



11352 - Mass and distance of the sub-Saturn microlensing planet OGLE-2007-BLG-349Lb

Cycle: 16, Proposal Category: GO/DD

(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) OGLE-2007-BLG-349	WFPC2	1	18-Jan-2008 08:05:14.0	yes
02	(1) OGLE-2007-BLG-349	NIC2	1	18-Jan-2008 08:05:18.0	yes
03	(1) OGLE-2007-BLG-349	WFPC2	1	18-Jan-2008 08:05:21.0	yes
04	(1) OGLE-2007-BLG-349	WFPC2	1	18-Jan-2008 08:05:25.0	yes
05	(1) OGLE-2007-BLG-349	NIC2	1	18-Jan-2008 08:05:37.0	yes

5 Total Orbits Used

ABSTRACT

OGLE-2007-BLG-349Lb is the seventh planet discovered using gravitational microlensing, with planet/star mass ratio $2.8e-4$. These microlensing planets lie in the cold, outer reaches of their solar systems and are difficult to detect by other techniques because of their long periods. However, microlensing detections by themselves generally give only the planet/star mass ratio, not the absolute planet mass. HST observations have yielded host star masses and distances for two previous microlensing planets. Here, we propose to apply a proven technique to measure the mass and distance of the newest microlensing planet, which was discovered only two weeks ago. We will use WFPC2 observations to unambiguously determine whether the blended light seen during the event is due to the host star (rather than a random interloper) and a combination of WFPC2 and NICMOS observations to obtain photometric estimates of the mass and distance. Two epochs of observations are required, one at high magnification (in the very near future) and the other at baseline (but not too late -- to avoid having the lens move substantially away from the source).

OBSERVING DESCRIPTION

We will use WFPC2 to image the field in I (F814W) at the first epoch and both V (F555W) and I (F814W) at the second epoch, with the object placed in the PC chip. At the two epochs, the source will be $I_{\text{Oct10}} = 18.8$ and $(V, I)_{\text{Jun1}} = (21.8, 19.9)$. Using the exposure time calculator, we find that a 5.3 min set of exposures (maximum for the visibility) yields $S/N=143$, which given the expected magnification lever arm ($A = 3.5$), is adequate. For the second epoch, we need 4 dithers to measure the PSF elongation in I, and longer exposures for photometry in both bands because the source is fainter. Hence we require two orbits, with (4×5.3) min in I and (4×5.3) min in V. We will use NICMOS/NIC2 to image the field in H (F160W). The source will be $H_{\text{Oct10}} = 16.6$ and $H_{\text{Jun1}} = 17.8$. The 6.1 minutes total exposure (given the visibility) during the first epoch will yield $S/N=372$, which is more than adequate. A full orbit during the second epoch will yield a S/N that is slightly bigger ($S/N = 381$).

Total request is 5 orbits: one WFPC F814W during 9/Oct - 11/Oct, 2007, one NICMOS/NIC2 F160W during 7/Oct - 13/Oct, plus two WFPC (one F814W + one F555W) between 4/May and 4/June, 2008 and one NICMOS/NIC2 F160W between 13/May and 4/June, 2008.

REAL TIME JUSTIFICATION

The microlensing planet was only discovered on 4 Sept 2007. The principal scientific goal of this proposal is the unambiguous identification of the blended light in the microlensing event as the lens (i.e., the planet's host star) in order to determine its mass and distance (and so the mass and

