



14356 - Multiwavelength Characterization of Candidate Black Holes in Nearby Dwarf Galaxies

Cycle: 23, Proposal Category: GO
(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(1) MRK-1434	WFC3/IR WFC3/UVIS	1	22-Oct-2015 21:21:19.0	yes
02	(2) SDSS-J1221+1738	WFC3/IR WFC3/UVIS	1	22-Oct-2015 21:21:21.0	yes
03	(3) SDSS-J1213+5436	WFC3/IR	1	22-Oct-2015 21:21:22.0	yes

3 Total Orbits Used

ABSTRACT

The properties of the first black holes (BH) that 'seeded' the growth of supermassive BHs are poorly understood, even though these seed BHs represent critical boundary conditions for models of BH/galaxy (co)-evolution. Local dwarf galaxies provide our best opportunity to obtain

observational constraints. Here, we propose multiwavelength Chandra, HST and VLA observations to investigate the nature of candidate nuclear BHs in three nearby dwarfs. Our targets were recently identified within the Chandra archive, and they represent a population missed by surveys at optical wavelengths. These observations will place new constraints on seed BH masses, and they will help inform future multiwavelength surveys for BHs in the nuclei of dwarf galaxies.

OBSERVING DESCRIPTION

Our primary HST goal is isolate the optical nucleus for our three target dwarf galaxies. To study our targets, we will use the F110W filter on the WFC3 IR channel and the F606W filter on the WFC3 UVIS channel. The IR filter traces the older stellar population, providing our best probe of the galaxy morphology, while the UVIS imaging will allow us to obtain color information and isolate star forming regions.

For targets SDSS J1221 and MRK 1434, we will use the following observing strategy:

IR/F110W:

With 600s exposures in the F110W filter, we will reach a sensitivity of $\mu_r=23$ mag/arcsec² at $S/N>10$ per pixel, according to the online WFC3 exposure time calculator (our experience is that we can go one magnitude deeper through radial profile averaging). We will divide the 600s exposures into four dithered positions to improve the pixel sampling (and reject bad pixels), using the STEP25 timing sequence with NSAMP=10 (150s per exposure), and using the IRSUB512 subarray to avoid buffer dumps.

UVIS/F606W:

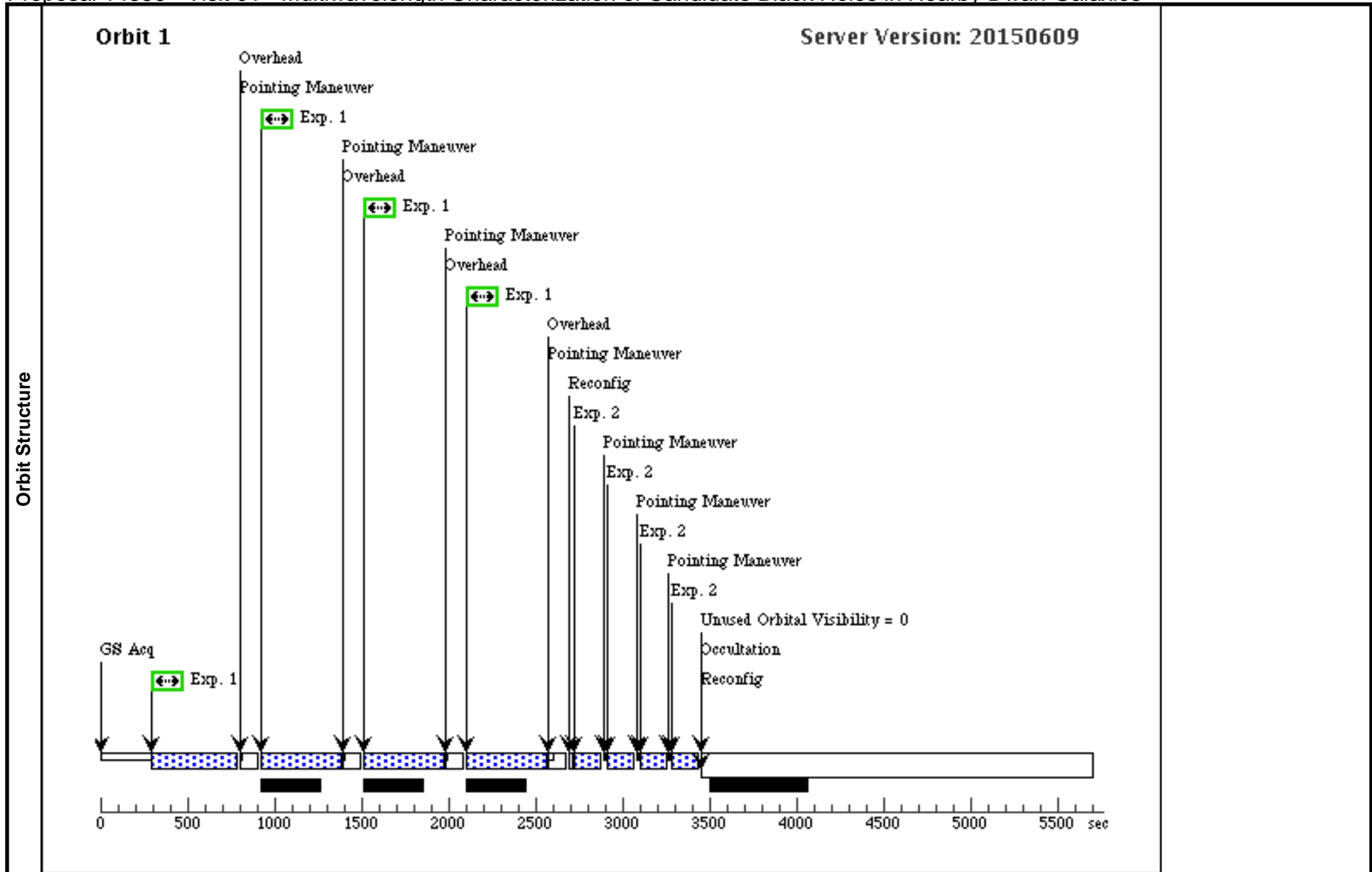
For the F606W filter, with ~1900 sec exposures we can reach a sensitivity better than $\mu_r=23$ mag/arcsec², with a $S/N\sim 9$ per 3x3 pixel box (similar to a 1x1 pixel area in the IR channel).

