13114 - 3C 111: An Ideal Galaxy for Revealing Jet Physics

Cycle: 20, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(2) 3C111POS1 (3) 3C111POS2 (4) 3C111POS3	WFC3/IR WFC3/UVIS	3	09-Oct-2012 21:41:33.0	yes

3 Total Orbits Used

ABSTRACT

One of Chandra's milestone discoveries was that many quasar and radio galaxy jets are X-ray emitters. The emission process for these objects has become the source of much debate, with both synchrotron and inverse-Compton processes possible, and with implications that impact not only on jet physics but also cluster and galaxy feedback modells. To obtain the best constraints on the jet physics it is critical to study long, relatively nearby jets. We therefore propose deep Chandra + HST observations of 3C 111, which has an extraordinary, 2-arcminute long X-ray jet,. We will constrain the X-ray and optical morphologies of the knot and hotspots, and obtain X-ray spectra and broadband spectral energy distributions for all

components. This will constrain the emission mechanism and the evolution of jet parameters as a function of distance from the AGN.

OBSERVING DESCRIPTION

We will obtain images of 3C 111, its jet, counterjet and hotspots with the WFC3/UVIS (F850LP) and WFC3/IR (F160W). This will allow us to characterize all jet components as well as the hotspots in the optical and near-IR, obtain morphological information, and also optical and broadband spectral energy distributions. The latter will allow the fitting of synchrotron emission models.

One image suffices to obtain the entire system in with WFC3/UVIS. However, to put both hotspots within the field, we are forced to have a very tight constraint on ORIENT (+/- 5 degrees). While we realize that this impacts schedulability, it is very important to have both hotspots, as this will allow us to fit relativistic beaming models, a key part of our project.

The optimal roll angle (ORIENT) for WFC3/IR is identical to that for WFC3/UVIS. However, due to the smaller field of view two images are necessary to obtain both hotspots in the IR channel. We have kept both channels in the same visit for simplicity.

As we have specified the point positions in RA, Dec rather than via POS TARGs, and the important thing is to fit the entire jet and lobes in the field of view, we can allow rotations of the ORIENT to multiples of 90 degrees.

Visit

Proposal 13114, Visit 01, implementation Wed Oct 10 01:41:42 GMT 2012

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR, WFC3/UVIS

Special Requirements: SCHED 100%; ORIENT 57D TO 67 D; ORIENT 147D TO 157 D; ORIENT 237D TO 247 D; ORIENT 327D TO 337 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=WFC3-IR-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.636 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.788 Angle Between Sides= Center Pattern=false		(2), (3)
(3)	Pattern Type=WFC3-UVIS-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.145 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1)

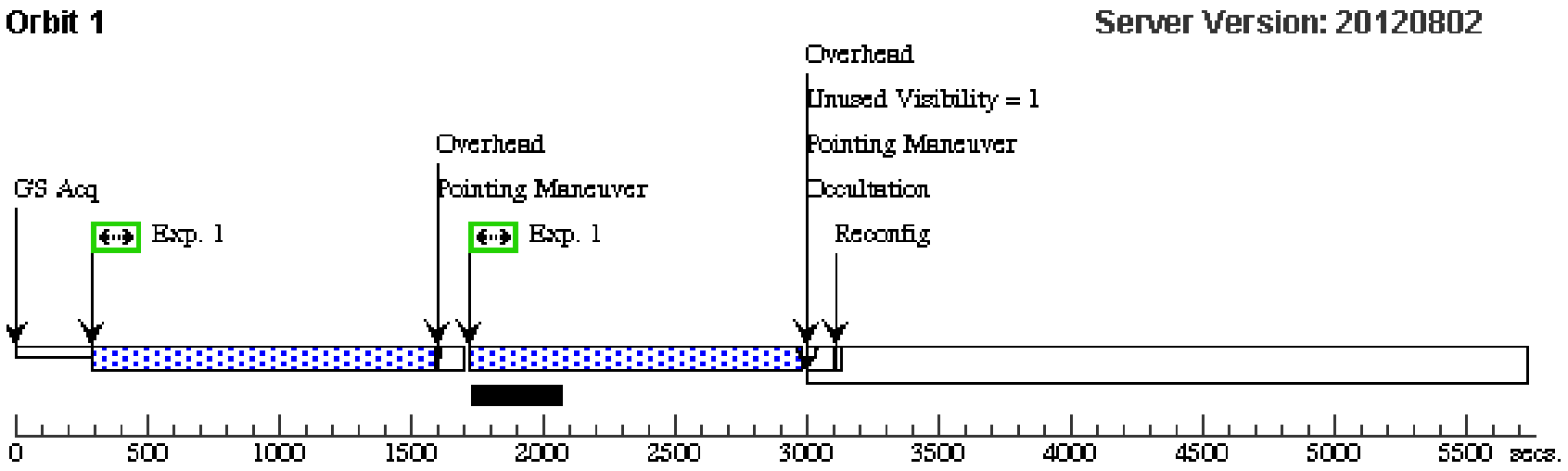
Fixed Targets

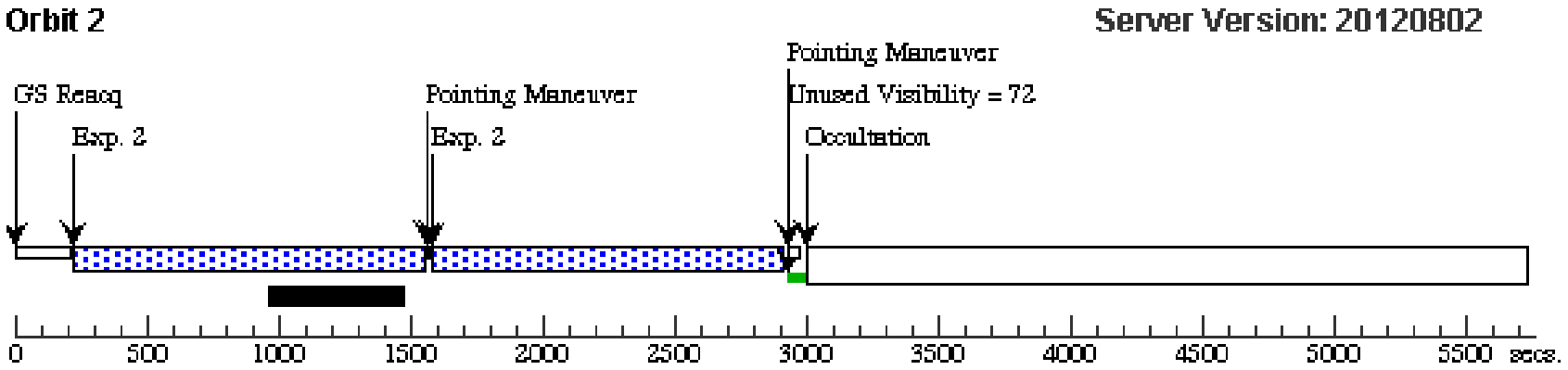
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	3C111POS1	RA: 04 18 22.1000 (64.5920833d) Dec: +38 01 42.30 (38.02842d) Equinox: J2000		V=18.05	Reference Frame: ICRS
(3)	3C111POS2	RA: 04 18 19.3500 (64.5806250d) Dec: +38 01 23.80 (38.02328d) Equinox: J2000		V=18.05	Reference Frame: ICRS
(4)	3C111POS3	RA: 04 18 24.8300 (64.6034583d) Dec: +38 01 57.10 (38.03253d) Equinox: J2000		V=18.05	Reference Frame: ICRS

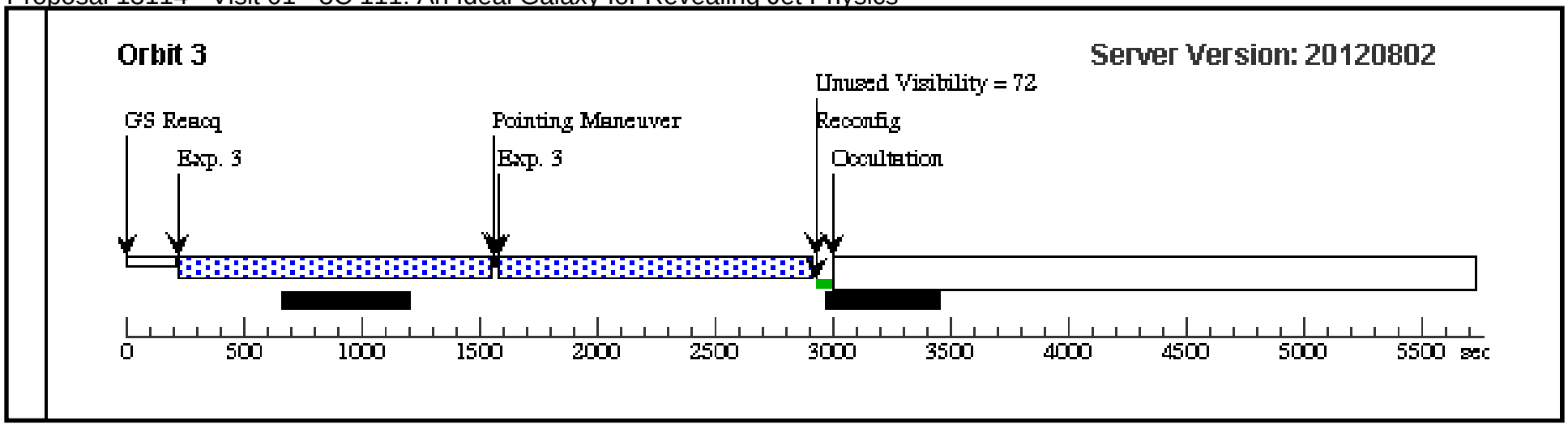
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(2) 3C111POS1	WFC3/UVIS, ACCUM, UVIS	F850LP		GS ACQ SCENARIO BASE1B3	Pattern 3, Exps 1-1 in Visit 01 (3)	1267 Secs *[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[1]***
2		(3) 3C111POS2	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=SPARS100; NSAMP=14		Pattern 2, Exps 2-2 in Visit 01 (2)	*[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[2]***
3		(4) 3C111POS3	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=SPARS100; NSAMP=14		Pattern 2, Exps 3-3 in Visit 01 (2)	*[==>(Pattern 1)]* *[==>(Pattern 2)]*	***[3]***

Orbit Structure






Orbit 3
Server Version: 20120802
Unused Visibility = 72
GS Reacq
Exp. 3
Pointing Maneuver
Exp. 3
Reconfig
Occultation
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500
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1500
2000
2500
3000
3500
4000
4500
5000
5500
sec