16064 - External and internal heating in the old pulsar PSR B0950+08

Cycle: 27, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. George G. Pavlov (PI) (Contact)	**The Pennsylvania State University**	**pavlov@astro.psu.edu**
Dr. Oleg Y. Kargaltsev (CoI)	George Washington University	kargaltsev@gwu.edu
Prof. Yuri Shibanov (CoI)	Ioffe Physical Technical Institute	shib@astro.ioffe.rssi.ru
Dr. Jeremy Hare (CoI)	University of California - Berkeley	jhare@berkeley.edu
Dr. Bettina Posselt (CoI) (ESA Member)	University of Oxford	bettina.posselt@physics.ox.ac.uk

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) PSRB0950+08	ACS/WFC	2	18-Aug-2020 14:00:13.0	yes
51	(1) PSRB0950+08	ACS/WFC	1	18-Aug-2020 14:00:13.0	yes
02	(1) PSRB0950+08	WFC3/UVIS	1	18-Aug-2020 14:00:14.0	yes

4 Total Orbits Used

ABSTRACT

PSR B0950+08 is a 17 Myr old bright radio pulsar at d=260 pc. X-ray observations of this pulsar provide a rare opportunity to test models of polar cap heating by precipitating magnetospheric particles, while the UV-optical observations can test models of internal heating in neutron stars, which are determined by fundamental properties of matter. The only previous XMM-Newton observation was not deep enough to reliably separate the polar cap and magnetospheric components, while optical observations with ground-based telescopes lacked the needed angular resolution. The proposed deep XMM-Newton observations, supplemented by an HST observation, will be the most detailed multiwavelength study of an old radio pulsar to

date.

OBSERVING DESCRIPTION

We will observe the target in two visits. Visit 1 consists of two orbis in which the pulsar and a possible faint red galaxy nearby will be imaged with the ACS/WFC F775W filter. Visit 2 consists of one orbit in which the pulsar will be imaged in the WFC3/UVIS F475X filter. These two visits will provide the pulsar's fluxes in two spectral bands and the spectral slope of its magnetospheric emission. To mitigate the CTE losses for this faint target, we place the target close to the readouts of the WFC and UVIS detectors. Applying post-flash is not necessary with the long detections and broad filters used.

Proposal 16064 - acs (01) - External and internal heating in the old pulsar PSR B0950+08

Visit

Proposal 16064, acs (01), failed Tue Aug 18 18:00:14 GMT 2020

Diagnostic Status: Warning

Scientific Instruments: ACS/WFC

Special Requirements: (none)

Diagnostics

(acs (01)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(acs (01)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.262 Line Spacing=0.192	Coordinate Frame=POS-TARG Pattern Orientation=18.39 Angle Between Sides=68.14 Center Pattern=false		(1)

Fixed Targets

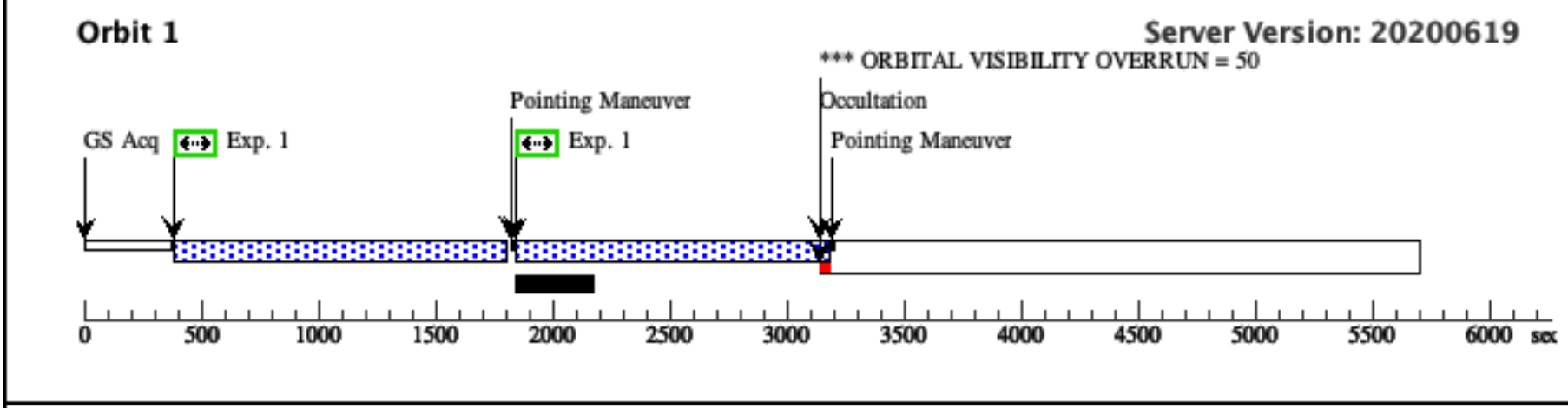
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	PSRB0950+08	RA: 09 53 9.3050 (148.2887708d) Dec: +07 55 36.77 (7.92688d) Equinox: J2000		V=27+/-1	Reference Frame: ICRS