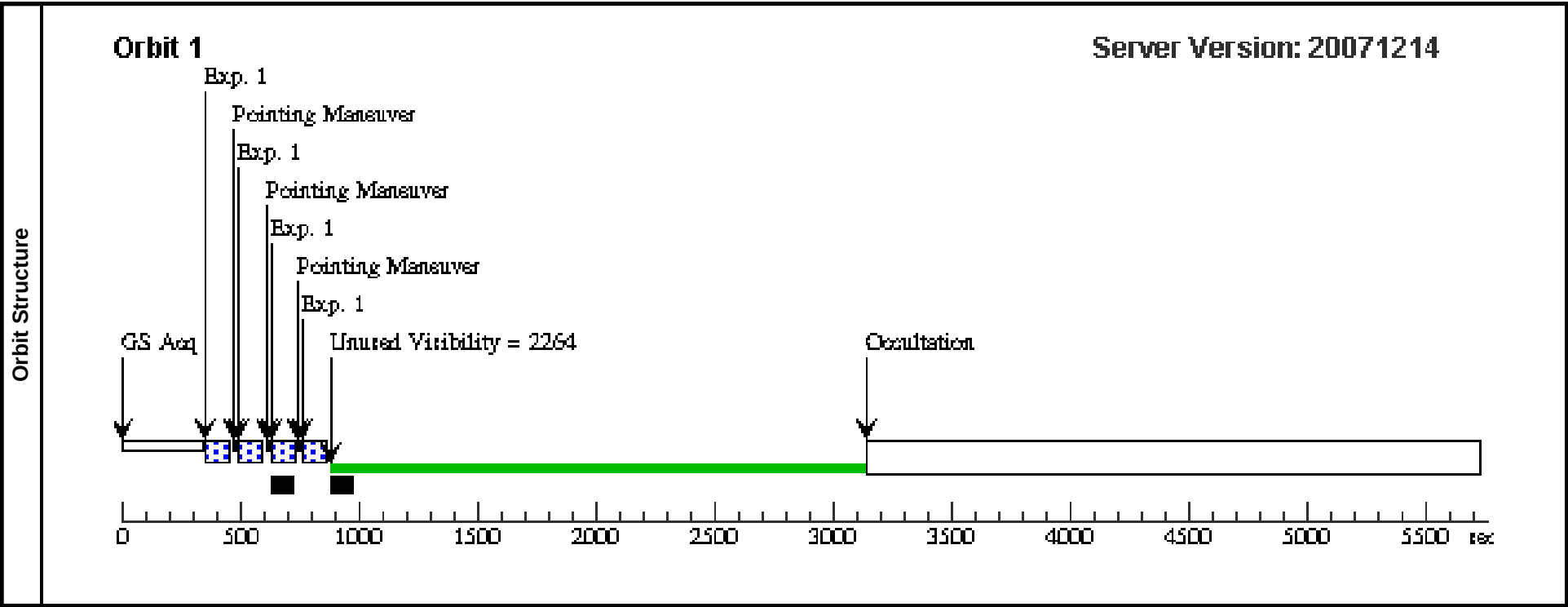
physical projected separation of the planet). Identification of the blended light as the lens requires an observation after about 9 months, when the event has returned to baseline but the lens has not yet moved too far, in order to measure the "PSF distortion" of the blend+source. Measurement of the blend color and magnitude requires two measurements, one near baseline and another when the event is substantially magnified. The event will only remain substantially magnified for about a month. Hence both sets of observations require DDT.

Proposal 11352 - Visit 01 - Mass and distance of the sub-Saturn microlensing planet OGLE-2007-BLG-349Lb

Visit	Proposal 11352, Visit 01, implementation										Fri Jan 18 13:05:43 GMT 2008
	Diagnostic Status: No Diagnostics										
	Scientific Instruments: WFPC2										
	Special Requirements: BETWEEN 08-OCT-2007:12:00:00 AND 13-OCT-2007:12:00:00										
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections		Fluxes			Miscellaneous		
	(1)	OGLE-2007-BLG-349	RA: 18 05 24.7400 (271.3530833d) Dec: -26 25 15.60 (-26.42100d) Equinox: J2000			V=20+/-0.2 Spectral Type: G3V, E(B-V) =1, 1st Epoch: I = 18.8 +/- 0.1, H = 16.6+/-0.2, F(1600) = 2.7 +/- 0.5 E-17, 2nd Epoch: V = 21.8 +/- 0.5, I = 19.9 +/- 0.2, H = 17.8 +/- 0.3, F(1600) = 9 +/- 3 E-18			Reference Frame: ICRS		
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit	
	1	2007/I	(1) OGLE-2007-BL G-349	WFPC2, IMAGE, PC1	F814W	CR-SPLIT=0.5			320.0 Secs [=>(Split 1)] [=>(Split 2)]	[1]	
Orbit Structure	Orbit 1 Server Version: 20071214										

