11311 - The high-amplification microlensing event OGLE-2007-BLG-224: a substellar lens in the Galactic disk or a low-mass stellar lens in the halo?

Cycle: 15, Proposal Category: GO/DD

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. Kailash Sahu (PI)	**Space Telescope Science Institute**	**ksahu@stsci.edu**
Dr. David P. Bennett (CoI)	University of Notre Dame	bennett@nd.edu
Dr. Andrew Gould (CoI)	The Ohio State University Research Foundation	gould@astronomy.ohio-state.edu
Dr. Martin Dominik (CoI)	University of St. Andrews	md35@st-andrews.ac.uk
Dr. Andrzej Udalski (CoI)	Warsaw University	udalski@astrouw.edu.pl
Dr. Takahiro Sumi (CoI)	Nagoya University	sumi@stelab.nagoya-u.ac.jp

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) OGLE-2007-BLG-224	WFPC2	1	23-Jan-2008 21:17:38.0	yes
02	(1) OGLE-2007-BLG-224	NIC1	1	23-Jan-2008 21:17:42.0	yes
03	(1) OGLE-2007-BLG-224	WFPC2	1	23-Jan-2008 21:17:44.0	yes
04	(1) OGLE-2007-BLG-224	NIC1	1	23-Jan-2008 21:17:46.0	yes

4 Total Orbits Used

ABSTRACT

OGLE-2007-BLG-224/MOA-2007-BLG-163 is a remarkable microlensing event towards the Galactic bulge, which peaked on May 12, 2007. The light curve reached a peak magnification of ~3700, which is the highest magnification ever observed. The color and magnitude of the source indicate that it is a G-dwarf in the Galactic bulge, and source radius crossing time of t* = 8.2 minutes implies that the lens-source relative proper motion is 45 mas/yr. This indicates that the lens must either be a very nearby brown dwarf, or a halo star. The HST observations proposed here provide a very good chance to distinguish between these two possibilities and to determine the distance and mass of the lens. If it is a nearby brown dwarf, it is likely to be associated with a high-proper-motion star that is found close to the source. HST observations taken at two epochs will resolve out the geocentric and the heliocentric the proper-motions, thus providing unambiguous proof that it is a substellar lens. If the lens is a halo star, then it should be detectable as it separates from the source star over the next year. This would be the first definitive detection of a lens star in the Galatic halo and it would help to resolve the long running controversy over whether a significant fraction of the microlensing events seen towards the Magellanic Clouds are due to lens objects in the halo. Thus, it will either be the first clear proof of a substellar lens in the Galactic disk, or the first clear detection of a halo lens.

OBSERVING DESCRIPTION

We will use WFPC2 to image the field in V and I filters, with the object placed in the PC chip. Given its magnitude of I~18.1, we will require about ~(5 +5) min exposures in V and I filters, which should allow us to see fainter objects in the field without saturating the source. We will also use NICMOS/NIC1 to image the field in J and H bands. The observations will be repeated about 8 months later. Note that the galactic bulge can be observed from about February to June, which allows the observations to be taken 8 months apart, in the 2-gyro mode.

Visit

Proposal 11311, Visit 01, implementation Thu Jan 24 02:17:49 GMT 2008

Diagnostic Status: No Diagnostics

Scientific Instruments: WFPC2

Special Requirements: ORIENT 324.0D TO 325.0 D; BETWEEN 11-JUN-2007:00:00:00 AND 12-JUN-2007:00:00:00

Patterns

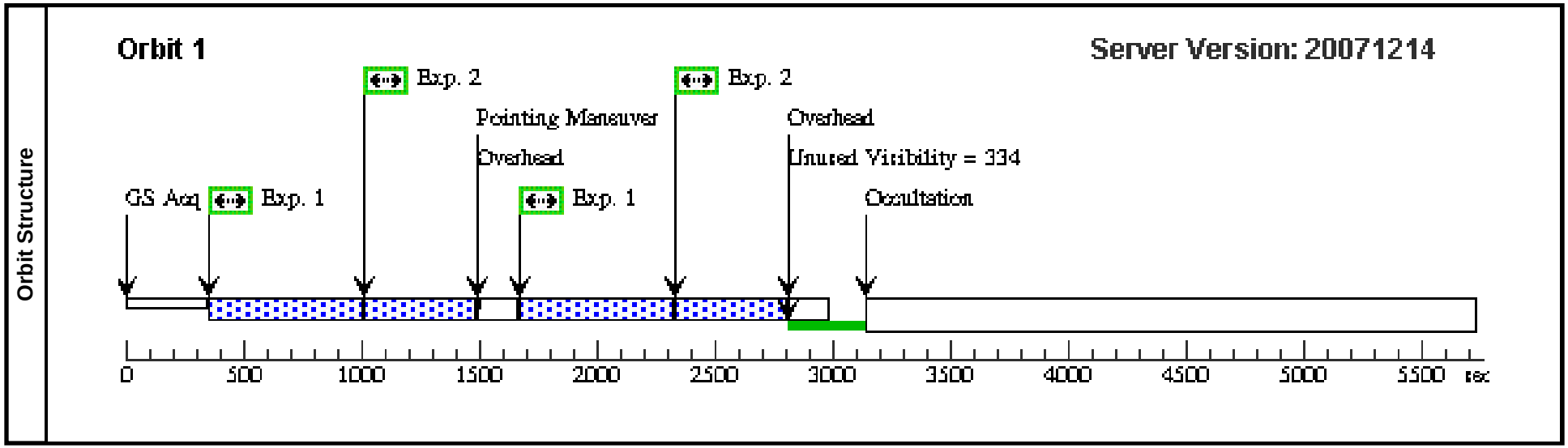
#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFPC2-LINE	Coordinate Frame=POS-TARG		(1-2)
	Purpose=DITHER	Pattern Orientation=45.0		
	Number Of Points=2	Angle Between Sides=		
	Point Spacing=0.3535	Center Pattern=false		
	Line Spacing=			

