16061 - The ultimate observing campaign for the Transitional ms X-ray PSRJ1023+0038

Cycle: 27, 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	(1) PSR-J1023+0038	STIS/CCD STIS/NUV-MAMA	2	08-Apr-2020 12:00:37.0	yes

2 Total Orbits Used

ABSTRACT

PSR J1023+0038 is a binary system that hosts a neutron star and a low-mass, main sequence companion star. It has been observed to switch on timescales of years between a radio millisecond pulsar state and a disc-dominated state, of uncertain origin. After its last switch to a disc-dominated state in 2013, the source has been the object of extensive multiwavelength monitoring campaigns, during which the continuous switch between three X-ray modes (high, low and flare) on timescales of 10 s has been observed. Here we propose the ultimate, strictly simultaneous, multi-wavelength campaign to study in detail this unique mode-switching phenomenon. We will involve NuSTAR, XMM-EPIC, Swift-UVOT, XMM-OM, VLT/HAWK-I, and VLA observations to probe models using correlations and lags (a profitable tool to study the emission mechanisms), as well as establish differences among the power spectra of the multi-band light curves. We will also track the elusive pulsations along the spectral energy distribution.

OBSERVING DESCRIPTION

This visit will consist in two HST orbits during which we will carry out time-resolved NUV TIME-TAG spectroscopy with the STIS/NUV-MAMA/G230L instrument/grating combination. We will use the 2376 \AA setting for this observation to achieve continuous wavelength coverage between 1570 \AA and 3180 \AA, with the 52X0.2 slit. The TIME-TAG mode of STIS will provide a maximum time resolution of 125 μs, fast enough to resolve pulsations at the 1.6 ms (the neutron star spin period) in the Near-UV band.

Our observations require strict simultaneity between HST and XMM-Newton observatories. It is essential to have simultaneous observations in the X-ray band so as to evaluate the system ephemerides at the epoch of the HST observations and restrict the parameter space for a sensitive search for UV pulsations.

Visit

Proposal 16061, Visit 01, implementation Wed Apr 08 16:00:37 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/NUV-MAMA, STIS/CCD

Special Requirements: (none)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	PSR-J1023+0038	RA: 10 23 47.6840 (155.9486833d) Dec: +00 38 41.01 (.64472d) Equinox: J2000	Epoch of Position: 2015.5	V=17.31+/-0.3	Reference Frame: ICRS

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[ACCRETION DISK, LMXB, PULSAR]

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(STIS.ta.1401752)	(1) PSR-J1023+0038	STIS/CCD, ACQ, 50CCD	MIRROR				5 Secs (5 Secs) *[==>]*	***[1]***
2	(STIS.sp.1401753)	(1) PSR-J1023+0038	STIS/NUV-MAMA, TIME-TAG, 52X0.2	G230L 2376 A	BUFFER-TIME=680			2000 Secs (2060 Secs) *[==>2060.0 Secs]*	***[1]***
3	(STIS.sp.1401753)	(1) PSR-J1023+0038	STIS/NUV-MAMA, TIME-TAG, 52X0.2	G230L 2376 A	BUFFER-TIME=680			2000 Secs (2690 Secs) *[==>2690.0 Secs]*	***[2]***

Orbit Structure