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MULTI-ELEMENTAL CHEMICAL COMPOSITION OF SOLAR-TYPE STARS

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The chemical composition of the long-lived solar-type stars is an extremely valuable diagnostic of the chemical evolution of the Galaxy. There is some evidence that such evolution has been heterogeneous both in time and space, and that the Sun might not be a typical star in what concerns its multi-elemental abundance pattern. The purpose of this work is to determine the abundances of the elements C, N, Na, Mg, Si, Ca, Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Sr, Y, Zr, Ba, Ce, Nd, Sm, Eu and Gd, in a sample of solar-type stars in the solar neighborhood. The technique utilized is the detailed and differential spectroscopic analysis, relative to the Sun, based on high resolution (R > 45,000) and high sign-to-noise ratio (S/N > 300) data obtained with the the bench-mounted echelle spectrograph of the 1.5 m telescope at CTIO. In addition, abundances of C and N are being obtained based on the spectral synthesis of molecular bands of the Swan and Red Electronic Systems using the Moog code. The atmospheric parameters were established using photometric colors, the excitation & ionization equilibria of the Fe lines and the stellar positions in the HR diagram. Our aim is to uncover details of the chemical evolution in the solar neighborhood and of the nucleosynthetic enrichment of the galactic disk, as well as find out how typical the solar chemical composition is relative to the local population of G-type dwarf stars. We are presenting the preliminary results of the determination of the atmospheric parameters, the detailed abundance analysis, masses and ages of the sample stars.

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ETA CARINAE: CYCLE-TO-CYCLE SPECTROSCOPIC VARIABILITY

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We present a spectroscopic monitoring of eta Carinae along the last 13 years in the wavelength range 3 900 - 11 000 A. The contrasting behavior of high and low excitation lines is discussed. We suggest physical mechanisms responsible for the complicated pattern of line variability and present predictions for the year 2003.5 event.

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FRANCK-CONDON FACTORS, SPONTANEOUS EMISSION PROBABILITIES AND OSCILLATOR STRENGTHS OF MOLECULAR SPECIES OF ASTROPHYSICAL INTEREST

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Interstellar molecules are important tools for obtaining physical conditions within stellar atmospheres and interstellar clouds, and fundamental physical-chemical processes that are difficult to achieve in laboratory. In particular, the molecular species CH, CN, NH, and OH are found in interstellar space as well as in the atmospheres and envelopes of late type stars, the sun, and comets. In this manner, using rotational and vibrational spectroscopic constants available in the literature, we applied the computer program TRAPRB developed by Jarmain and McCallum (1970), to obtain the Franck-Condon factors (FCFs) and respective r-centroids for the main vibrational bands for the electronic transitions CH[(A-X), (B-X), (C-X)], (C-X), CN(B-X), NH(A-X) and OH(A-X). We also calculate the spontaneous emission probabilities, the oscillator strengths (f-values), and the corresponding radiative lifetimes.