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HST FOS SPECTROSCOPY OF ETA CARINAE'S NORTHEAST JET

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RESUMEN

Hemos obtenido espectros FOS en diez posiciones en la nebulosidad que rodea a η Carinae, incluyendo dos aperturas localizadas a lo largo del prominente jet que emerge hacia el noreste de la región central. A diferencia de otros espectros de η Carinae y las eyecciones que la rodean, el espectro de nuestra apertura J1 permite el cálculo de unas pocas abundancias químicas clave, libres de contaminación por luz reflejada. Esto se debe a la alta velocidad relativa a η Car del nudo de eyección contenido en esta apertura. Este espectro permite conocer cuantitativamento el impacto de la luz reflejada en las determinaciones de abundancias químicas en la nebulosa de η Carinae.

ABSTRACT

We have obtained FOS spectra of ten locations in the nebulosity surrounding η Carinae, including two apertures located along the prominent "jet" protruding northeast from the central region. Unlike previous spectra of η Carinae and its surrounding ejecta, the spectrum in our J1 aperture allows the calculation of a few key chemical abundances free of contamination by reflected light. This is due to the high velocity relative to η of the knot of ejecta contained in this aperture. This unique spectrum also yields quantitative insight into the impact of reflected light on chemical abundance determinations in the η Carinae nebula.

Key words: **ISM: INDIVIDUAL OBJECTS (ETA CARINAE) — STARS: MASS LOSS — STARS: VARIABLES: OTHER (LUMINOUS BLUE VARIABLES)**

1. INTRODUCTION

The ejecta surrounding η Carinae consists of two adjacent hollow spherical lobes with a disk-shaped equatorial "skirt" between the tangent spheres, constituting the structure described as the "homunculus" (named for its resemblance in ground-based photographs to a rotund human form). In addition to this polar-symmetric structure, a sequence of knots of ejecta (the NE jet) extends to the northeast, pointing radially outward from the central star. Another detached portion of nebulosity forms an arc cradling the Homunculus on its southwest side, the "S-condensation", in which four of our apertures lie.

It has recently been shown (Currie 1996) that portions of the nebulosity follow a Hubble-type expansion law: the tangential velocity of each part of the ejecta is directly proportional to its distance from η. This indicates that the homunculus was expelled from the central star in a single eruptive event centered on the year 1841. For the knots in our J1 and J2 apertures however, the highest-precision astrometric work done to date (Morse 1997) confirms the earlier *HST* astrometry results (Ebbetts et al. 1992), which indicated that these NE Jet features were ejected in 1860 (NN) and 1874 (NS).

Although the energy released in η Car's Great Eruption, 10^{49} ergs, exceeds by approximately a factor of ten that of the moderate eruptions of the stellar class known as the Luminous Blue Variables (LBV's), it is suspected that η's behaviour may be related to that of the LBV's. The abnormally high nitrogen abundance and circumstellar shells of η Carinae and some LBV's suggest also a connection to the Wolf-Rayet stars; recent theoretical evolution scenarios link the LBV's to WR's.

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