SDSS J1213 is significantly fainter than the other two targets, with a central surface brightness $\mu_{0,r} \sim 23.8$ mag/arcsec². For this source, we will forego the F606W filter, and take a longer ~2600s exposure in only the F110W IR filter. This will provide a sensitivity of $\mu_r \sim 24-25$ mag/arcsec², which will be sufficient. For that source, we will use two exposure sequences of 4 dither points each. The first will use the STEP100 sequence with NSAMP = 12 (~600s per exposure). The second will use the STEP100 sequence with NSAMP = 6 (~50s per exposure) for a total exposure time of ~2600s. No subarray will be necessary. We will easily meet our main HST goal of isolating the optical center.

Proposal 14356 - Visit 01 - Multiwavelength Characterization of Candidate Black Holes in Nearby Dwarf Galaxies

Fri Oct 23 01:21:24 GMT 2015

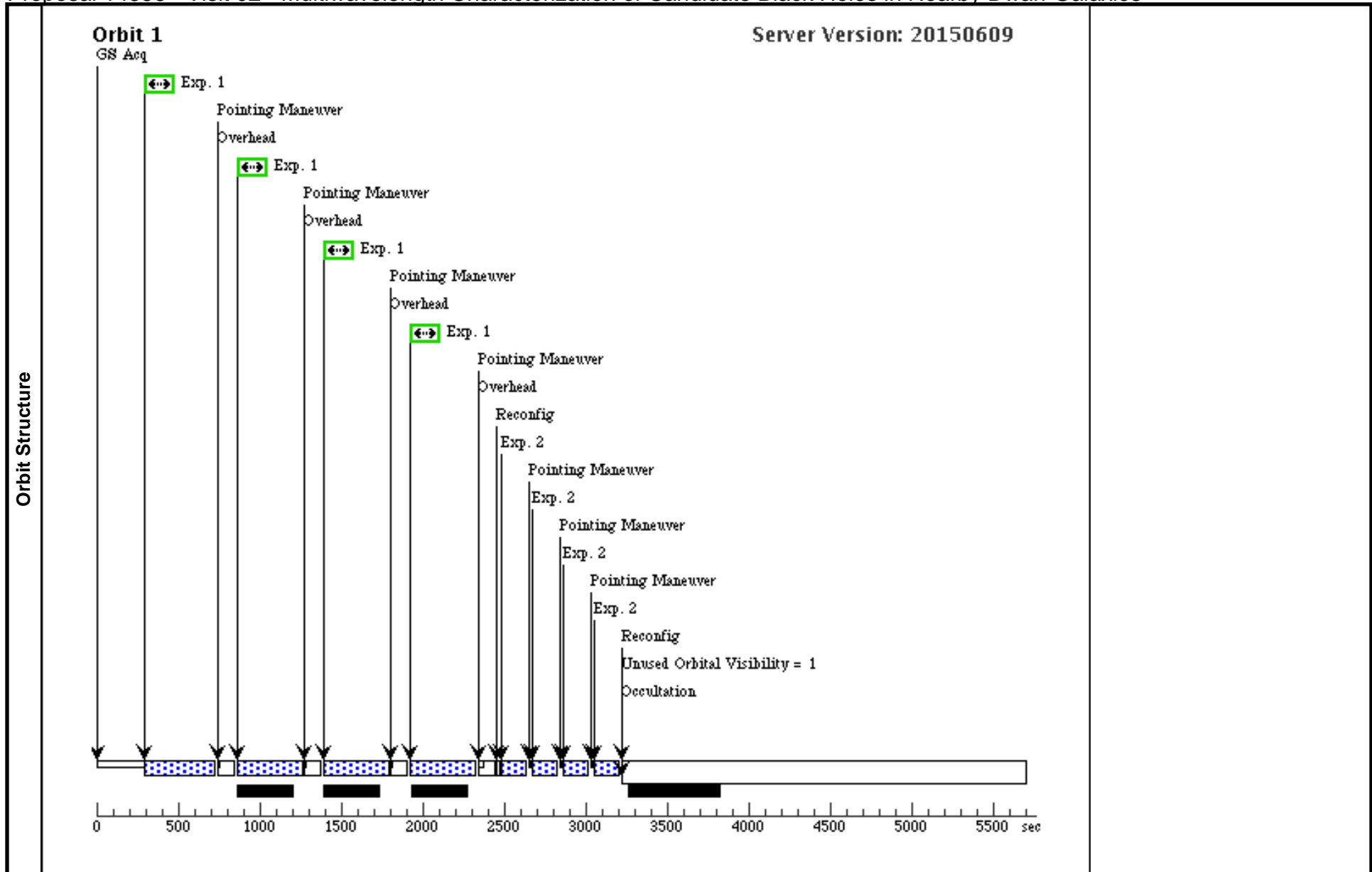
Visit	Proposal 14356, Visit 01, implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR, WFC3/UVIS Special Requirements: (none)									
	#	Primary Pattern	Secondary Pattern	Exposures						
Patterns	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365 Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false		(2)						
	(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)	MRK-1434	RA: 10 34 10.1664 (158.5423600d) Dec: +58 03 49.43 (58.06373d) Equinox: J2000		V=16.40	Reference Frame: ICRS				
<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(1) MRK-1434	WFC3/UVIS, ACCUM, UVIS2	F606W				Pattern 2, Exps 1-1 in Visit 01 (2) 463 Secs (1852 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)]	[1]
2		(1) MRK-1434	WFC3/IR, MULTIACCUM, IRSUB512	F110W		NSAMP=10; SAMP-SEQ=STEP2 5		Pattern 1, Exps 2-2 in Visit 01 (1) 128.439646 Secs (513.759 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)]	[1]	



Proposal 14356 - Visit 02 - Multiwavelength Characterization of Candidate Black Holes in Nearby Dwarf Galaxies

Fri Oct 23 01:21:24 GMT 2015

