10898 - The orbit of the most massive known astrometric binary

Cycle: 15, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

Visit	*Targets*	*Configurations*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) HD93129A	ACS/HRC	1	18-May-2006 21:49:17.0	yes

Visit	*Targets*	*Configurations*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
02	(9) REF8 (1) HD93129A (4) REF3 (5) REF4 (2) REF1 (6) REF5 (7) REF6 (8) REF7 (3) REF2	FGS	1	18-May-2006 21:49:29.0	yes

2 Total Orbits Used

ABSTRACT

We have recently used FGS and HRC observations to (a) resolve HD 93129A into two components with very similar optical/UV colors and a magnitude difference of 0.9 and to (b) detect their relative orbital motion over a span of 8 years. HD 93129Aa is the prototype O2 If* star, with an evolutionary mass near 100 M_Sun, while Ab is likely to be a very early O main-sequence star with a similar or only slightly smaller mass. Our HST astrometric measurements yield a total mass above 100 M_Sun, thus confirming the extremely high mass of the binary, and indicate that the system appears to be approaching periastron. We request new FGS and HRC observations to (a) calculate the mass ratio of the system by measuring the orbit of each of the components with respect to the nearby stars, (b) obtain the periastron epoch, and (c) start measuring the orbit in order to produce an estimate of the total mass. These measurements are crucial to shed light on the value of the stellar upper mass limit.

OBSERVING DESCRIPTION

We propose observing HD 93129 at three different epochs using ACS/HRC and FGS.

Visit

Proposal 10898, Visit 01 Fri May 19 01:49:32 GMT 2006

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/HRC

Special Requirements: ORIENT 147.0D TO 167.0 D; ORIENT 327.0D TO 347.0 D; BETWEEN 02-AUG-2006:00:00:00 AND 12-AUG-2006:00:00:00

Comments: Orientation requirement imposed in order to ensure continuity with program 10205.

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=ACS-HRC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=2.7 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=5.8 Angle Between Sides= Center Pattern=true	Pattern Type=ACS-HRC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.15 Line Spacing=0.098	Coordinate Frame=POS-TARG Pattern Orientation=19.9 Angle Between Sides=63.5 Center Pattern=true	(1), (2)
(2)	Pattern Type=ACS-HRC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=2.7 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=5.8 Angle Between Sides= Center Pattern=true			(5), (6), (7), (8), (9)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD93129A	RA: 10 43 57.5000 (160.9895833d) Dec: -59 32 53.00 (-59.54806d) Equinox: J2000		V=7.3+/-0.1 O2 If*	Reference Frame: ICRS

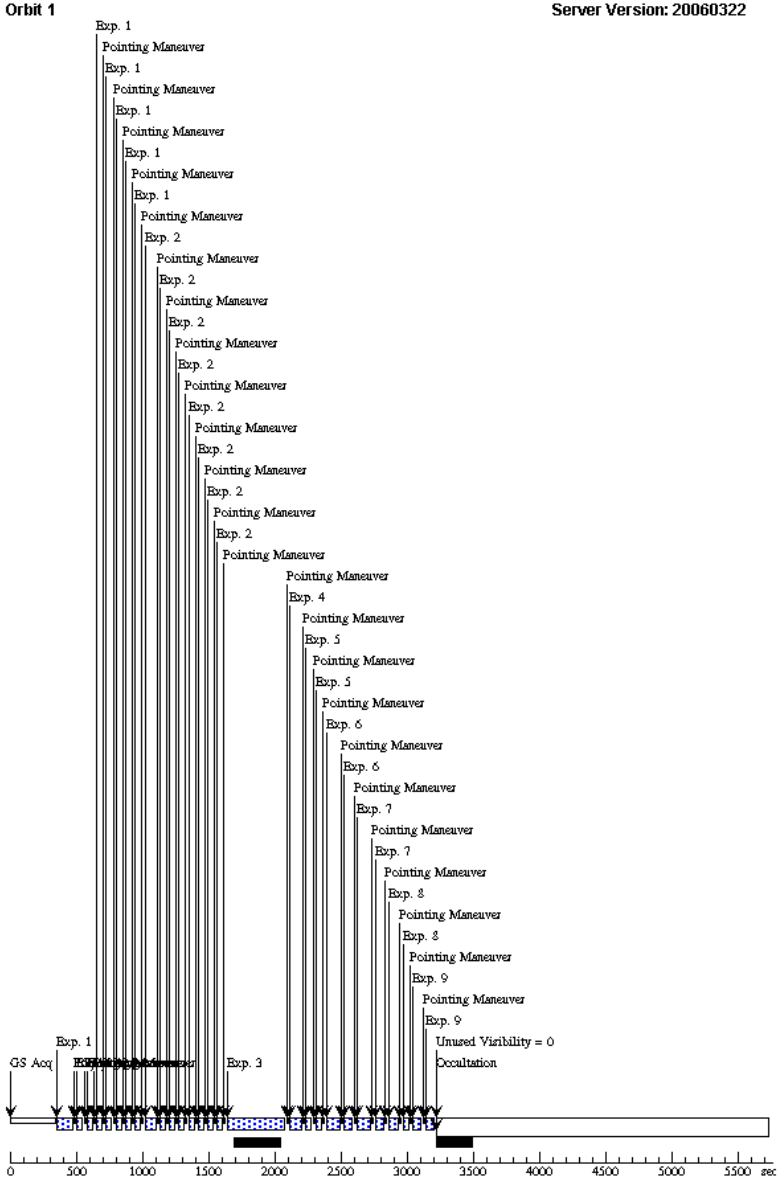
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) HD93129A	ACS/HRC, ACCUM, HRC	F435W	CR-SPLIT=NO; GAIN=2		Pattern 1-1 (1)	0.1 Secs *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 1,3)]* *[==>(Pattern 1,4)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]* *[==>(Pattern 2,3)]* *[==>(Pattern 2,4)]*	***[1]***

