



16509 - Detection of the Astrometric Microlensing Signal by the Binary Black Hole

Candidate MOA-2019-BLG-284

Cycle: 28, Proposal Category: GO
(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) MOA-2019-BLG-284	WFC3/UVIS	1	09-Sep-2021 15:00:42.0	yes
02	(1) MOA-2019-BLG-284	WFC3/UVIS	1	09-Sep-2021 15:00:44.0	yes
03	(1) MOA-2019-BLG-284	WFC3/UVIS	1	09-Sep-2021 15:00:46.0	yes
04	(1) MOA-2019-BLG-284	WFC3/UVIS	1	09-Sep-2021 15:00:49.0	yes

4 Total Orbits Used

ABSTRACT

We propose to directly measure, for the first time, the individual masses for the binary black hole candidate MOA-2019-BLG-284. Unlike some previous studies (Sahu+2009, 2019, Kains+2017), we have selected this candidate based on both its large Einstein radius crossing time of 500 days and its relatively small microlensing parallax of 0.038. The combination of these two parameters is much more effective at identifying black hole microlensing candidates than using events with large Einstein radius crossing time, but no constraint on the microlensing parallax. We also have worked with the microlensing survey groups to remove systematic photometry errors that could contaminate the microlensing parallax measurement. This target is ideal given its very long duration, clear microlensing parallax signal, relatively bright baseline magnitude and previous HST observations taken in 2020. Further, the current best-model gives a total lens mass of ~ 10 Msun or more, with roughly equal mass lens components. If successful, these observations will complement the groundbreaking work of LIGO, and open a new window on the population of (pre-merged) binary black holes in our Galaxy.

OBSERVING DESCRIPTION

If this observing program is successful, it will open a new window on the population of binary black holes (BHs) in our Galaxy and contribute to our understanding of the Galactic distribution of binary BHs, with which LIGO paved the way. We will avoid any potential saturation issues in these new 2021 epochs by using ground-based observations shortly before the scheduled HST observations to ensure the exposure time selected will not saturate the target. In the event that the OGLE or MOA observatories are shut down due to COVID-19 during this time frame, we can easily pivot to an observing scheme that uses primarily many short exposures that we can stack. We propose measurements in the F814W passband over four separate visits during March - September.

Four visits are needed in order to maximize the probability that we are able to successfully measure the astrometric shift induced by the binary BH lens. We request 16 exposures per orbit in the WFC3/UVIS F814W passband to get good spatial sampling of the effective PSFs (Anderson and King 2000), and this means that we will be unable to do parallel, full-frame buffer dumps. However, our target is relatively bright, so we want a large enough area to ensure a sufficient number of stars with a similar color and brightness to our target that can be used to construct precise PSF models and calibrate the data. We select the UVIS2-C1K1C-SUB subarray to obtain ~ 50 stars within 0.5 in magnitude from the target, similar to the previous observing program's strategy. Due to roll-angle (U3 range) restrictions, our target cannot be observed with the same pixel orientation in two visits separated by 200 days, therefore we request a 180 degree orientation change between visit two and three (i.e. visits one and two: 269 degree,

Proposal 16509 (STScI Edit Number: 0, Created: Thursday, September 9, 2021 at 2:00:49 PM Eastern Standard Time) - Overview visits three and four: 89 degree). This will allow us to maintain the pixel grid alignments between all four visits.

Note: Reduced gyro operations may degrade the astrometric performance and require marginally longer exposure times to achieve a comparable astrometric precision. There exist archival two-gyro astrometric data sets that we could use to estimate the impact, if needed. Again, we have a mitigation protocol ready to implement in the event that we are unable to measure the target brightness from the ground (due to COVID-19 or otherwise) and adjust the HST exposure time shortly before each epoch. This backup plan ensures we are still able to retrieve the best-possible astrometry and photometry of the magnified source star in each epoch.

