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***Review***

# AN OVERVIEW OF THE OBSERVATIONAL AND THEORETICAL STUDIES OF HH 1 AND 2

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RESUMEN

Presentamos una descripción de la bibliografía sobre los objetos HH 1 y 2, desde el descubrimiento de los objetos HH (por Herbig y Haro en 1951/2) hasta el año 2010. El trabajo sobre HH 1 y 2 traza la historia del campo de los objetos Herbig-Haro, e incluye la mayor parte de los eventos importantes en el desarrollo de nuestro entendimiento de los flujos de estrellas jóvenes.

ABSTRACT

We present a description of the bibliography of HH 1 and 2, from the discovery of HH objects (by Herbig and Haro in 1951/2) up to the year 2010. The work on HH 1 and 2 traces the history of the field of Herbig-Haro objects, and includes most of the important developments of our understanding of outflows from young stars.

*Key Words:* ISM: jets and outflows — ISM: kinematics and dynamics — stars: mass-loss — stars: pre-main sequence

## 1. INTRODUCTION

HH 1 and 2 have played a fundamental role in the development of the field of Herbig-Haro (HH) objects. They were the first HH objects that were discovered, and were the exclusive objective of all of the early studies of HH spectra. Also, many of the main properties of HH objects (for example, the proper motions, and UV, radio continuum and X-ray emission) were first seen in the HH 1/2 system. Finally, many of the theoretical ideas about HH objects were first formulated so as to explain the characteristics of HH 1 and 2.

Given this fundamental role of HH 1 and 2 in the field of HH objects, we have collected a comprehensive bibliography of the (mostly refereed) papers on the HH 1/2 system. These papers include the HH 1/2 observations at all wavelengths and the theoretical papers with models that are specifically applied to HH 1 and 2. We have proceeded to make a commented bibliography[5] describing the contributions of all of these papers.

We first give a description of the region around HH 1 and 2, discussing the general observational results (§ 2). We then describe the criteria that were used to select the papers on HH 1 and 2, and give a short description of the time distribution of the publications (§ 3). We then summarize the work that has been done regarding optical observations (§§ 4 and 5), observations in other wavelength ranges (§ 6), and theoretical models (§ 7). We then choose a set of 8 specific topics for which the HH 1/2 system has played a particularly important role, describe their development, and comment on the still unfinished work on each topic (§ 8). A short bibliographic study describing the collaborations that have dominated the research on HH 1/2 is presented in § 9. The conclusions are presented in § 10.

## 2. THE HH 1/2 PAPER DATABASE

We have searched on the SAO/NASA Astrophysics Data System (ADS) for papers on the objects "HH 1" or "HH 2". From the 500 papers given (until the end of 2010) by the ADS, we have chosen the

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[5]Available on-line at `http://www.nucleares.unam.mx/astroplasmas/`.