14745 - Is there a substellar companion around the neutron star RX J0806.4-4123?

Cycle: 24, 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) RX-J0806.4-4123	WFC3/IR	2	07-Sep-2016 18:21:07.0	yes

2 Total Orbits Used

ABSTRACT

Deep near-infrared (NIR) observations from the ground, first with the VLT in the H-band and recently with Gemini in the J-band, showed indication of a faint (~24-25 mag) flux enhancement at the position of the young (~0.5 Myr) nearby (250 pc) isolated neutron star RX J0806.4-4123. The combined detection significance of these two independent NIR observations is 3.1sigma. Previous Hubble observations in the optical showed that there are no other objects within 2.5 arcsec, and established that the neutron star itself is very faint (STmag of 28 in the F475W filter). The neutron star is expected to be even fainter in the NIR, because young neutron stars have their emission maximum in the UV to X-ray range. Hence, emission from the neutron star surface cannot be responsible for the NIR flux enhancement at the position of RX J0806.4-4123. The NIR emission could come from a young warm substellar companion which has about 13 Jupiter masses. We propose deep H-band observations of RX J0806.4-4123 in order to (i) confirm unambiguously the very faint NIR emission, (2) detect it with the required astrometric precision to enable the confirmation of the putative companion by studying its co-motion, (3) prepare follow-up JWST investigations.

OBSERVING DESCRIPTION

This programs aims to confirm a faint H~25 mag source with WFC3/IR, measure its H magnitude, and get as a good astrometric position as possible. The source is very likely a point source, but we cannot entirely exclude an extended object. We use WFC3/IR with the F160W and observe the target in 1 visit with 2 orbits.

We use 6 dither positions in total, and employ 3x SPARS100, NSAMP=10 (902s) in each orbit.

Since there are relatively bright (H~12 mag) stars at >10 arcsec, we employ only a small dither offsets.

In particular we use an improved 6-point dither strategy recently developed by the instrument team (Jay Anderson et al.) in order to achieve better photometry and astrometry accuracies. We also use an ORIENT constraint to avoid the diffraction spikes of one nearby (12 arcsec) bright star (PA=313.5, East of North).

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Visit

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Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: ORIENT 0D TO 33.5 D; ORIENT 53.5D TO 123.5 D; ORIENT 143.5D TO 213.5 D; ORIENT 233.5D TO 303.5 D; ORIENT 323.5D TO 359 D

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	RX-J0806.4-4123	RA: 08 06 23.4000 (121.5975000d) Dec: -41 22 30.90 (-41.37525d) Equinox: J2000		V=28	Reference Frame: SIMBAD

Comments: The position is a Chandra position with 2sigma position uncertainty. The proper motion < 80 mas/yr.
Extended=NO

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	rxj0806e1	(1) RX-J0806.4-4123	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=10; SAMP-SEQ=SPARS100	POS TARG 0,0		902.935198 Secs (902.935 Secs) *[==>]*	*[1]*
2	rxj0806e2	(1) RX-J0806.4-4123	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=10; SAMP-SEQ=SPARS100	POS TARG 0.7,0.063		902.935198 Secs (902.935 Secs) *[==>]*	*[1]*
3	rxj0806e3	(1) RX-J0806.4-4123	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=10; SAMP-SEQ=SPARS100	POS TARG 1.399,0.025		902.935198 Secs (902.935 Secs) *[==>]*	*[1]*
4	rxj0806e4	(1) RX-J0806.4-4123	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=10; SAMP-SEQ=SPARS100	POS TARG 0.068,0.706		902.935198 Secs (902.935 Secs) *[==>]*	*[2]*
5	rxj0806e5	(1) RX-J0806.4-4123	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=10; SAMP-SEQ=SPARS100	POS TARG 0.768,0.648		902.935198 Secs (902.935 Secs) *[==>]*	*[2]*
6	rxj0806e6	(1) RX-J0806.4-4123	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=10; SAMP-SEQ=SPARS100	POS TARG 1.468,0.690		902.935198 Secs (902.935 Secs) *[==>]*	*[2]*

Orbit Structure