Visit	Proposal 14356, Visit 02, implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR, WFC3/UVIS Special Requirements: (none)									
	#	Primary Pattern	Secondary Pattern	Exposures						
Patterns	(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365 Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false		(2)						
	(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				
	(2)	SDSS-J1221+1738	RA: 12 21 11.2560 (185.2969000d) Dec: +17 38 19.32 (17.63870d) Equinox: J2000		V=20.89	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(2) SDSS-J1221+1738	WFC3/UVIS, ACCUM, UVIS2	F606W				Pattern 2, Exps 1-1 in Visit 02 (2) 404 Secs (1616 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)]	[1]
2		(2) SDSS-J1221+1738	WFC3/IR, MULTIACCUM, IRSUB512	F110W		NSAMP=10; SAMP-SEQ=STEP2 5		Pattern 1, Exps 2-2 in Visit 02 (1) 128.439646 Secs (513.759 Secs) [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)] [=>(Pattern 4)]	[1]	



Proposal 14356 - Visit 03 - Multiwavelength Characterization of Candidate Black Holes in Nearby Dwarf Galaxies

Fri Oct 23 01:21:24 GMT 2015

Visit	Proposal 14356, Visit 03, implementation Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR Special Requirements: (none)									
	Patterns	#	Primary Pattern				Secondary Pattern			Exposures
		(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false				(1)		
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous	
	(3)	SDSS-J1213+5436	RA: 12 13 25.9656 (183.3581900d) Dec: +54 36 31.68 (54.60880d) Equinox: J2000					V=23.68		Reference Frame: ICRS
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(3) SDSS-J1213+5436	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=14; SAMP-SEQ=SPAR S25		Pattern 1, Exps 1-1 in Visit 03 (1)	327.938986 Secs X 2 (2623.512 Secs)	[1]
									[=>(Pattern 1, Copy 1)] [=>(Pattern 1, Copy 2)] [=>(Pattern 2, Copy 1)] [=>(Pattern 2, Copy 2)] [=>(Pattern 3, Copy 1)] [=>(Pattern 3, Copy 2)] [=>(Pattern 4, Copy 1)] [=>(Pattern 4, Copy 2)]	