Exposures (continued)

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
2		(1) HD93129A	ACS/HRC, ACCUM, HRC	F850LP	CR-SPLIT=NO; GAIN=2		Pattern 2-2 (1)	0.2 Secs *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 1,3)]* *[==>(Pattern 1,4)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]* *[==>(Pattern 2,3)]* *[==>(Pattern 2,4)]*	***[1]***
3		(1) HD93129A	ACS/HRC, ACCUM, HRC	PR200L	CR-SPLIT=NO; GAIN=4; AUTOIMAGE=NO	POS TARG 1.343,0.138		357.0 Secs *[==>]*	***[1]***
4		(1) HD93129A	ACS/HRC, ACCUM, HRC	PR200L	CR-SPLIT=NO; GAIN=4; AUTOIMAGE=NO	POS TARG -1.343,-0.138		50.0 Secs *[==>]*	***[1]***
5		(1) HD93129A	ACS/HRC, ACCUM, HRC	PR200L	CR-SPLIT=NO; GAIN=2; AUTOIMAGE=NO		Pattern 5-5 (2)	0.1 Secs *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[1]***
6		(1) HD93129A	ACS/HRC, ACCUM, HRC	F435W	CR-SPLIT=NO; GAIN=4		Pattern 6-6 (2)	25.0 Secs *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[1]***
7		(1) HD93129A	ACS/HRC, ACCUM, HRC	F850LP	CR-SPLIT=NO; GAIN=4		Pattern 7-7 (2)	25.0 Secs *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[1]***
8		(1) HD93129A	ACS/HRC, ACCUM, HRC	F330W	CR-SPLIT=NO; GAIN=2		Pattern 8-8 (2)	0.1 Secs *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[1]***
9		(1) HD93129A	ACS/HRC, ACCUM, HRC	F330W	CR-SPLIT=NO; GAIN=4		Pattern 9-9 (2)	25.0 Secs *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[1]***

Orbit Structure



Proposal 10898 - Visit 02 - The orbit of the most massive known astrometric binary

Visit

Proposal 10898, Visit 02 — Fri May 19 01:49:33 GMT 2006

Diagnostic Status: Warning

Scientific Instruments: FGS

Special Requirements: PCS MODE FINE; SCHED 70%; ORIENT 145.0D TO 149.0 D; AFTER 01 BY 0 D TO 10 D

Diagnostics

(Visit 02) Warning: FGS EXPOSURE TOO SHORT TO GUARANTEE SCIENCE DATA
(Visit 02) Warning: FGS EXPOSURE TOO SHORT TO GUARANTEE SCIENCE DATA
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(Visit 02) Warning: FGS EXPOSURE TOO SHORT TO GUARANTEE SCIENCE DATA
(Visit 02) Warning: LONG FGS SCAN LENGTH MAY SIGNAL PROBLEMS
(Visit 02) Warning: FGS EXPOSURE TOO SHORT TO GUARANTEE SCIENCE DATA
(Visit 02) Warning: FGS EXPOSURE TOO SHORT TO GUARANTEE SCIENCE DATA
(Visit 02) Warning: FGS EXPOSURE TOO SHORT TO GUARANTEE SCIENCE DATA
(Visit 02) Warning: FGS EXPOSURE TOO SHORT TO GUARANTEE SCIENCE DATA