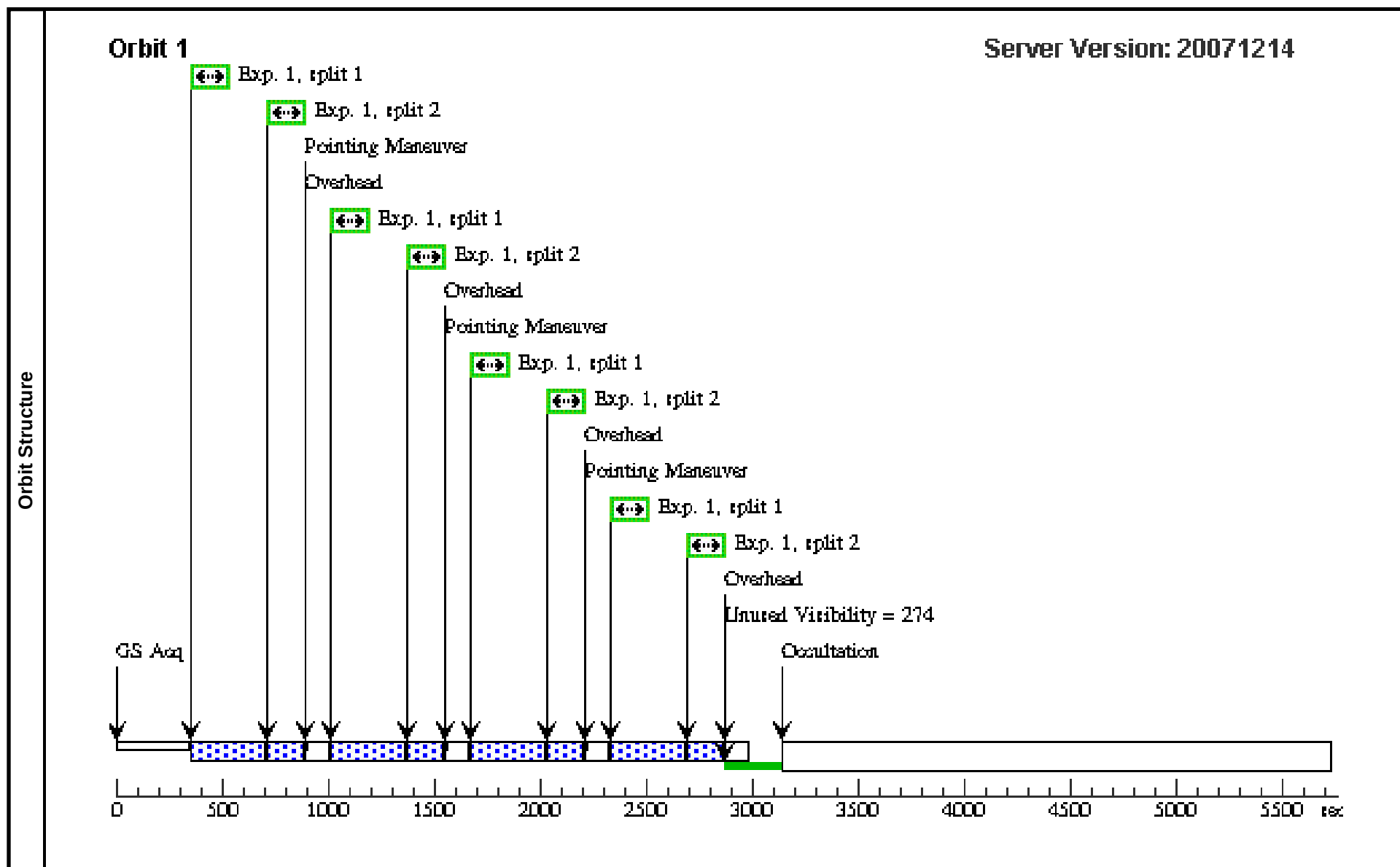
Proposal 11352 - Visit 02 - Mass and distance of the sub-Saturn microlensing planet OGLE-2007-BLG-349Lb