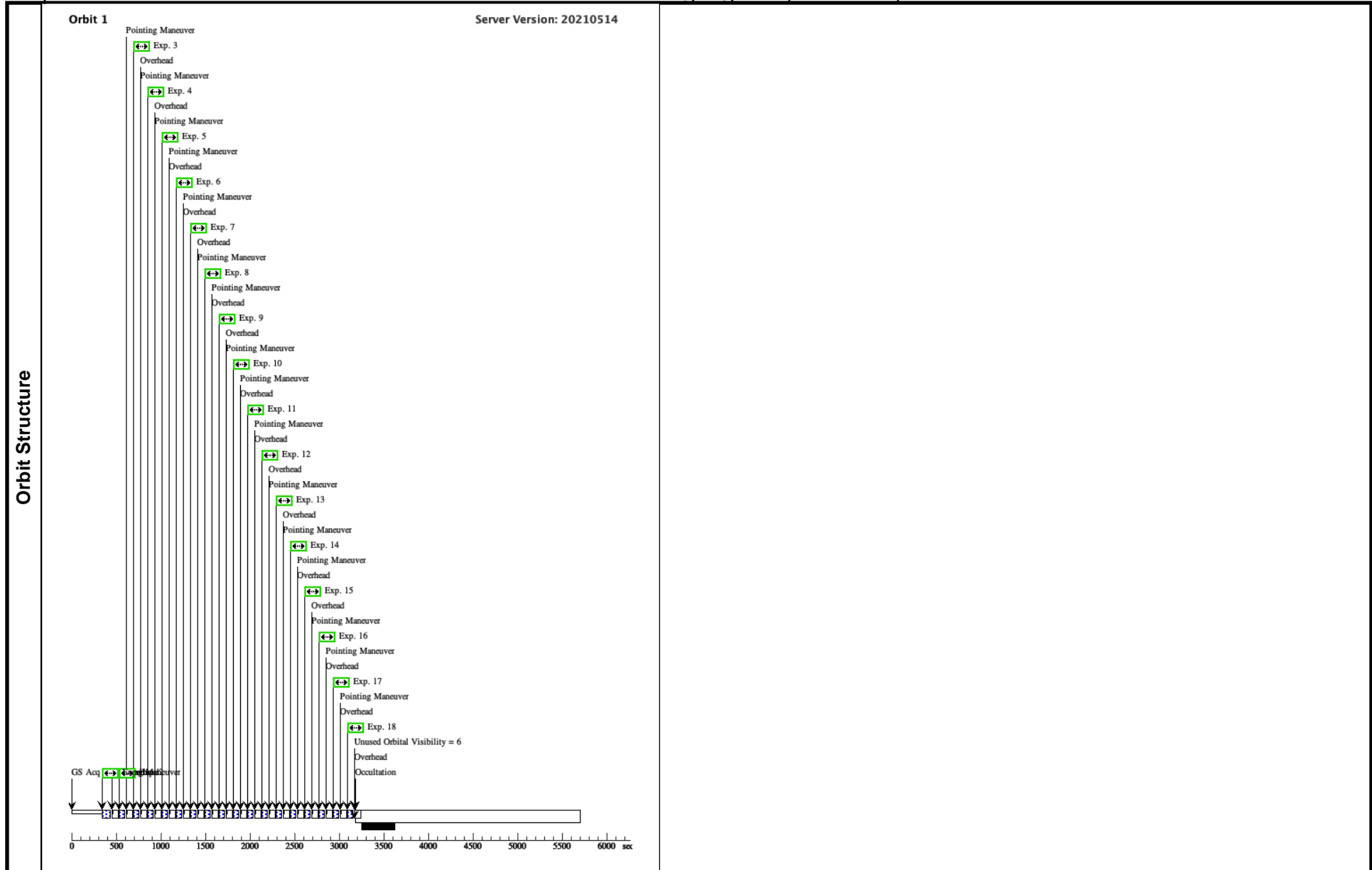
Proposal 16509 - Visit 01 - Detection of the Astrometric Microlensing Signal by the Binary Black Hole Candidate MOA-2019-BLG-284

Thu Sep 09 19:00:49 GMT 2021

Visit	Proposal 16509, Visit 01, completed Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: ORIENT 269D TO 269 D; BETWEEN 28-MAR-2021:00:00:00 AND 06-APR-2021:00:00:00						
	Diagnostics	(Exposure 1 (Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 2 (Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 3 (Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 4 (Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 5 (Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 6 (Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 7 (Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 8 (Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 9 (Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 10 (Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 11 (Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 12 (Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 13 (Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 14 (Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 15 (Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 16 (Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 17 (Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 18 (Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser					
Fixed Targets		#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
		(1)	MOA-2019-BLG-284	RA: 18 05 55.0600 (271.4794167d) Dec: -30 20 12.94 (-30.33693d) Equinox: J2000		V=17.10+/-0.10 I = 15.38 +/- 0.10	Reference Frame: ICRS
Comments: Category=STAR Description=[BULGE, GRAVITATIONAL LENS]							

