
<p><i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> <i>Category=Star</i> <i>Description=[Compact binary systems, White dwarfs]</i> <i>Extended=NO</i></p>					

Proposal 1666 - Observation 1 - Validating JWST's in-orbit clock accuracy

Wed May 10 17:00:31 GMT 2023

Observation	<p>Proposal 1666, Observation 1: Time Series Mode</p> <p>Diagnostic Status: Warning</p> <p>Observing Template: NIRCcam Time Series</p>											
Diagnostics	<p>(Time Series Mode (Obs 1)) Warning (Form): Exposure Duration exceeds the limit of 10000.0 seconds. Above this limit it is possible that a High Gain Antenna move may occur during the exposure.</p> <p>(Visit 1:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p>											
Fixed Targets	#	Name	Target Coordinates			Targ. Coord. Corrections			Miscellaneous			
	(1)	NAME-ZTF-J153932.16+502738.8	RA: 15 39 32.1533 (234.8839721d) Dec: +50 27 38.72 (50.46076d) Equinox: J2000			Proper Motion RA: -3.5741593224163906E-4 sec of time/yr Proper Motion Dec: -0.003822999951808015 arcsec/yr Epoch of Position: 2015.5						
	<p><i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i></p> <p><i>Category=Star</i></p> <p><i>Description=[Compact binary systems, White dwarfs]</i></p> <p><i>Extended=NO</i></p>											
Acquisition	#										Target	
	1										NONE	
Template	Module					Subarray						
	B					SUB160P						
Spectral Elements	#	Short Pupil	Short Filter	Long Pupil	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
	1	CLEAR	F070W	CLEAR	F277W	BRIGHT1	10	6100	1	6100	34025.312	58590
Special Requirements	<p>Time Series Observation</p> <p>No Parallel Attachments</p>											

Proposal 1666 - Observation 3 - Validating JWST's in-orbit clock accuracy

Wed May 10 17:00:31 GMT 2023

Observation	<p>Proposal 1666, Observation 3: Time Series Mode</p> <p>Diagnostic Status: Warning</p> <p>Observing Template: NIRCam Time Series</p>											
Diagnostics	<p>(Time Series Mode (Obs 3)) Warning (Form): Exposure Duration exceeds the limit of 10000.0 seconds. Above this limit it is possible that a High Gain Antenna move may occur during the exposure.</p> <p>(Visit 3:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.</p>											
Fixed Targets	#	Name	Target Coordinates			Targ. Coord. Corrections			Miscellaneous			
	(1)	NAME-ZTF-J153932.16+502738.8	RA: 15 39 32.1533 (234.8839721d) Dec: +50 27 38.72 (50.46076d) Equinox: J2000			Proper Motion RA: -3.5741593224163906E-4 sec of time/yr Proper Motion Dec: -0.003822999951808015 arcsec/yr Epoch of Position: 2015.5						
	<p><i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i></p> <p><i>Category=Star</i></p> <p><i>Description=[Compact binary systems, White dwarfs]</i></p> <p><i>Extended=NO</i></p>											
Acquisition	#										Target	
	1										NONE	
Template	Module					Subarray						
	B					SUB160P						
Spectral Elements	#	Short Pupil	Short Filter	Long Pupil	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
	1	CLEAR	F070W	CLEAR	F322W2	BRIGHT1	10	6100	1	6100	34025.312	58590
Special Requirements	<p>Time Series Observation</p> <p>No Parallel Attachments</p>											