RevMexAA (Serie de Conferencias), **12**, 41–41 (2002)

ISO SPECTROSCOPY OF ULTRACOMPACT H II REGIONS: ELEMENT ABUNDANCE GRADIENT IN THE GALAXY

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Ionized Gaseous Nebulae (Mexico City, 21-24 November 2000)
Editors: William Henney, José Franco, Marco Martos, & Miriam Peña

In order to study the element abundance distribution in the Galaxy, infrared spectra between 2.3 and 196 μm were taken towards a sample of ultracompact H II regions using the two spectrometers (SWS and LWS) on board *ISO*. The sample spans a large range in galactocentric distance (0 to 20 kpc). The fine structure lines of O, N, Ne, Ar, S, C and Si are detected in most of the sources with some species (O, N, S, Ne, and Ar) present in different stages of ionization. From the measured line fluxes, the properties of the ionized gas can be precisely constrained.

The distribution of Galactic element abundances is central to the studies of the chemical evolution of the Milky Way. Measurements of element abundances throughout the Galactic disc provide vital inputs to model the formation and evolution of the Galaxy. H II regions are prime targets to derive the present-day elemental abundances, allowing us to probe the interstellar medium (ISM) in the vicinity of massive stars and to trace the present composition of the ISM in the Galaxy.

The complete *ISO* grating spectra of 43 Galactic ultracompact H II regions, which are described in the catalogue by Peeters et al. (2001), give access to nearly all the atomic fine-structure lines in the infrared range, as can be seen in Figure 1. Furthermore, the H II regions sample the Galactic plane from the center to the outer regions and allow us to study Galactic abundance variations over a larger range than in previous studies (Shaver et al. 1983; Simpson et al. 1995; Afflerbach et al. 1997; Rudolph et al. 1997 and references therein). For some elements, different ionization stages are measured, which alleviates the problem of applying ionization correction factors for unseen ions. In addition, using the line ratios of adjacent ionization stages of the same species, one can investigate the ionization state of the H II regions along the Galactic disc. Both the study of the abundance gradient and variation of the degree of ionization across the Galactic disc are presented in Martín-Hernández et al. (2001a) and Martín-Hernández et al. (2001b).

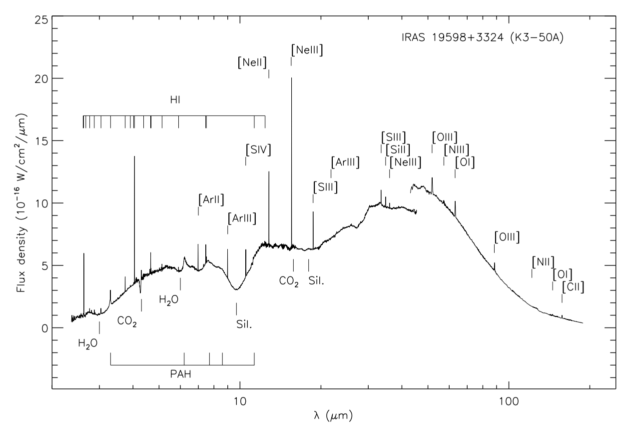

Fig. 1. Combined SWS and LWS spectrum of K3–50A. The positions of the atomic fine-structure lines and H I recombination lines are labeled, as well as the main dust bands.

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