Proposal 16509 - Visit 01 - Detection of the Astrometric Microlensing Signal by the Binary Black Hole Candidate MOA-2019-BLG-284

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
Exposures	1	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.0,0.0		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	2	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.39965, 0.07586		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	3	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.08431, 0.10751		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	4	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.48396, 0.18337		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	5	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.16845, 0.17497		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	6	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.56810, 0.25084		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	7	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.25276, 0.28248		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	8	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.65241, 0.35835		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	9	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.33689, 0.34995		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	10	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.37904, 0.40370		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	11	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.06372, 0.43533		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	12	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.46318, 0.47117		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	13	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.14564, 0.50266		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	14	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.54749, 0.57867		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	15	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.23216, 0.61030		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	16	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.63162, 0.64614		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	17	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.31629, 0.67777		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	18	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.71592, 0.75364		60 Secs (63 Secs)	[==>63.0 Secs]	[1]



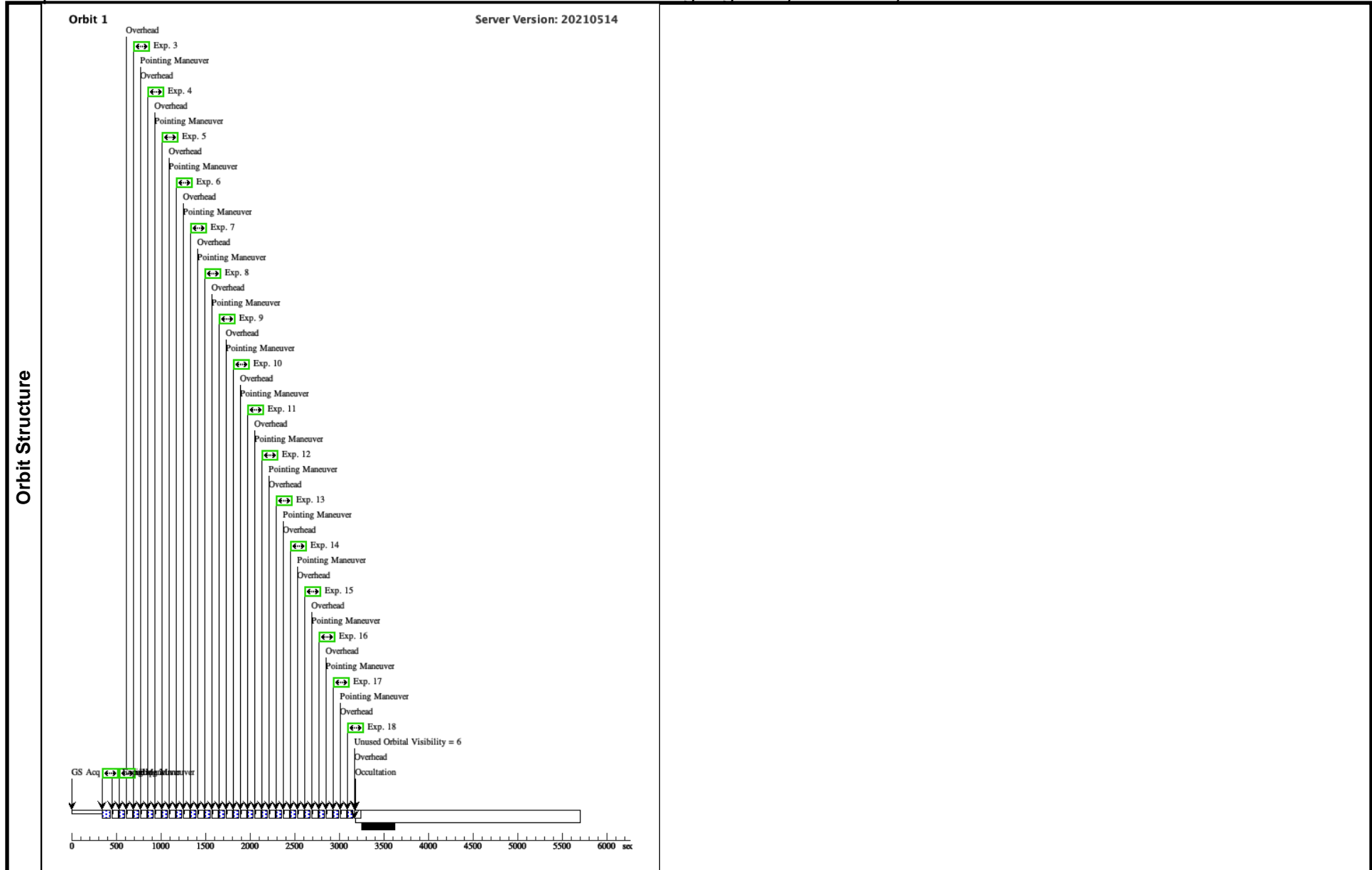
Proposal 16509 - Visit 02 - Detection of the Astrometric Microlensing Signal by the Binary Black Hole Candidate MOA-2019-BLG-284

