17080 - Astrometric search for Planets orbiting the closest Y Dwarf

Cycle: 30, 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) WISEA-J085510.74-071442.5	WFC3/IR	2	11-Jul-2022 11:01:18.0	yes
02	(1) WISEA-J085510.74-071442.5	WFC3/IR	2	11-Jul-2022 11:01:20.0	yes

4 Total Orbits Used

ABSTRACT

Located at 2.2 pc, the ~250K Y2 (sub-)brown dwarf WISE J085510.83-071442.5 is the fourth closest known system to Earth. Studying this object provides unique insights into brown dwarf (and exoplanet) atmospheric properties, thermal evolution, multiplicity, and planet-hosting prospects.

We propose to use HST to obtain one the most accurate annual parallax of this - or any - planetary-mass brown dwarf to date, achieving an unprecedented accuracy of 200 micro-arcseconds, and constraining its absolute space motion to equivalent accuracy. More importantly, we will be able to search for faint companions co-moving with the target, either resolved or through astrometric perturbations of its linear motion, the latter probing down to a few Earth masses.

HST is the optimal facility for precision astrometric measurement of WISE 0855-0714, as this source is too cool and faint at optical and near-infrared wavelengths to observe with ground-based facilities or Gaia. Our observations will improve current astrometric precision of this source by a factor of 40 and anchor future JWST measurements of this and other cold brown dwarfs, while providing high-precision distance and motion measurements and tight constraints on planetary-mass companions for one of the closest ``stellar object'' to the Sun.

OBSERVING DESCRIPTION

This is an astrometric project.

Visit

Proposal 17080, epoch-01 (01) Mon Jul 11 15:01:21 GMT 2022

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: BETWEEN 07-NOV-2022:00:00:00 AND 11-NOV-2022:00:00:00

Comments: around Nov 9th, 2022

Fixed Targets

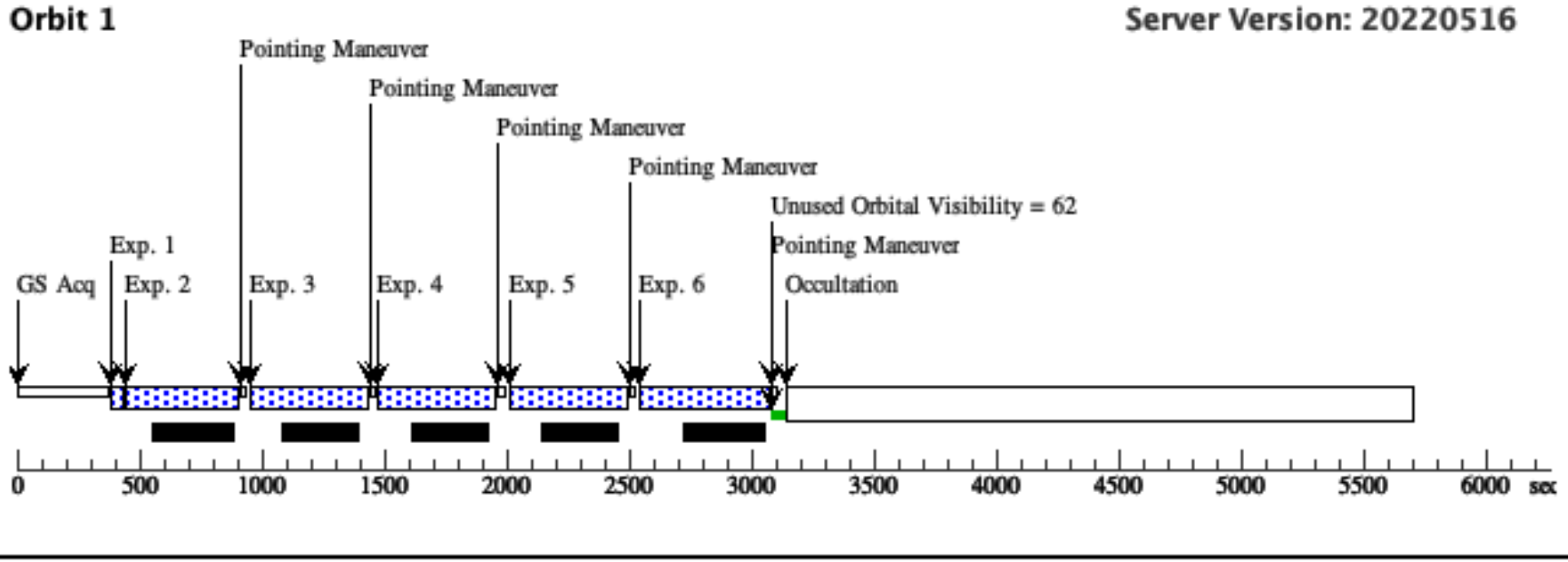
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	WISEA-J085510.74-071442.5	RA: 08 55 3.9073 (133.7662804d) Dec: -07 14 34.47 (-7.24291d) Equinox: J2000		V=(?) J=24.8	Reference Frame: SIMBAD