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	OGLE-2007-BLG-224	RA: 18 05 41.0500 (271.4210417d) Dec: -28 45 36.20 (-28.76006d) Equinox: J2000		V=17.5+/-0.5	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-BLG-224	WFPC2, IMAGE, PC1	F814W			Pattern 1-2 (1)	400.0 Secs	
								[==>(Pattern 1)] *[==>(Pattern 2)]*	***[1]***
2		(1) OGLE-2007-BLG-224	WFPC2, IMAGE, PC1	F555W			Pattern 1-2 (1)	400.0 Secs	
								[==>(Pattern 1)] *[==>(Pattern 2)]*	***[1]***


Orbit Structure
Orbit 1
Server Version: 20071214
Exp. 2
Exp. 2
Pointing Maneuver
Overhead
Overhead
Unused Visibility = 334
GS Acq
Exp. 1
Exp. 1
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 11311, Visit 02, implementation Thu Jan 24 02:17:50 GMT 2008

Diagnostic Status: No Diagnostics

Scientific Instruments: NIC1

Special Requirements: BETWEEN 11-JUN-2007:00:00:00 AND 12-JUN-2007:00:00:00

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=NIC-SPIRAL-DITH	Coordinate Frame=POS-TARG		(1-2)
	Purpose=DITHER	Pattern Orientation=45.0		
	Number Of Points=2	Angle Between Sides=		
	Point Spacing=0.334461	Center Pattern=false		
	Line Spacing=			

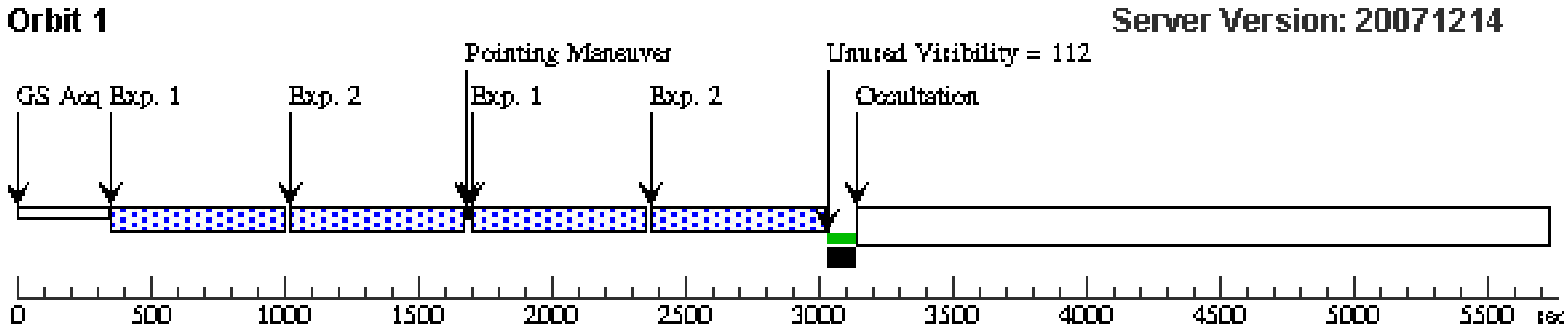
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	OGLE-2007-BLG-224	RA: 18 05 41.0500 (271.4210417d) Dec: -28 45 36.20 (-28.76006d) Equinox: J2000		V=17.5+/-0.5	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-BLG-224	NIC1, MULTIACCUM, NIC1	F110W	NSAMP=14; SAMP-SEQ=STEP128		Pattern 1-2 (2)	*[==>(Pattern 1)]* *[==>(Pattern 2)]*	*[1]*
2		(1) OGLE-2007-BLG-224	NIC1, MULTIACCUM, NIC1	F160W	NSAMP=14; SAMP-SEQ=STEP128		Pattern 1-2 (2)	*[==>(Pattern 1)]* *[==>(Pattern 2)]*	*[1]*