Thu Sep 09 19:00:50 GMT 2021

Visit	<p>Proposal 16509, Visit 02, completed</p> <p>Diagnostic Status: Warning</p> <p>Scientific Instruments: WFC3/UVIS</p> <p>Special Requirements: ORIENT 269D TO 269 D; BETWEEN 26-MAY-2021:00:00:00 AND 06-JUN-2021:00:00:00</p> <p><i>Comments: Target is variable, prior to visit the exposure times should be updated via communication with science team who have access to real-time ground-based photometry.</i></p>						
	Diagnostics	<p>(Exposure 1 (Visit 02)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 2 (Visit 02)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 3 (Visit 02)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 4 (Visit 02)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 5 (Visit 02)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 6 (Visit 02)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 7 (Visit 02)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 8 (Visit 02)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 9 (Visit 02)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 10 (Visit 02)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 11 (Visit 02)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 12 (Visit 02)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 13 (Visit 02)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 14 (Visit 02)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 15 (Visit 02)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 16 (Visit 02)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 17 (Visit 02)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 18 (Visit 02)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p>					
Fixed Targets		#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
		(1)	MOA-2019-BLG-284	RA: 18 05 55.0600 (271.4794167d) Dec: -30 20 12.94 (-30.33693d) Equinox: J2000		V=17.10+/-0.10 I = 15.38 +/- 0.10	Reference Frame: ICRS
<p><i>Comments:</i> <i>Category=STAR</i> <i>Description=[BULGE, GRAVITATIONAL LENS]</i></p>							

Proposal 16509 - Visit 02 - Detection of the Astrometric Microlensing Signal by the Binary Black Hole Candidate MOA-2019-BLG-284