Visit	Proposal 11352, Visit 02, implementation										Fri Jan 18 13:05:44 GMT 2008	
	Diagnostic Status: No Diagnostics											
	Scientific Instruments: NIC2											
	Special Requirements: ORIENT 89.0D TO 91.0 D; BETWEEN 08-OCT-2007:12:00:00 AND 13-OCT-2007:12:00:00											
Patterns	#	Primary Pattern				Secondary Pattern				Exposures		
	(5)	Pattern Type=BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.49322 Line Spacing=0.4899		Coordinate Frame=POS-TARG Pattern Orientation=90.0 Angle Between Sides=90.0 Center Pattern=false						(1)		
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(1)	OGLE-2007-BLG-349	RA: 18 05 24.7400 (271.3530833d) Dec: -26 25 15.60 (-26.42100d) Equinox: J2000				V=20+/-0.2 Spectral Type: G3V, E(B-V) =1, 1st Epoch: I = 18.8 +/- 0.1, H = 16.6+/-0.2, F(1600) = 2.7 +/- 0.5 E-17, 2nd Epoch: V = 21.8 +/- 0.5, I = 19.9 +/- 0.2, H = 17.8 +/- 0.3, F(1600) = 9 +/- 3 E-18		Reference Frame: ICRS			
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]		Orbit	
	1		(1) OGLE-2007-BL G-349	NIC2, MULTIACCUM, NIC2-FIX	F160W	NSAMP=25; SAMP-SEQ=SPAR S4		Pattern 1-1 (5)	[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]		[1]	



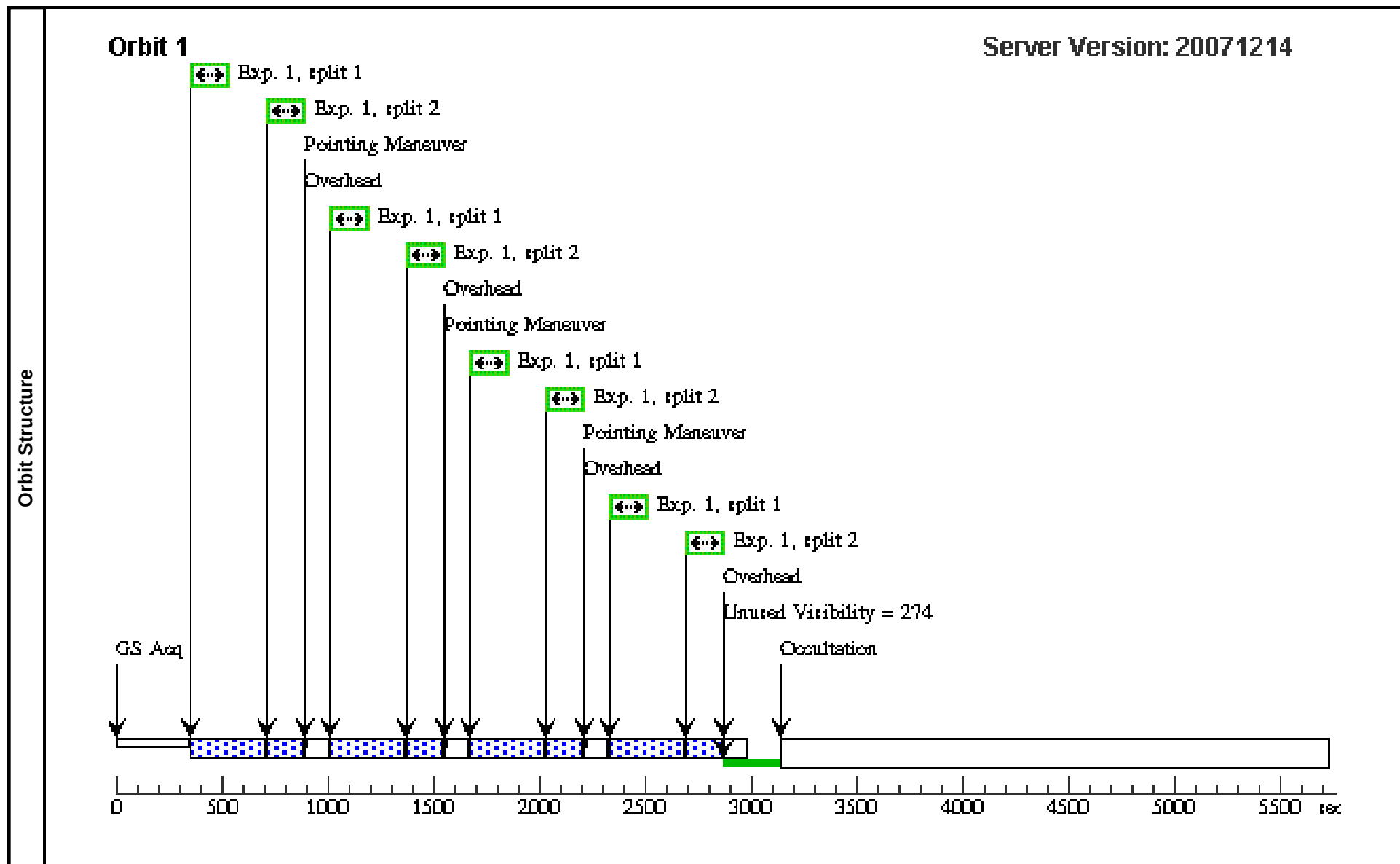
Proposal 11352 - Visit 03 - Mass and distance of the sub-Saturn microlensing planet OGLE-2007-BLG-349Lb

