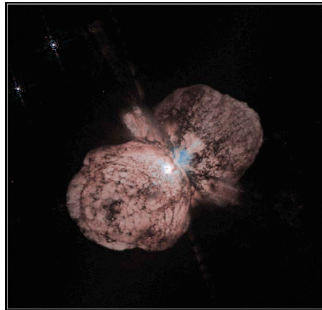


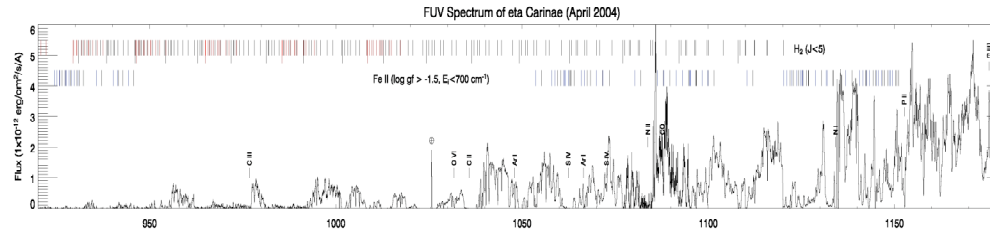
Searching for Radial Velocity Variations in η Carinae

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Introduction

The Luminous Blue Variable η Carinae has long been suspected to be a massive binary system. Our FUSE Cycle 4 observations have detected a hot companion of η Carinae for the first time (Iping et al 2005, *ApJL* 633, L37). FUSE observations of η Carinae now span over complete binary period (5.54 years) - see Table 1. All LWRs observations however, are contaminated by two nearby B stars (see top left of picture). Several exposures taken with the HIRS aperture recorded the B star spectra in the SIC1A channel and this enabled us to correct the LWRs spectra for the B star contamination. We have analyzed some wind features to search for radial velocity changes associated with the binary orbital motion.



ABSTRACT

A hot companion of η Carinae has been detected using high resolution spectra (905-1180 Å) obtained with the Far Ultraviolet Spectroscopic Explorer (FUSE) satellite (see poster 175.11 by Sonneborn et al.). Analysis of the far-UV spectrum shows that η Car B is a luminous hot star. The N II 1084-86 Å emission feature indicates that the star might be nitrogen rich. The FUV continuum and the S IV 1073 Å P-Cygni wind line suggest that the effective temperature of η Car B is at least 25,000 K.

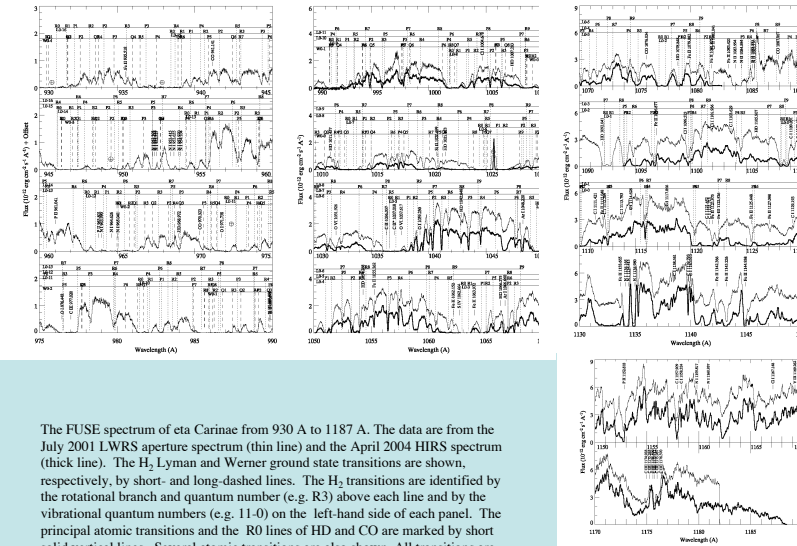
FUV spectra of η Carinae were obtained with the FUSE satellite at 9 epochs between 2000 February and 2005 July. The data consists of 12 observations taken with the LWRs aperture (30 x 30 arcsec), three with the HIRS aperture (1.25 x 20 arcsec), and one MRDS aperture (4 x 20 arcsec) see table1. In this paper we discuss the analysis of these spectra to search for radial velocity variations associated with the 5.54-year binary orbit of η Car AB.