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
Exposures	1	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.0,0.0		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	2	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.39965, 0.07586		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	3	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.08431, 0.10751		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	4	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.48396, 0.18337		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	5	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.16845, 0.17497		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	6	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.56810, 0.25084		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	7	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.25276, 0.28248		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	8	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.65241, 0.35835		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	9	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.33689, 0.34995		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
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	12	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.46318, 0.47117		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	13	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.14564, 0.50266		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	14	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.54749, 0.57867		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	15	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.23216, 0.61030		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	16	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.63162, 0.64614		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
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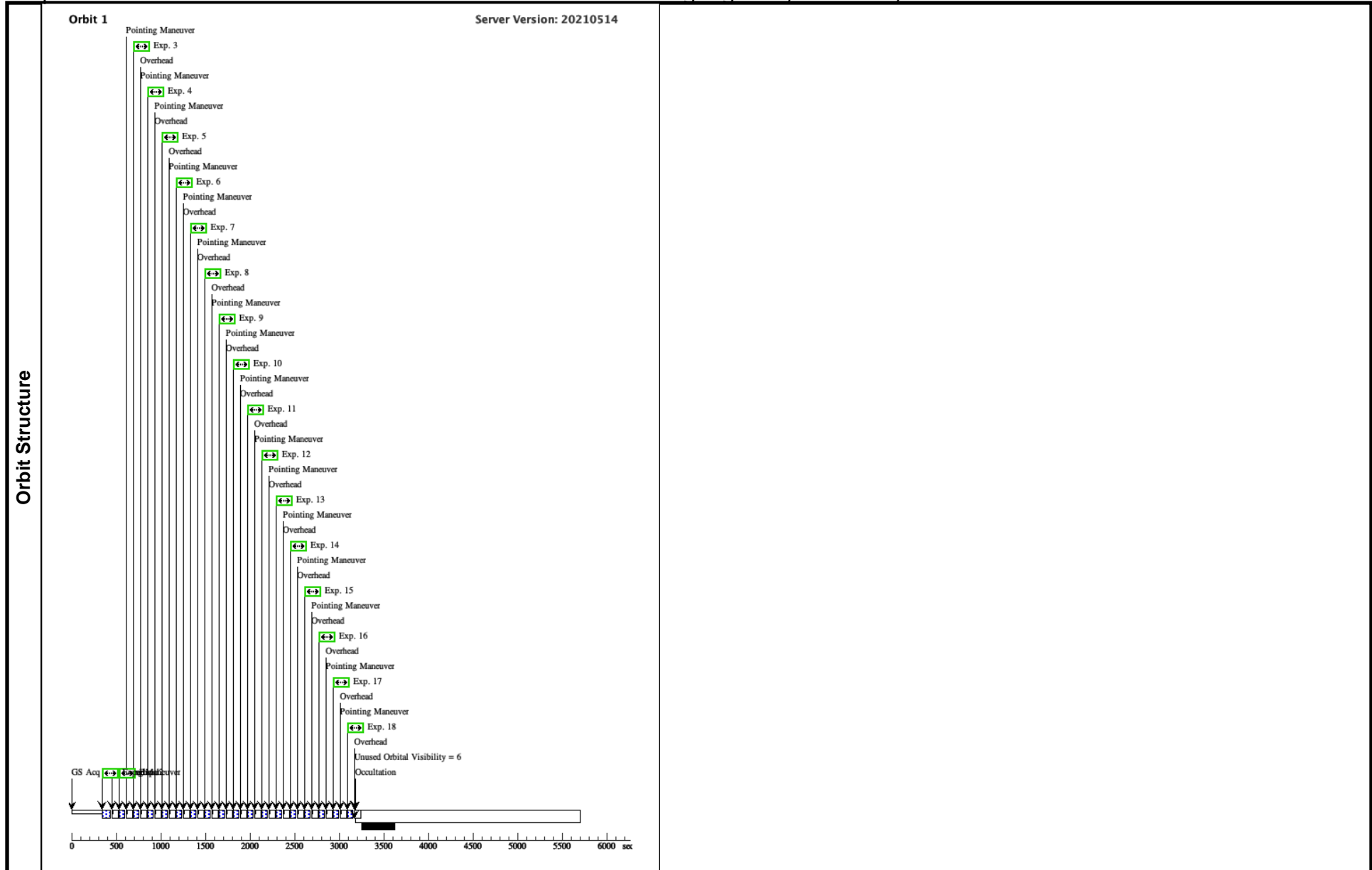
Proposal 16509 - Visit 03 - Detection of the Astrometric Microlensing Signal by the Binary Black Hole Candidate MOA-2019-BLG-284

Thu Sep 09 19:00:50 GMT 2021

Visit	<p>Proposal 16509, Visit 03, completed</p> <p>Diagnostic Status: Warning</p> <p>Scientific Instruments: WFC3/UVIS</p> <p>Special Requirements: ORIENT 89D TO 89 D; BETWEEN 04-AUG-2021:00:00:00 AND 12-AUG-2021:00:00:00</p> <p><i>Comments: Target is variable, prior to visit the exposure times should be updated via communication with science team who have access to real-time ground-based photometry.</i></p>						
	Diagnostics	<p>(Exposure 1 (Visit 03)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 2 (Visit 03)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 3 (Visit 03)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 4 (Visit 03)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 5 (Visit 03)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 6 (Visit 03)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 7 (Visit 03)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 8 (Visit 03)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 9 (Visit 03)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 10 (Visit 03)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 11 (Visit 03)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 12 (Visit 03)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 13 (Visit 03)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 14 (Visit 03)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 15 (Visit 03)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 16 (Visit 03)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 17 (Visit 03)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(Exposure 18 (Visit 03)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p>					
Fixed Targets		#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
		(1)	MOA-2019-BLG-284	RA: 18 05 55.0600 (271.4794167d) Dec: -30 20 12.94 (-30.33693d) Equinox: J2000		V=17.10+/-0.10 I = 15.38 +/- 0.10	Reference Frame: ICRS
<p><i>Comments:</i> <i>Category=STAR</i> <i>Description=[BULGE, GRAVITATIONAL LENS]</i></p>							

Proposal 16509 - Visit 03 - Detection of the Astrometric Microlensing Signal by the Binary Black Hole Candidate MOA-2019-BLG-284

