More recently Fischer et al. (2010) used the Herschel Space Telescope to image the HH 1/2 region at far-infrared wavelengths, and in addition to the (unresolved) VLA 1/2 stellar system (their source HOPS 203), they detected another protostar, HOPS 165, only 13 arcseconds away. It thus appears that the HH 1/2 source region contains a small quadruple system of protostellar objects in very early evolutionary stages. Substantial progress in the observations of the region around VLA 1 is to be expected when this region is observed with ALMA.

4. THE DISCOVERY PAPERS

Herbig (1951) obtained spectra of HH 1 and 2, and also showed a photographic image of the region around the two objects. Herbig noted the unusual characteristics of the spectrum, which include the strength of the red [S II] lines, and the wide range of ionization+excitation energies (given by the presence of strong [O I], [O II] and [O III] lines). Herbig (1951) noted that there are no blue stars (which might photoionize the gas) visible in the region, and suggested that the excitation might be powered by accretion onto a late-type dwarf. Haro (1952) and Haro & Minkowski (1960) obtained deeper plates, and lowered the brightness for possible stars within HH 1 and 2. The name "Herbig-Haro objects" was proposed by Ambartsumian (1954).

Böhm (1956) obtained spectra of HH 1, and used diagnostic lines to determine n_e and T (the electron density and temperature) of the object. Böhm noted that the (at least partially) ionized gas cannot be in coronal ionization equilibrium at the measured temperature of ≈7500 K. Böhm (1956) commented that HH 1 is too large (with a size of ∼1000 AU) compared to the accretion radius around a low mass star (∼10 AU) for the object to be powered directly by accretion.

Osterbrock (1958) presented further spectrophotometry of HH 1, confirming the results of Böhm (1956). Osterbrock suggested that high energy particles in a stellar wind might be producing the observed ionization (without mentioning shocks). This idea was followed in more detail by Magnan & Schatzmann (1965). It is notable that these initial papers were very well directed, pointing in the general direction of later developments in the field of HH objects.

5. OPTICAL OBSERVATIONS

5.1. *Imaging*

Including the paper with the first published image of HH 1/2 (Herbig 1951), there are 19 papers with images of this outflow. Photographic plates were published by Haro (1952), Haro & Minkowski (1960), Herbig (1974), Herbig & Jones (1981, the first determination of proper motions in HH flows). Ground-based images with electronic detectors were presented by Bohigas et al. (1985), Strom et al. (1985), Raga et al. (1988), Reipurth (1989), Raga, Barnes, & Mateo (1990), Reipurth et al. (1993b), Eislöffel, Mundt, & Böhm (1994), Ogura (1995) and Warren-Smith & Scarrot (1999, presenting imaging polarimetry). Images obtained with the HST were presented by Schwartz et al. (1993), Ray et al. (1996), Hester et al. (1998), Reipurth et al. (2000) and Bally et al. (2002, who obtained proper motions from HST images).

5.2. *Spectrophotometry*

Starting with the original paper of Herbig (1951), 15 papers have been published with observations of emission line fluxes and/or the optical continuum of HH 1 and 2. The main components of this work are the calculations of n_e and T_e diagnostics and the calculations of the gas-phase abundances.

The first of these studies was published by Böhm (1956), who presented diagnostic line ratios and discussed the possible reddening corrections. This work was later extended with detections of progressively more lines by Böhm, Perry, & Schwartz (1973: 60 lines), Böhm, Siegmund, & Schwartz (1976: reddening from the IR and blue [S II] lines), Schwartz (1976), Dopita (1978), Böhm & Brugel (1979), Brugel, Böhm, & Mannery (1981a), Strom et al. (1985) and Solf, Böhm, & Raga (1988: 175 lines in HH 1). Cohen & Schwartz (1979) and Mundt & Hartmann (1983) presented the spectrum of the "Cohen-Schwartz" (C-S) star, which was suggested as a possible source of the HH 1/2 system (later demoted, see § 3.2). The optical continuum emission of HH 1 and 2 was studied by Böhm, Schwartz, & Siegmund (1974), Brugel, Böhm, & Mannery (1981b) and Solf et al. (1988).

5.3. *High resolution spectroscopy*

There are 12 papers discussing line profiles of the emission of the HH 1/2 region. The first mention of the line profiles of HH 1/2 was that of Böhm et al. (1973), who stated that the line widths are ∼1 Å. Radial velocities and line widths were studied by Schwartz (1978, 1981) and Dopita (1978). Hartmann & Raymond (1984) and Böhm & Solf (1985) and Hartigan, Raymond, & Hartmann (1987) presented the details of short- and long-slit line profiles of HH 1 and 2. The two-dimensional spatial distributions of the line profiles of HH 1 (Solf et al. 1991) and