18365 - Luminous O(He) stars - merger products or stripped stars ejected by a supernova?

Cycle: 34, Proposal Category: GO

(UV Initiative)

(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) EC-21049-1330	STIS/CCD STIS/FUV-MAMA	1	14-Aug-2026 09:00:14.0	yes
02	(2) GALEX-J172854.3+361958	COS/FUV	1	14-Aug-2026 09:00:15.0	yes

2 Total Orbits Used

ABSTRACT

H-deficient stars are key probes of non-canonical stellar evolution, tracing pathways such as late He-shell flashes, double-degenerate mergers, and supernova (SN) ejections. They provide direct constraints on extreme physical processes driven by binary interaction and stellar explosions.

Among them, O(He) stars represent a short-lived phase in He-dominated stellar evolution and are commonly interpreted as products of double He white dwarf mergers. However, we have identified two luminous O(He) stars that likely follow a different evolutionary pathway. They are the most massive known members of their class, appear single, and exhibit extreme halo kinematics, placing them at the boundary between CO+He white dwarf merger products and SN-ejected stripped He stars.

We propose high-resolution UV spectroscopy, which uniquely enables us to derive their metal abundances and thereby distinguish between these formation channels. CO+He white dwarf mergers predict strongly sub-solar iron-group abundances, while SN-ejected stripped stars are expected to retain near-solar composition.

By establishing the formation channel of these objects, the program will provide empirical constraints on the relative importance of double-degenerate mergers and SN ejection channels in producing He-dominated stars. Confirming a CO+He white dwarf merger origin provides constraints on merger nucleosynthesis and establishes luminous O(He) stars as the long-sought evolutionary link between cooler He-rich pre-white dwarfs and massive white dwarfs. Alternatively, a SN ejection origin would significantly expand the currently very small sample of such objects and place new constraints on their birthrate.

OBSERVING DESCRIPTION

For EC-21049-1330 a FUV spectrum with STIS/E140M(1425) shall be obtained within one orbit.
For GALEX-J172854.3+361958 a FUV spectrum with COS/G130M(1291) shall be obtained within one orbit.

Visit

Proposal 18365, Visit 01

Fri Aug 14 13:00:16 GMT 2026

Diagnostic Status: No Diagnostics

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

Special Requirements: (none)

Comments: STIS E140M(1425) spectrum for EC-21049-1330

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	EC-21049-1330	RA: 21 07 42.3949 (316.9266454d) Dec: -13 18 22.48 (-13.30624d) Equinox: J2000	Proper Motion RA: -0.026 mas/yr Proper Motion Dec: -8.515999911651306 mas/yr Parallax: 1.8920000000000002E-4" Epoch of Position: 2000	V=13.759+/-0.03 2.2E-12 @ 1100A (predicted by SED fit of best fit NLTE model t o photometry from FUV till W2)	Reference Frame: ICRS

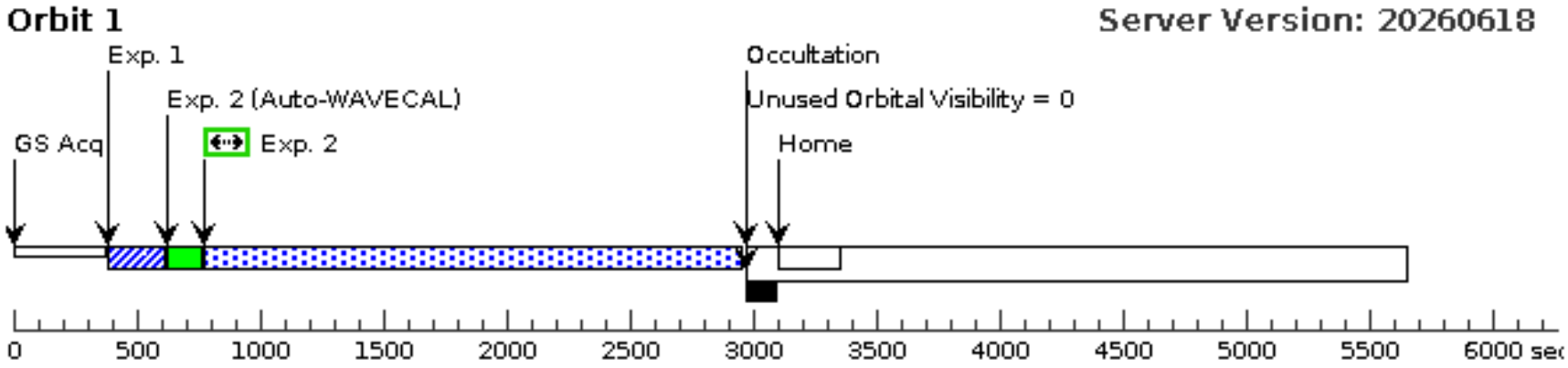
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.
Category=STAR
Description=[SDO]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(STIS.ta.2364223)	(1) EC-21049-1330	STIS/CCD, ACQ, F28X50LP	MIRROR				1 Secs (1 Secs) *[==>]*	 ***[1]***
2	(STIS.sp.2364222)	(1) EC-21049-1330	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				2167 Secs (2167 Secs) *[==>]*	 ***[1]***

Orbit Structure



Visit

Proposal 18365, Visit 02 Fri Aug 14 13:00:16 GMT 2026

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV

Special Requirements: (none)

Comments: FUV spectrum with COS/G130M(1291) for GALEX-J172854.3+361958.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	GALEX-J172854.3+361958	RA: 17 28 54.3429 (262.2264288d) Dec: +36 19 58.62 (36.33295d) Equinox: J2000	Proper Motion RA: -2.143 mas/yr Proper Motion Dec: -0.9310000450568623 mas/yr Parallax: 5.28E-5" Epoch of Position: 2000	V=16.84 1.0E-13 @ 1100A (predicted by SED fit of best fit NLTE model to photometry from FUV till W1)	Reference Frame: ICRS

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.
Category=STAR
Description=[SDO]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(COS.sa.2364206)	(2) GALEX-J172854.3+361958	COS/FUV, ACQ/PEAKXD, PSA	G130M 1291 A	LIFETIME-POS=LP7			5 Secs (5 Secs) *[==>]*	 ***[1]***
2	(COS.sa.2364206)	(2) GALEX-J172854.3+361958	COS/FUV, ACQ/PEAKD, PSA	G130M 1291 A	LIFETIME-POS=LP7; CENTER=FLUX-WT-FLR; STEP-SIZE=0.9			5 Secs (5 Secs) *[==>]*	 ***[1]***
3	(COS.sp.2364221)	(2) GALEX-J172854.3+361958	COS/FUV, ACCUM, PSA	G130M 1291 A	FP-POS=3; LIFETIME-POS=LP7; SEGMENT=BOTH			821 Secs (821 Secs) *[==>]*	 ***[1]***
4	(COS.sp.2364221)	(2) GALEX-J172854.3+361958	COS/FUV, ACCUM, PSA	G130M 1291 A	FP-POS=4; LIFETIME-POS=LP7; SEGMENT=BOTH			821 Secs (821 Secs) *[==>]*	 ***[1]***

Orbit Structure