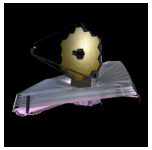

6410 - A Giant Planet Candidate Orbiting a Young, Massive White Dwarf

Cycle: 3, Proposal Category: GO

INVESTIGATORS

Name	*Institution*
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Prof. Kevin Schlaufman (CoI) (CoPI)	The Johns Hopkins University
Dr. Ilaria Caiazzo (CoI)	California Institute of Technology

OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
1				
	1	1 NIRSpec IFU	NIRSpec IFU Spectroscopy	(1) SDSS-J071816.41+373139.1

ABSTRACT

From a sample of nearby, young, massive white dwarfs with archival Spitzer/IRAC photometry, we have identified one source with 4.5 micron flux excesses that are inconsistent with debris disks or background galaxy contamination. This source is best explained by a binary system unresolved in Spitzer's 2" PSF consisting of a white dwarf primary and a hot, young secondary with 5 Jupiter mass. If this planetary interpretation is correct, then we expect the white dwarf primary and planetary secondary in this system to have F444W ~ 18 and angular separation in excess of 0.2". The white dwarf primary would have had M_star ~ 8 M_Sun and been classified as B stars on the main sequence. Observing this or analogous systems from the ground with GPI 2.0 or SPHERE would require currently impossible-to-achieve H-band contrast ratios in excess of 10^10 at 0.2". We propose to spectrally and likely spatially resolve this system with JWST NIRSpec IFU to confirm or reject the planetary explanation for its photometry. If the proposed observation recover point sources with planet-like spectra, then it will be the first unambiguously planet-mass objects found orbiting objects that are or were main sequence B stars. The exquisite resolution and sensitivity of the JWST applied to this spatially and spectrally resolvable system will produce high signal-to-noise ratio near-infrared emission spectra of planet-mass objects with precise system age.

OBSERVING DESCRIPTION

The program plans to observe a massive white dwarf at around 4.5 microns with the NIRSpec IFU. A giant planet is expected to be orbiting this white dwarf according to Spitzer's photometry. The white dwarf is massive, faint, and located at 85 pc. It has an expected brightness around 18 mag (~10 muJy) and the expected giant planet is around 19 mag (~4 muJy) at 4.5 micron, which is not a high-contrast imaging. The planet--white dwarf separation is expected to be larger than 0.1", likely resolvable by NIRSpec IFU.

- NIRSpec IFU:
  G395M/F290LP
  4-point nodding
  NRSIRS2RAPID readout
  4727s exposure

Proposal 6410 - Targets - A Giant Planet Candidate Orbiting a Young, Massive White Dwarf

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	SDSS-J071816.41+373139.1	RA: 07 18 16.3781 (109.5682421d) Dec: +37 31 38.68 (37.52741d) Equinox: J2000	Proper Motion RA: -0.0029319271152844282 sec of time/yr Proper Motion Dec: -0.035815999945043586 arcsec/yr Parallax: 0.01182" Epoch of Position: 2015.5	

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. J = 17.70, Spitzer 3.6 = 18.08, Spitzer 4.5 = 17.66, distance = 85 pc
Category=Star
Description=[White dwarfs]
Extended=NO

Observation

Proposal 6410, Observation 1: 1 NIRSpec IFU

Fri Mar 01 09:01:47 GMT 2024

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Diagnostics

(Visit 1:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(1)	SDSS-J071816.41+373139.1	RA: 07 18 16.3781 (109.5682421d) Dec: +37 31 38.68 (37.52741d) Equinox: J2000	Proper Motion RA: -0.0029319271152844282 sec of time/yr Proper Motion Dec: -0.035815999945043586 arcsec/yr Parallax: 0.01182" Epoch of Position: 2015.5	

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Category=Star
Description=[White dwarfs]
Extended=NO

Template

TA Method
NONE

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	4-POINT-NOD				

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	G395M/F290LP	NRSIRS2RAPID	80	1	false	true	NONE	4	4	4726.8	176484.50