Orbit Structure



Visit

Proposal 11311, Visit 03 Thu Jan 24 02:17:50 GMT 2008

Diagnostic Status: No Diagnostics

Scientific Instruments: WFPC2

Special Requirements: ORIENT 324.01D TO 324.02 D; BETWEEN 08-JUN-2008:00:00:00 AND 15-JUN-2008:00:00:00

Patterns

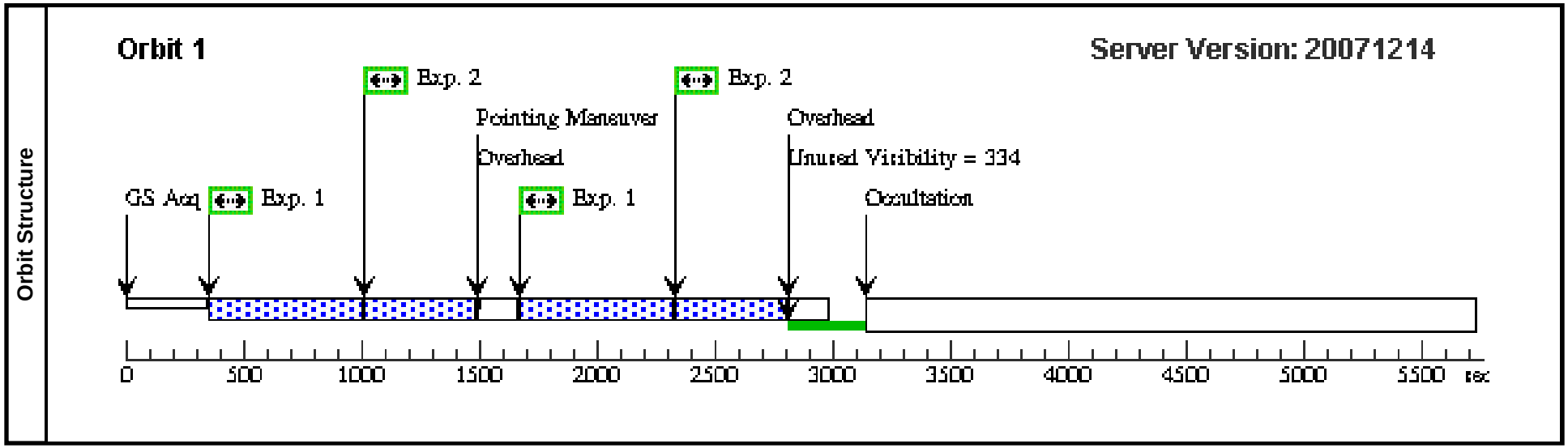
#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFPC2-LINE	Coordinate Frame=POS-TARG		(1-2)
	Purpose=DITHER	Pattern Orientation=45.0		
	Number Of Points=2	Angle Between Sides=		
	Point Spacing=0.3535	Center Pattern=false		
	Line Spacing=			

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	OGLE-2007-BLG-224	RA: 18 05 41.0500 (271.4210417d) Dec: -28 45 36.20 (-28.76006d) Equinox: J2000		V=17.5+/-0.5	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-BLG-224	WFPC2, IMAGE, PC1	F814W		GSPAIR S9SO0006 34F2S9SR000110F1	Pattern 1-2 (1)	400.0 Secs *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[1]***
2		(1) OGLE-2007-BLG-224	WFPC2, IMAGE, PC1	F555W			Pattern 1-2 (1)	400.0 Secs *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[1]***


Orbit Structure
Orbit 1
Server Version: 20071214
Exp. 2
Exp. 2
Pointing Maneuver
Overhead
Overhead
Unused Visibility = 334
GS Acq
Exp. 1
Exp. 1
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 11311, Visit 04 Thu Jan 24 02:17:50 GMT 2008

Diagnostic Status: No Diagnostics

Scientific Instruments: NIC1

Special Requirements: ORIENT 316.1846D TO 316.1846 D; BETWEEN 08-JUN-2008:00:00:00 AND 15-JUN-2008:00:00:00

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=NIC-SPIRAL-DITH	Coordinate Frame=POS-TARG		(1-2)
	Purpose=DITHER	Pattern Orientation=45.0		
	Number Of Points=2	Angle Between Sides=		
	Point Spacing=0.334461	Center Pattern=false		
	Line Spacing=			

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	OGLE-2007-BLG-224	RA: 18 05 41.0500 (271.4210417d) Dec: -28 45 36.20 (-28.76006d) Equinox: J2000		V=17.5+/-0.5	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-BLG-224	NIC1, MULTIACCUM, NIC1	F110W	NSAMP=13; SAMP-SEQ=STEP128	GSPAIR S9SO000653F2S9SR000087F3; GS ACQ SCENARIO BASE1T3	Pattern 1-2 (2)	*[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[1]***
2		(1) OGLE-2007-BLG-224	NIC1, MULTIACCUM, NIC1	F160W	NSAMP=14; SAMP-SEQ=STEP128		Pattern 1-2 (2)	*[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[1]***

Orbit Structure