12186 - Jet launching and evolution in the weakly magnetized Herbig Ae star HD 163296

Cycle: 18, 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) HD-163296	STIS/CCD STIS/FUV-MAMA	2	07-Sep-2010 21:13:28.0	yes

2 Total Orbits Used

ABSTRACT

Jets are common in young stars, however, their driving mechanism and many details about their evolution are still unknown. We propose to reobserve HH 409, the jet driven by the Herbig Ae star HD 163296. One orbit each will be used for optical (G750M, covering Ha and the density and temperature sensitive forbidden lines [OI], [SII] and [NII]) and FUV (G140M, covering Lya) long-slit spectroscopy with STIS.

Similar HST data were taken between 1998 and 2003 already. Comparing archival to new observations we have a long time baseline to study the evolution of velocity, temperature and density in the Herbig-Haro objects of the jet. We can infer their energy budget from radiative cooling, expansion and continuous shock reheating. Furthermore, we will spectrally resolve the emission lines. If a high-velocity component is found, we can

rule out disk winds as jet launching scenario. HH 409 is the only jet with detected X-ray emission from a young star with a weak magnetic field.

OBSERVING DESCRIPTION

We ask for 2 orbits of HST time to measure i) the position and ii) the spectrum of the HH objects. All proposed HST observations closely resemble existing observations. Those observations show that no safety contraint will be violated. We expect the position of the emitting gas to change, but as best estimate we base our exposure time calculation on the existing data. At the declination of HD 163296 the usable time is 54 min per orbit. Target acquisition including acquisition exposures requires roughly 10 min, so in each orbit we can take a single long-slit exposure of 2700 s.
We request a full orbit with the G750M grating with central wavelength 6581 A on the 50×0.2 slit, positioning the central star behind the occulting bar to reduce the risk of stray light (aperture 52X0.2F1). In contrast to dataset O5FO22010 the higher resolution of the G750M grating allows us to separate [S ii] 6716 A and [S ii] 6731 A. To estimate the SNR ratio we use the line fluxes from an G750L observation of 1440 s (dataset O5FO22010, Wassell et al. 2006); the data is shown in Fig. 4 of the science justification. In [Oi] 6300 A and [Nii] 6584 A we will reach a signal to noise ratio (SNR) of 5-10 for knot A, which was fainter than knot B and C in the existing observations. In Halpha we will reach SNR of 30 in the line center and 15 in the fast component, assuming that the line width is 500 km/s. Thus we can easily split the flux in different velocity components.
We propose to observe the FUV lines with the G140M grating, central wavelength 1218 A, for one full orbit. We will use the 50×0.2 slit. This exactly replicates the set-up of an observation taken on 1999-09-30 15:16:27 (dataset O57Z03010). That observation was published by Devine et al. (2000); the data is shown in Fig. 2 of the science justification.

ADDITIONAL COMMENTS

The BOT warns me of bright objects, which might damage the detector. That is OK, the bright object is actually HD 163296 be very target we want to observe (or more preciely, we want to observe the jet from HD 163296). This is why we place the central star behind the occulting bar for the spectrocopy and perfrom the target acquisition with a narrow band filter.
Observatiosn of very similar layout on the same object have been done with STIS before without any detector damage.

Visit

Proposal 12186, Visit 01, implementation Wed Sep 08 01:13:33 GMT 2010

Diagnostic Status: No Diagnostics

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

Special Requirements: ORIENT 88.3D TO 90.3 D

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD-163296	RA: 17 56 21.2879 (269.0886996d) Dec: -21 57 21.88 (-21.95608d) Equinox: J2000	Proper Motion RA: -5.843850057091823E-4s/yr Proper Motion Dec: -0.04043"/yr Parallax: 0.00819" Epoch of Position: 2000	V=6.871	Reference Frame: ICRS

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

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) HD-163296	STIS/CCD, ACQ, F28X50OII	MIRROR	ACQTYPE=POINT			2 Secs	
								[==>]	***[1]***
2		(1) HD-163296	STIS/CCD, ACCUM, 52X0.2F1	G750M 6581 A	CR-SPLIT=3			2000 Secs	
								[==>758.0 Secs (Split 1)]	***[1]***
								[==>758.0 Secs (Split 2)]	
								[==>759.0 Secs (Split 3)]	
3		(1) HD-163296	STIS/FUV-MAMA, TIME-TAG, 52X0.2F1	G140M 1218 A	BUFFER-TIME=1000			2700 Secs	
								[==>2997.0 Secs]	***[2]***

Orbit Structure