We searched for radial variations in the FUV spectrum of η Car by analyzing the N II 1084-6 feature and the S IV 1073 line. The spectra were first aligned to the interstellar H₂ lines. The fluxes were normalized at 1089A (SiC1a channel for N II) and 1059A (LiF1a channel for S IV).

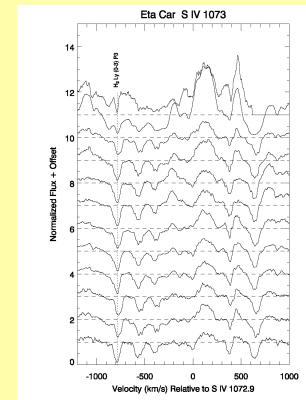
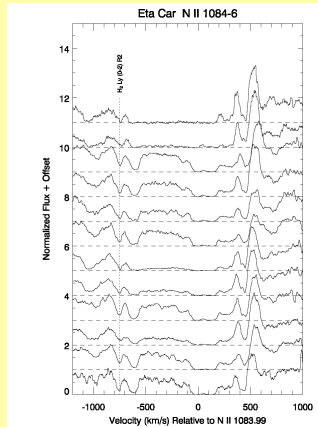
Table 1. Observation Parameters

FUSE OBS ID	Start Time (U.T.)	No. Exposures	texpo (s)	Aper	p.a.
X024:01:01	2000 Febr 1 11:54	2	3790	LWRs	61°.5
X024:01:02	2000 Mar 20 11:20	11	24497	LWRs	100°.1
B127:01:03	2001 Mar 2 13:38	10	18095	LWRs	89°.8
B127:01:02	2001 Jul 6 16:35	5	20475	LWRs	220°.4
C154:01:01	2002 Jun 25 16:38	7	28727	LWRs	208°.6
C154:01:02	2003 Feb 18 02:19	5	23084	LWRs	76°.8
D007:01:02	2003 Jun 10 14:36	11	15282	LWRs	195°.3
D007:01:03	2003 Jun 17 03:33	4	14311	LWRs	201°.1
D007:01:04	2003 Jun 27 00:21	3	4531	LWRs	119°.4
D007:01:06	2004 Feb 7 04:14	4	17820	LWRs	66°.6
D007:01:07	2004 Mar 29 14:36	7	9202	LWRs	119°.4
D007:01:08	2004 Mar 30 09:42	18	34281	LWRs	120°.2
D007:02:10	2004 Apr 9 03:23	9	34476	HIRS	131°.3
D007:03:11	2004 Apr 10 07:18	8	15507	HIRS	132°.7
D007:01:09	2004 Apr 11 21:16	6	17118	HIRS	134°.5
F132:01:01	2005 Jul 20 10:30	14	10547	MRDS	234°.2

The X024 data and B1270103 are calibrated with CalFUSE v 3.0. The rest of the data have been calibrated with CalFUSE v. 3.1.



The FUSE spectrum of eta Carinae from 930 Å to 1187 Å. The data are from the July 2001 LWRs aperture spectrum (thin line) and the April 2004 HIRS spectrum (thick line). The H₂ Lyman and Werner ground state transitions are shown, respectively, by short- and long-dashed lines. The H₂ transitions are identified by the rotational branch and quantum number (e.g. R3) above each line and by the vibrational quantum numbers (e.g. 11-0) on the left-hand side of each panel. The principal atomic transitions and the R0 lines of HD and CO are marked by short solid vertical lines. Several atomic transitions are also shown. All transitions are marked at their laboratory wavelengths.



N II 1084 and S IV 1073 line profiles are plotted above on a velocity scale for the observations listed in Table 1. N II, probably originating from a region between η Car A and η Car B, shows small changes in velocity. The radial velocity curve for the N II emission feature is below. No apparent velocity shifts are measured in the S IV 1073 line.