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD93129A	RA: 10 43 57.5000 (160.9895833d) Dec: -59 32 53.00 (-59.54806d) Equinox: J2000		V=7.3+/-0.1 O2 If*	Reference Frame: ICRS
(2)	REF1 Alt Name1: GS8626-01835	RA: 10 43 57.3000 (160.9887500d) Dec: -59 32 8.40 (-59.53567d) Equinox: J2000		V=12.8+/-0.2	Reference Frame: ICRS
(3)	REF2 Alt Name1: GS8626-02625	RA: 10 43 56.2600 (160.9844167d) Dec: -59 32 28.20 (-59.54117d) Equinox: J2000		V=13.34+/-0.2	Reference Frame: ICRS
(4)	REF3 Alt Name1: GS86260-1570	RA: 10 44 2.7800 (161.0115833d) Dec: -59 32 28.80 (-59.54133d) Equinox: J2000		V=12.59+/-0.2	Reference Frame: ICRS
(5)	REF4 Alt Name1: GS8626-02425	RA: 10 44 3.8500 (161.0160417d) Dec: -59 33 10.90 (-59.55303d) Equinox: J2000		V=13.21+/-0.2	Reference Frame: ICRS
(6)	REF5 Alt Name1: GS8626-02096	RA: 10 43 59.1200 (160.9963333d) Dec: -59 33 20.10 (-59.55558d) Equinox: J2000		V=12.71+/-0.2	Reference Frame: ICRS

Fixed Targets (continued)