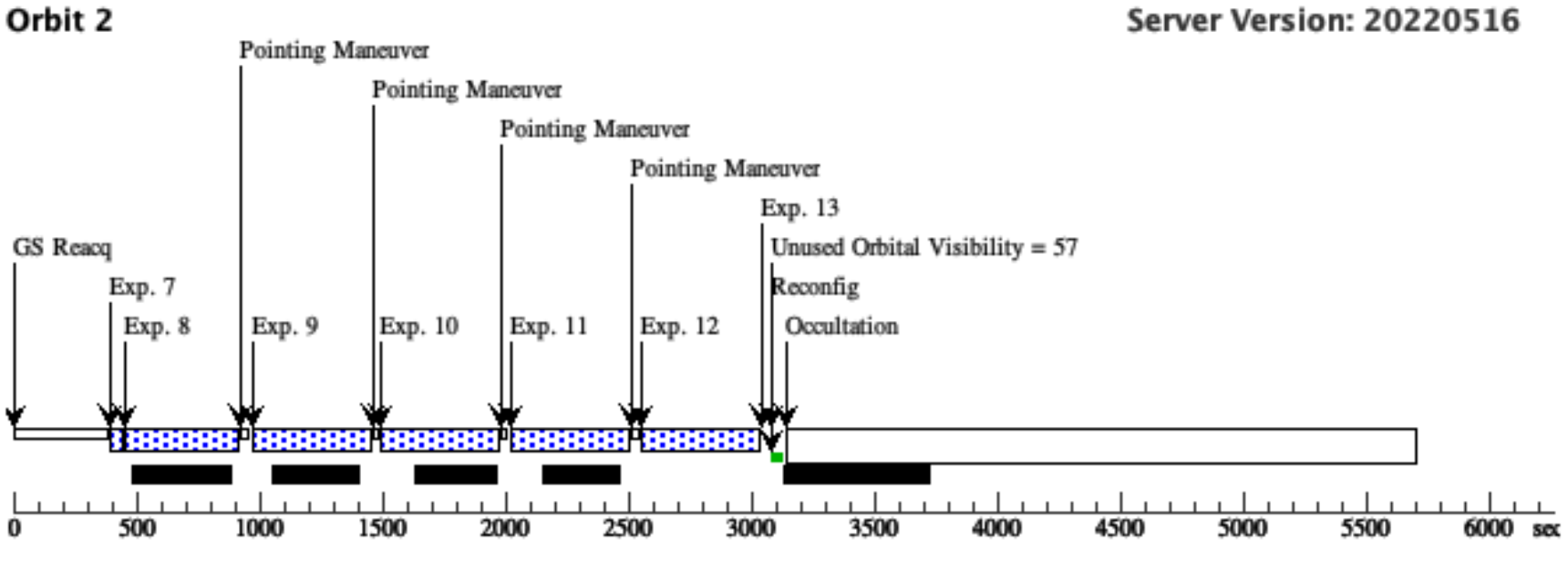
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[BROWN DWARF]
Extended=NO

