# Dynamical Stability of Habitable Planets in Astrobiologically Interesting Binary Stars

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Binary stars are universally thought as second rate sites for the location of habitable planets. It is still open to debate, in current planet-forming theory, whether planetary formation similar to that of single stars can proceed in multiple systems, and whether, once formed, these planets have a substantial probability of remaining in stable orbits inside the stellar continuously habitable zones (CHZs) for lengths of time compatible with the evolution of life. Here we consider binary stars which were rejected in the study of Porto de Mello et al. (*Astrobiology*, **6**, 308, 2006) on the sole basis of their binarity. These stars were selected by having masses, temperatures, metallicities, luminosities and degree of chromospheric activity compatible with the long term permanence of habitable telluric planets inside their CHZ, being rejected only by their binary/multiple status. We investigate the dynamical stability of the system composed by the binary and an Earth-like planet within the CHZ of the primary component, and, for a few cases, also of the secondary component. Our analysis is modeled semi-analytically in the frame of the 3-dimensional general 3-body problem. We investigate the topology of the phase space without any restriction on eccentricities or inclinations. We obtain the boundaries of the system's secular stability as a function of mass, semi-major axis and inclination, qualitatively supplementing these results by direct numerical investigations. Also, we obtain and discuss their evolutionary masses, luminosities, state of evolution, degree of chromospheric activity, isochronal ages and space velocities, fully characterizing their astrobiological interest.