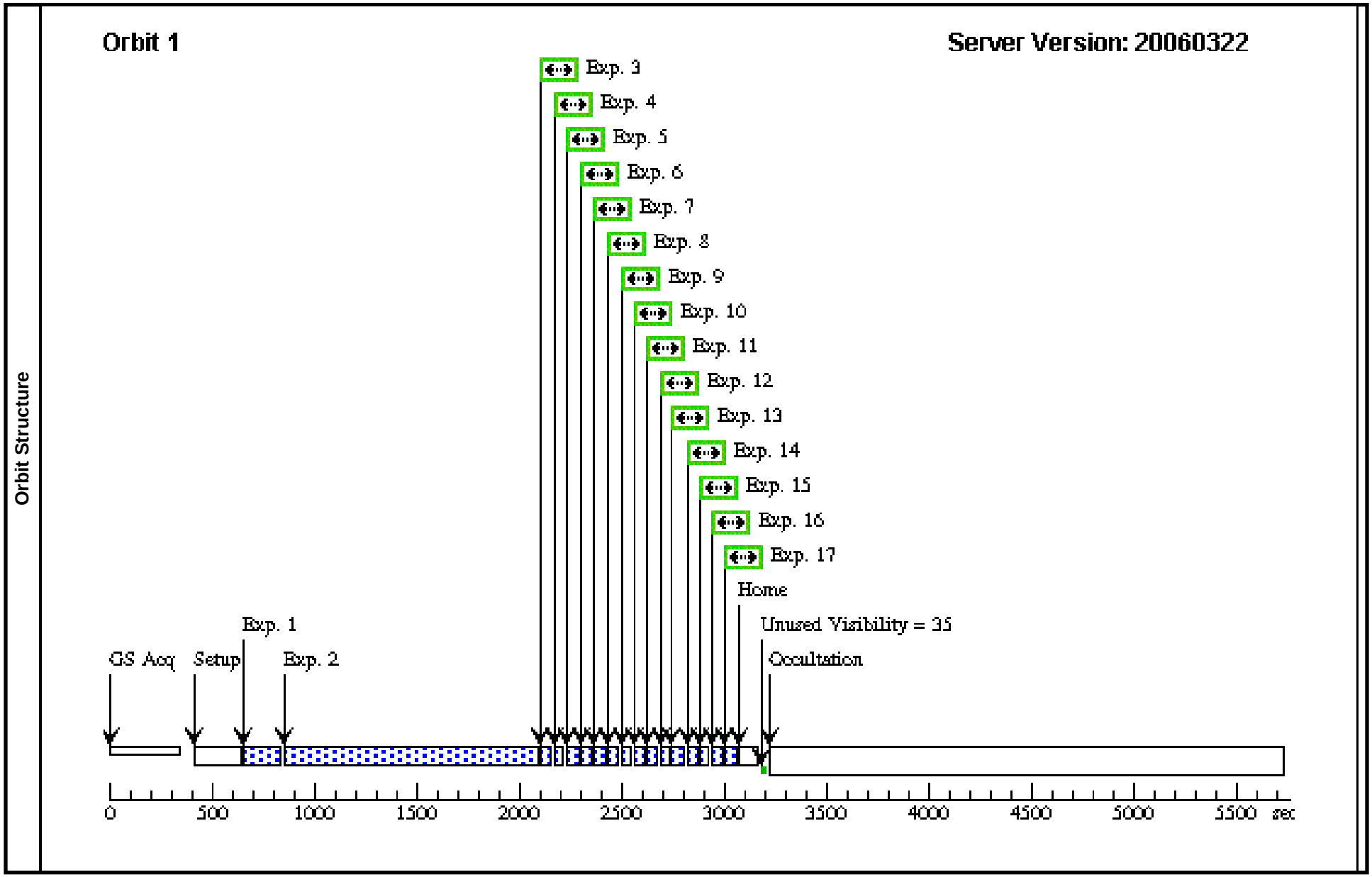
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(7)	REF6 Alt Name1: GS8626-02077	RA: 10 43 57.6600 (160.9902500d) Dec: -59 33 38.80 (-59.56078d) Equinox: J2000		V=12.34+/-0.2	Reference Frame: ICRS
(8)	REF7 Alt Name1: GS8626-00153	RA: 10 43 53.7000 (160.9737500d) Dec: -59 33 28.70 (-59.55797d) Equinox: J2000		V=12.42+/-0.2	Reference Frame: ICRS
(9)	REF8 Alt Name1: GS8626-00123 Alt Name2: TR14-20	RA: 10 43 46.6900 (160.9445417d) Dec: -59 32 54.50 (-59.54847d) Equinox: J2000		V=9.5+/-0.2	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) HD93129A	FGS, TRANS, 1	F5ND	SCANS=1; STEP-SIZE=2		Sequence 1-17 Non-Int	75.0 Secs *[==>]*	***[1]***
2		(1) HD93129A	FGS, TRANS, 1	F5ND	SCANS=16; STEP-SIZE=0.5	SAME POS AS 1	Sequence 1-17 Non-Int	992.0 Secs *[==>]*	***[1]***
3		(1) HD93129A	FGS, POS, 1	F5ND		SAME POS AS 1	Sequence 1-17 Non-Int	6.0 Secs *[==>]*	***[1]***
4		(2) REF1	FGS, POS, 1	F583W		SAME POS AS 1	Sequence 1-17 Non-Int	6.0 Secs *[==>]*	***[1]***
5		(3) REF2	FGS, POS, 1	F583W		SAME POS AS 1	Sequence 1-17 Non-Int	6.0 Secs *[==>]*	***[1]***
6		(4) REF3	FGS, POS, 1	F583W		SAME POS AS 1	Sequence 1-17 Non-Int	6.0 Secs *[==>]*	***[1]***
7		(5) REF4	FGS, POS, 1	F583W		SAME POS AS 1	Sequence 1-17 Non-Int	6.0 Secs *[==>]*	***[1]***
8		(2) REF1	FGS, POS, 1	F583W		SAME POS AS 1	Sequence 1-17 Non-Int	6.0 Secs *[==>]*	***[1]***
9		(1) HD93129A	FGS, POS, 1	F5ND		SAME POS AS 1	Sequence 1-17 Non-Int	6.0 Secs *[==>]*	***[1]***
10		(9) REF8	FGS, POS, 1	F583W		SAME POS AS 1	Sequence 1-17 Non-Int	6.0 Secs *[==>]*	***[1]***
11		(8) REF7	FGS, POS, 1	F583W		SAME POS AS 1	Sequence 1-17 Non-Int	6.0 Secs *[==>]*	***[1]***
12		(7) REF6	FGS, POS, 1	F583W		SAME POS AS 1	Sequence 1-17 Non-Int	6.0 Secs *[==>]*	***[1]***
13		(5) REF4	FGS, POS, 1	F583W		SAME POS AS 1	Sequence 1-17 Non-Int	6.0 Secs *[==>]*	***[1]***

Exposures (continued)

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
14		(6) REF5	FGS, POS, 1	F583W		SAME POS AS 1	Sequence 1-17 Non-Int	6.0 Secs	
								[==>]	***[1]***
15		(1) HD93129A	FGS, POS, 1	F5ND		SAME POS AS 1	Sequence 1-17 Non-Int	6.0 Secs	
								[==>]	***[1]***
16		(2) REF1	FGS, POS, 1	F583W		SAME POS AS 1	Sequence 1-17 Non-Int	6.0 Secs	
								[==>]	***[1]***
17		(5) REF4	FGS, POS, 1	F583W		SAME POS AS 1	Sequence 1-17 Non-Int	6.0 Secs	
								[==>]	***[1]***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Server Version: 20060322
Orbit Structure
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Exp. 4
Exp. 5
Exp. 6
Exp. 7
Exp. 8
Exp. 9
Exp. 10
Exp. 11
Exp. 12
Exp. 13
Exp. 14
Exp. 15
Exp. 16
Exp. 17
Home
Exp. 1
Unused Visibility = 35
GS Acq
Setup
Exp. 2
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec