13759 - Extreme Variability in the M87 Jet

Cycle: 22, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. Juan P. Madrid (PI) (Contact)	**Gemini Observatory, Southern Operations**	**jmadrid@gemini.edu**
Dr. Daniel E. Harris (CoI)	Smithsonian Institution Astrophysical Observatory	dharris@cfa.harvard.edu
Dr. Chi C. Cheung (CoI)	Naval Research Laboratory	teddy.cheung@nrl.navy.mil
Prof. Eric S. Perlman (CoI)	Florida Institute of Technology	eperlman@fit.edu

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) M-87	STIS/NUV-MAMA	1	30-Apr-2015 21:20:55.0	yes
51	(1) M-87	STIS/NUV-MAMA	1	30-Apr-2015 21:20:57.0	yes

2 Total Orbits Used

ABSTRACT

The M87 jet is experiencing extreme optical/UV variability and very high energy emission that were never anticipated. HST-1, a knot along the M87 jet located at ~0.85" from the nucleus, has experienced unusual and repeated flaring at all wavelengths during the last decade: exceptional brightness variability for an individual component of an AGN jet. Hubble Space Telescope observations revealed that the NUV intensity of HST-1 increased by a factor of 100 between 1999 and 2005. Equivalent variability was recorded by Chandra, and the VLA. This is an unprecedented event that has only been observed in the M87 jet and has serious implications for models of jet variability and unified schemes of AGNs. Similarly, all three major Cherenkov observatories studying very high energy gamma-rays reported flaring of M87 in the very high energy regime in 2005, 2008, and 2010.

This proposal aims at obtaining a single orbit image of the M87 jet with STIS to determine the evolution of the rapidly changing M87 jet during Cycle 22. This new image will be an important addition to the dataset of HST observations of M87 in the optical and near ultraviolet spaning more than 20 years. A single observation of the M87 jet in 2015 will also make a substantial contribution to the interpretation of M87 observations built by Chandra.

With these observations we aim to: study the physical origin of the flare, find new and longer periodicities for this event, and measure the impact of such an energetic burst on the outflow of an AGN jet.
We will also follow the emergence of new knot along the M87 jet, unrelated to HST-1, and present during the last years of STIS observations.

OBSERVING DESCRIPTION

We will obtain near ultraviolet imaging of the M87 jet with the Space Telescope Imaging Spectrograph. We will use the NUV/MAMA with the F25QTZ longpass filter.

The observations we propose have the same configuration as STIS archival data in order to build a homogenous database.

We made no formal coordination request but on a best effort basis HST and Chandra observations can be scheduled within a few days of each other. We have a recently approved Chandra program with one observation scheduled in December 2014; another in March 2015. The observation window for December 2014 (13 DEC 2014 to 18 DEC 2014) is the preferred one.

Visit

Proposal 13759, Visit 01, failed Fri May 01 01:20:58 GMT 2015

Diagnostic Status: Warning

Scientific Instruments: STIS/NUV-MAMA

Special Requirements: ORIENT 280D TO 280 D; BETWEEN 07-JAN-2015 AND 18-JAN-2015

Comments: Exposure times based on archival data.

Diagnostics

(Exposure 1 (Visit 01)) Warning (Form): Sensitive exposures should have an ETC run number provided.

(Exposure 2 (Visit 01)) Warning (Form): Sensitive exposures should have an ETC run number provided.

(Exposure 3 (Visit 01)) Warning (Form): Sensitive exposures should have an ETC run number provided.

(Exposure 4 (Visit 01)) Warning (Form): Sensitive exposures should have an ETC run number provided.

Fixed Targets

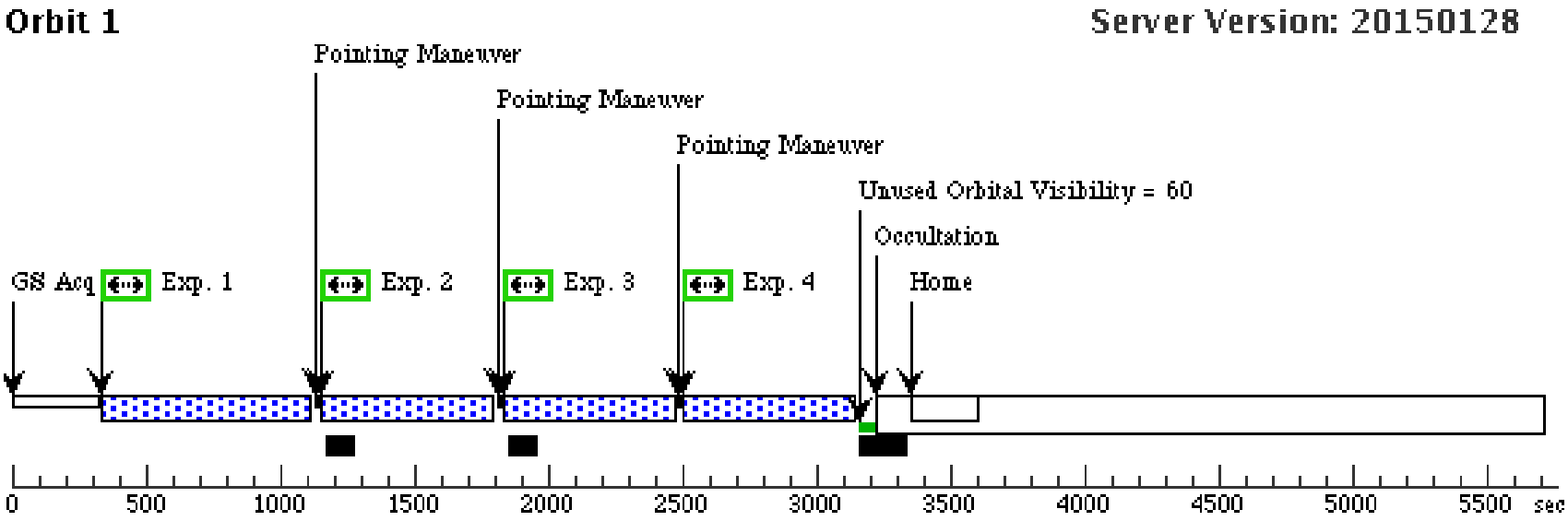
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	M-87	RA: 12 30 49.4234 (187.7059308d) Dec: +12 23 28.04 (12.39112d) Equinox: J2000		V=8.63	Reference Frame: ICRS

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) M-87	STIS/NUV-MAMA, ACCUM, F25QTZ	MIRROR		POS TARG -7,7; GS ACQ SCENARIO BASE1B3		630 Secs (630 Secs) *[==>]*	 ***[1]***
2		(1) M-87	STIS/NUV-MAMA, ACCUM, F25QTZ	MIRROR		POS TARG -6.496,6.748		630 Secs (630 Secs) *[==>]*	 ***[1]***
3		(1) M-87	STIS/NUV-MAMA, ACCUM, F25QTZ	MIRROR		POS TARG -6.244,6.244		630 Secs (630 Secs) *[==>]*	 ***[1]***
4		(1) M-87	STIS/NUV-MAMA, ACCUM, F25QTZ	MIRROR		POS TARG -6.748,6.496		630 Secs (630 Secs) *[==>]*	 ***[1]***

Orbit Structure



Visit

Proposal 13759, Visit 51, implementation Fri May 01 01:20:58 GMT 2015

Diagnostic Status: Warning

Scientific Instruments: STIS/NUV-MAMA

Special Requirements: ORIENT 100D TO 110 D

Comments: Exposure times based on archival data.

Diagnostics

(Exposure 1 (Visit 51)) Warning (Form): Sensitive exposures should have an ETC run number provided.

(Exposure 2 (Visit 51)) Warning (Form): Sensitive exposures should have an ETC run number provided.

(Exposure 3 (Visit 51)) Warning (Form): Sensitive exposures should have an ETC run number provided.

(Exposure 4 (Visit 51)) Warning (Form): Sensitive exposures should have an ETC run number provided.

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3		(1) M-87	STIS/NUV-MAMA, ACCUM, F25QTZ	MIRROR		POS TARG -6.244,6.244		640 Secs (640 Secs) *[==>]*	 ***[1]***
4		(1) M-87	STIS/NUV-MAMA, ACCUM, F25QTZ	MIRROR		POS TARG -6.748,6.496		640 Secs (640 Secs) *[==>]*	 ***[1]***

Orbit Structure