A Survey Of Solar Twin Stars Within 50 Parsecs Of The Sun

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Solar twins stars are, broadly, stars with the same mass, temperature, surface gravity, luminosity, metal content and age as the Sun. Such objects are, presumably, privileged candidates to possess planetary systems similar to our own and also to be abodes for lifeforms based on carbon-chain chemistry and water oceans. They may also help answer the still lingering question of how typical the solar characteristics are with respect to the local galactic population of middle-aged G-type stars. The recent identification of the best ever solar twin (Porto de Mello & da Silva 1997, ApJ Letters, 476, L89) enabled a much better understanding of the strategies necessary to uncover stars that closely resemble the Sun. We present the preliminary results of a systematic survey to reveal all solar twin stars within 50 pc of the Sun. We have selected from the HIPPARCOS astrometric and photometric database 52 near main-sequence, G-type candidate stars with absolute magnitudes and color indices very closely approaching the Sun’s. These stars are being spectroscopically studied with high-resolution, high S/N optical spectra, and with moderate resolution ultraviolet spectra. We aim at determining the atmospheric parameters, chemical abundances, evolutionary state and degree of chromospheric activity of these stars and to discuss their interest to the current search for planetary systems and SETI programs.