Visit	Proposal 11352, Visit 03, implementation										Fri Jan 18 13:05:45 GMT 2008
	Diagnostic Status: No Diagnostics										
	Scientific Instruments: WFPC2										
	Special Requirements: BETWEEN 04-MAY-2008:12:00:00 AND 04-JUN-2008:12:00:00										
Patterns	#	Primary Pattern					Secondary Pattern				Exposures
	(3)	Pattern Type=WFPC2-BOX		Coordinate Frame=POS-TARG							(1)
Purpose=DITHER		Pattern Orientation=26.56505									
Number Of Points=4		Angle Between Sides=143.1301									
Point Spacing=0.559017		Center Pattern=false									
Line Spacing=0.559017											
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(1)	OGLE-2007-BLG-349	RA: 18 05 24.7400 (271.3530833d) Dec: -26 25 15.60 (-26.42100d) Equinox: J2000				V=20+/-0.2 Spectral Type: G3V, E(B-V) =1, 1st Epoch: I = 18.8 +/- 0.1, H = 16.6+/-0.2, F(1600) = 2.7 +/- 0.5 E-17, 2nd Epoch: V = 21.8 +/- 0.5, I = 19.9 +/- 0.2, H = 17.8 +/- 0.3, F(1600) = 9 +/- 3 E-18		Reference Frame: ICRS		
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]		Orbit
	1	2008/I	(1) OGLE-2007-BL G-349	WFPC2, IMAGE, PC1	F814W	CR-SPLIT=0.5		Pattern 1-1 (3)	320.0 Secs		[1]
										[==>(Pattern 1, Split 1)]	
										[==>(Pattern 1, Split 2)]	
										[==>(Pattern 2, Split 1)]	
										[==>(Pattern 2, Split 2)]	
										[==>(Pattern 3, Split 1)]	
										[==>(Pattern 3, Split 2)]	
										[==>(Pattern 4, Split 1)]	
									[==>(Pattern 4, Split 2)]		



Proposal 11352 - Visit 04 - Mass and distance of the sub-Saturn microlensing planet OGLE-2007-BLG-349Lb