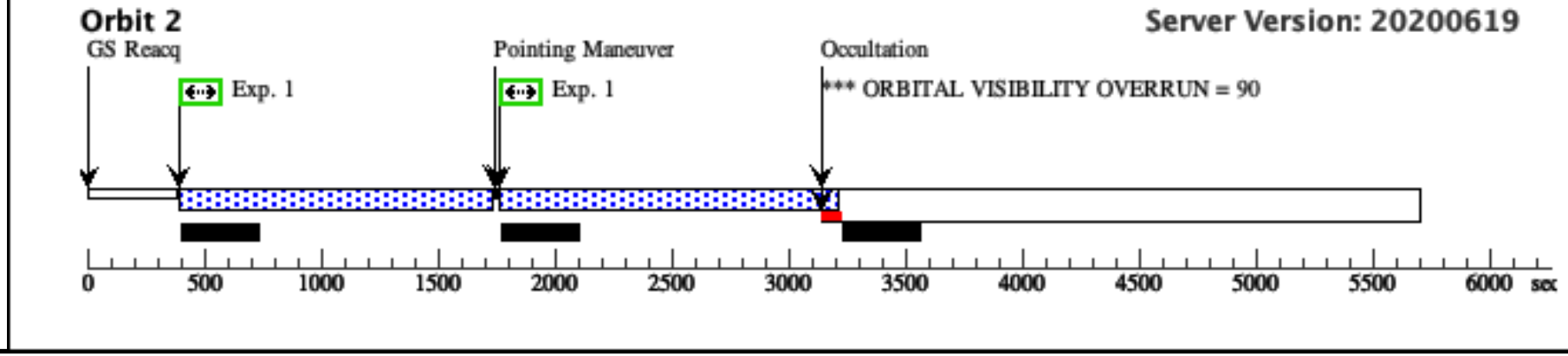
Comments:
Category=STAR
Description=[PULSAR]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(ACS.im.14 11529)	(1) PSRB0950+08	ACS/WFC, ACCUM, WFC1-CTE	F775W			Pattern 1, Exps 1-1 in acs (01) (1)	1217 Secs (4981 Secs)	
								[==>(Pattern 1)]	***[1]***
								[==>(Pattern 2)]	
								[==>(Pattern 3)]	***[2]***
								[==>1330.0 Secs (Pattern 4)]	

Orbit Structure





Visit

Proposal 16064, acs (51) Tue Aug 18 18:00:14 GMT 2020

Diagnostic Status: Warning

Scientific Instruments: ACS/WFC

Special Requirements: (none)

Diagnostics

(acs (51)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(3)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=3.034 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.29 Angle Between Sides= Center Pattern=false		(1)

Fixed Targets

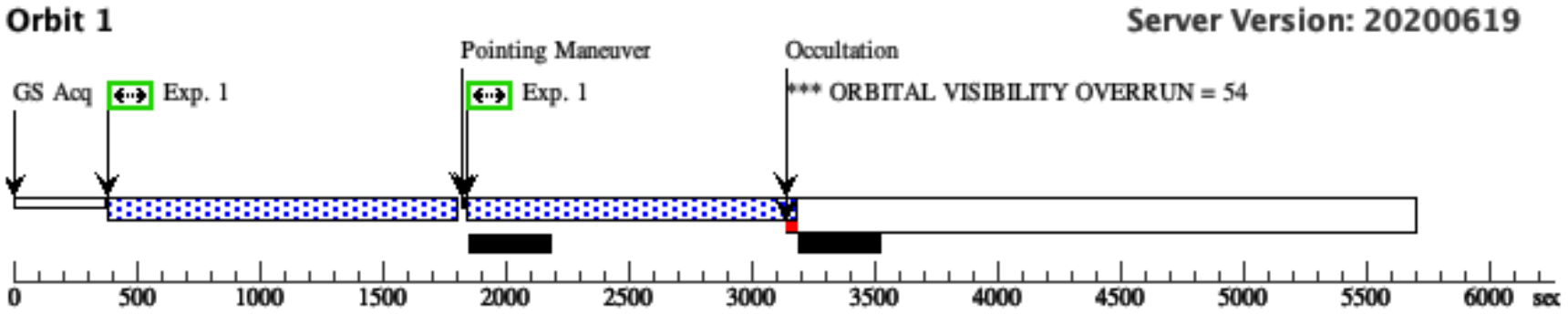
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	PSRB0950+08	RA: 09 53 9.3050 (148.2887708d) Dec: +07 55 36.77 (7.92688d) Equinox: J2000		V=27+/-1	Reference Frame: ICRS

Comments:
Category=STAR
Description=[PULSAR]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(ACS.im.14 11529)	(1) PSRB0950+08	ACS/WFC, ACCUM, WFC1-CTE	F775W			Pattern 3, Exps 1-1 in acs (51) (3)	1217 Secs (2434 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[1]***

Orbit Structure



Visit

Proposal 16064, uvis (02), completed Tue Aug 18 18:00:14 GMT 2020

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Diagnostics

(uvis (02)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112	Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false		(1)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	PSRB0950+08	RA: 09 53 9.3050 (148.2887708d) Dec: +07 55 36.77 (7.92688d) Equinox: J2000		V=27+/-1	Reference Frame: ICRS

Comments:
Category=STAR
Description=[PULSAR]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(WFC3UVIS.im.1411533)	(1) PSRB0950+08	WFC3/UVIS, ACCUM, UVIS2-C512C-CTE	F475X			Pattern 2, Exps 1-1 in uvis (02) (2)	605 Secs (2420 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***

Orbit Structure