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
Exposures	1	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.0,0.0		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	2	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.39965, 0.07586		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	3	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.08431, 0.10751		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	4	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.48396, 0.18337		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	5	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.16845, 0.17497		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	6	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.56810, 0.25084		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	7	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.25276, 0.28248		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	8	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.65241, 0.35835		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	9	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.33689, 0.34995		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	10	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.37904, 0.40370		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	11	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.06372, 0.43533		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	12	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.46318, 0.47117		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	13	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.14564, 0.50266		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	14	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.54749, 0.57867		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	15	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.23216, 0.61030		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	16	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.63162, 0.64614		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	17	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.31629, 0.67777		60 Secs (63 Secs)	[==>63.0 Secs]	[1]
	18	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.71592, 0.75364		60 Secs (63 Secs)	[==>63.0 Secs]	[1]



Visit	Proposal 16509, Visit 04, implementation Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: ORIENT 89D TO 89 D; BETWEEN 27-SEP-2021:00:00:00 AND 10-OCT-2021:00:00:00 <i>Comments: Target is variable, prior to visit the exposure times should be updated via communication with science team who have access to real-time ground-based photometry.</i>						
	Diagnostics	(Exposure 1 (Visit 04)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 2 (Visit 04)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 3 (Visit 04)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 4 (Visit 04)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 5 (Visit 04)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 6 (Visit 04)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 7 (Visit 04)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 8 (Visit 04)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 9 (Visit 04)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 10 (Visit 04)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 11 (Visit 04)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 12 (Visit 04)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 13 (Visit 04)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 14 (Visit 04)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 15 (Visit 04)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 16 (Visit 04)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 17 (Visit 04)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 18 (Visit 04)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 19 (Visit 04)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 20 (Visit 04)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (Exposure 21 (Visit 04)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser					
Fixed Targets		#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
		(1)	MOA-2019-BLG-284	RA: 18 05 55.0600 (271.4794167d) Dec: -30 20 12.94 (-30.33693d) Equinox: J2000		V=17.10+/-0.10 I = 15.38 +/- 0.10	Reference Frame: ICRS
<i>Comments:</i> Category=STAR Description=[BULGE, GRAVITATIONAL LENS]							

Proposal 16509 - Visit 04 - Detection of the Astrometric Microlensing Signal by the Binary Black Hole Candidate MOA-2019-BLG-284

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
Exposures	1	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.0,0.0		39 Secs (40 Secs)	[1]	
								[==>40.0 Secs]		
	2	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.39965, 0.07586		39 Secs (40 Secs)	[1]	
								[==>40.0 Secs]		
	3	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.08431, 0.10751		39 Secs (40 Secs)	[1]	
								[==>40.0 Secs]		
	4	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.48396, 0.18337		39 Secs (40 Secs)	[1]	
								[==>40.0 Secs]		
	5	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.16845, 0.17497		39 Secs (40 Secs)	[1]	
								[==>40.0 Secs]		
	6	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.56810, 0.25084		39 Secs (40 Secs)	[1]	
								[==>40.0 Secs]		
	7	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.25276, 0.28248		39 Secs (40 Secs)	[1]	
								[==>40.0 Secs]		
	8	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.65241, 0.35835		39 Secs (40 Secs)	[1]	
								[==>40.0 Secs]		
	9	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.33689, 0.34995		39 Secs (40 Secs)	[1]	
								[==>40.0 Secs]		
	10	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.37904, 0.40370		39 Secs (40 Secs)	[1]	
								[==>40.0 Secs]		
	11	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.06372, 0.43533		39 Secs (40 Secs)	[1]	
							[==>40.0 Secs]			
12	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.46318, 0.47117		39 Secs (40 Secs)	[1]		
							[==>40.0 Secs]			
13	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.14564, 0.50266		39 Secs (40 Secs)	[1]		
							[==>40.0 Secs]			
14	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.54749, 0.57867		39 Secs (40 Secs)	[1]		
							[==>40.0 Secs]			
15	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.23216, 0.61030		39 Secs (40 Secs)	[1]		
							[==>40.0 Secs]			
16	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.63162, 0.64614		39 Secs (40 Secs)	[1]		
							[==>40.0 Secs]			
17	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.31629, 0.67777		39 Secs (40 Secs)	[1]		
							[==>40.0 Secs]			
18	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.71592, 0.75364		39 Secs (40 Secs)	[1]		
							[==>40.0 Secs]			
19	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.0000, 0.4000		39 Secs (40 Secs)	[1]		
							[==>40.0 Secs]			
20	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.1719, 0.5970		39 Secs (40 Secs)	[1]		
							[==>40.0 Secs]			
21	(1) MOA-2019-BLG-284	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F814W	FLASH=10	POS TARG 0.3437, 0.7542		39 Secs (40 Secs)	[1]		
							[==>40.0 Secs]			