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	short	(1) WISEA-J085510.74-071442.5	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=RAPID; NSAMP=7	POS TARG -19,+19		20.526037 Secs (20.526 Secs)	
								[==>]	***[1]***
2	long	(1) WISEA-J085510.74-071442.5	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=STEP50; NSAMP=14	POS TARG -19,+19		449.233834 Secs (449.234 Secs)	
								[==>]	***[1]***
3	long	(1) WISEA-J085510.74-071442.5	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=STEP50; NSAMP=14	POS TARG -20,-1		449.233834 Secs (449.234 Secs)	
								[==>]	***[1]***
4	long	(1) WISEA-J085510.74-071442.5	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=STEP50; NSAMP=14	POS TARG -21,-21		449.233834 Secs (449.234 Secs)	
								[==>]	***[1]***
5	long	(1) WISEA-J085510.74-071442.5	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=STEP50; NSAMP=14	POS TARG +1,+20		449.233834 Secs (449.234 Secs)	
								[==>]	***[1]***
6	long	(1) WISEA-J085510.74-071442.5	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=STEP50; NSAMP=15	POS TARG +0,+0		499.234285 Secs (499.234 Secs)	
								[==>]	***[1]***
7	short	(1) WISEA-J085510.74-071442.5	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=RAPID; NSAMP=7	POS TARG -1,-20		20.526037 Secs (20.526 Secs)	
								[==>]	***[2]***
8	long	(1) WISEA-J085510.74-071442.5	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=STEP50; NSAMP=14	POS TARG -1,-20		449.233834 Secs (449.234 Secs)	
								[==>]	***[2]***
9	long	(1) WISEA-J085510.74-071442.5	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=STEP50; NSAMP=14	POS TARG +19,+21		449.233834 Secs (449.234 Secs)	
								[==>]	***[2]***
10	long	(1) WISEA-J085510.74-071442.5	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=STEP50; NSAMP=14	POS TARG +20,+0		449.233834 Secs (449.234 Secs)	
								[==>]	***[2]***
11	long	(1) WISEA-J085510.74-071442.5	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=STEP50; NSAMP=14	POS TARG +21,-19		449.233834 Secs (449.234 Secs)	
								[==>]	***[2]***
12	long	(1) WISEA-J085510.74-071442.5	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=STEP50; NSAMP=14	POS TARG -1,+1		449.233834 Secs (449.234 Secs)	
								[==>]	***[2]***
13	short	(1) WISEA-J085510.74-071442.5	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=RAPID; NSAMP=7	POS TARG -1,+1		20.526037 Secs (20.526 Secs)	
								[==>]	***[2]***

Orbit Structure





Visit

Proposal 17080, epoch-02 (02) Mon Jul 11 15:01:21 GMT 2022

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: BETWEEN 06-MAY-2023:00:00:00 AND 14-MAY-2023:00:00:00

Comments: around May 10th, 2023

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	WISEA-J085510.74-071442.5	RA: 08 55 3.9073 (133.7662804d) Dec: -07 14 34.47 (-7.24291d) Equinox: J2000		V=(?) J=24.8	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[BROWN DWARF]
Extended=NO

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	short	(1) WISEA-J085510.74-071442.5	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=RAPID; NSAMP=7	POS TARG -19,+19		20.526037 Secs (20.526 Secs)	
								[==>]	***[1]***
2	long	(1) WISEA-J085510.74-071442.5	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=STEP50; NSAMP=14	POS TARG -19,+19		449.233834 Secs (449.234 Secs)	
								[==>]	***[1]***
3	long	(1) WISEA-J085510.74-071442.5	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=STEP50; NSAMP=14	POS TARG -20,-1		449.233834 Secs (449.234 Secs)	
								[==>]	***[1]***
4	long	(1) WISEA-J085510.74-071442.5	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=STEP50; NSAMP=14	POS TARG -21,-21		449.233834 Secs (449.234 Secs)	
								[==>]	***[1]***
5	long	(1) WISEA-J085510.74-071442.5	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=STEP50; NSAMP=14	POS TARG +1,+20		449.233834 Secs (449.234 Secs)	
								[==>]	***[1]***
6	long	(1) WISEA-J085510.74-071442.5	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=STEP50; NSAMP=15	POS TARG +0,+0		499.234285 Secs (499.234 Secs)	
								[==>]	***[1]***
7	short	(1) WISEA-J085510.74-071442.5	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=RAPID; NSAMP=7	POS TARG -1,-20		20.526037 Secs (20.526 Secs)	
								[==>]	***[2]***
8	long	(1) WISEA-J085510.74-071442.5	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=STEP50; NSAMP=14	POS TARG -1,-20		449.233834 Secs (449.234 Secs)	
								[==>]	***[2]***
9	long	(1) WISEA-J085510.74-071442.5	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=STEP50; NSAMP=14	POS TARG +19,+21		449.233834 Secs (449.234 Secs)	
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10	long	(1) WISEA-J085510.74-071442.5	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=STEP50; NSAMP=14	POS TARG +20,+0		449.233834 Secs (449.234 Secs)	
								[==>]	***[2]***
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								[==>]	***[2]***

Orbit Structure