Visit	Proposal 11352, Visit 04, implementation										Fri Jan 18 13:05:45 GMT 2008	
	Diagnostic Status: No Diagnostics											
	Scientific Instruments: WFPC2											
	Special Requirements: BETWEEN 04-MAY-2008:12:00:00 AND 04-JUN-2008:00:00:00											
Patterns	#	Primary Pattern					Secondary Pattern				Exposures	
	(3)	Pattern Type=WFPC2-BOX		Coordinate Frame=POS-TARG							(1)	
Purpose=DITHER		Pattern Orientation=26.56505										
Number Of Points=4		Angle Between Sides=143.1301										
Point Spacing=0.559017		Center Pattern=false										
Line Spacing=0.559017												
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(1)	OGLE-2007-BLG-349	RA: 18 05 24.7400 (271.3530833d) Dec: -26 25 15.60 (-26.42100d) Equinox: J2000				V=20+/-0.2 Spectral Type: G3V, E(B-V) =1, 1st Epoch: I = 18.8 +/- 0.1, H = 16.6+/-0.2, F(1600) = 2.7 +/- 0.5 E-17, 2nd Epoch: V = 21.8 +/- 0.5, I = 19.9 +/- 0.2, H = 17.8 +/- 0.3, F(1600) = 9 +/- 3 E-18		Reference Frame: ICRS			
Exposures	#	Label	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]		Orbit
	1	2008/V	(1) OGLE-2007-BL G-349	WFPC2, IMAGE, PC1		F555W	CR-SPLIT=0.5		Pattern 1-1 (3)	320.0 Secs		[1]
	[==>(Pattern 1, Split 1)]											
	[==>(Pattern 1, Split 2)]											
	[==>(Pattern 2, Split 1)]											
	[==>(Pattern 2, Split 2)]											
	[==>(Pattern 3, Split 1)]											
	[==>(Pattern 3, Split 2)]											
	[==>(Pattern 4, Split 1)]											
[==>(Pattern 4, Split 2)]												



Proposal 11352 - Visit 05 - Mass and distance of the sub-Saturn microlensing planet OGLE-2007-BLG-349Lb

Visit	Proposal 11352, Visit 05, implementation				Fri Jan 18 13:05:46 GMT 2008	
	Diagnostic Status: No Diagnostics					
	Scientific Instruments: NIC2					
	Special Requirements: ORIENT 269.0D TO 271.0 D; BETWEEN 13-MAY-2008:00:00:00 AND 04-JUN-2008:00:00:00					
Patterns	#	Primary Pattern		Secondary Pattern	Exposures	
	(5)	Pattern Type=BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.49322 Line Spacing=0.4899	Coordinate Frame=POS-TARG Pattern Orientation=90.0 Angle Between Sides=90.0 Center Pattern=false		(1)	
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	OGLE-2007-BLG-349	RA: 18 05 24.7400 (271.3530833d) Dec: -26 25 15.60 (-26.42100d) Equinox: J2000		V=20+/-0.2 Spectral Type: G3V, E(B-V) =1, 1st Epoch: I = 18.8 +/- 0.1, H = 16.6+/-0.2, F(1600) = 2.7 +/- 0.5 E-17, 2nd Epoch: V = 21.8 +/- 0.5, I = 19.9 +/- 0.2, H = 17.8 +/- 0.3, F(1600) = 9 +/- 3 E-18	Reference Frame: ICRS

Proposal 11352 - Visit 05 - Mass and distance of the sub-Saturn microlensing planet OGLE-2007-BLG-349Lb

	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]		Orbit
Exposures	1		(1) OGLE-2007-BLG-349	NIC2, MULTIACCUM, NIC2-FIX	F160W	NSAMP=23; SAMP-SEQ=SPAR S4		Pattern 1-1 (5)	[==>(Pattern 1, Copy 1)]		[1]
									[==>(Pattern 1, Copy 2)]		
									[==>(Pattern 1, Copy 3)]		
									[==>(Pattern 1, Copy 4)]		
									[==>(Pattern 1, Copy 5)]		
									[==>(Pattern 1, Copy 6)]		
									[==>(Pattern 1, Copy 7)]		
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