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EVO-SETI QUARTICS YIELDING ET CIVILIZATIONS' ENERGY

Abstract

Evo-SETI Theory is a mathematical model to compute both the energy and the information amount (= Shannon entropy) available to advanced ET Civilizations.

This mathematical model was gradually developed by this author over the last 10 years in a dozen mathematical papers published in Acta Astronautica, International Journal of Astrobiology and Life.

In the present paper we explore for the first time the Evo-SETI "quartics", i.e. polynomials of the fourth degree in the time yielding an advanced ET Civilization's power curve in between the central star's birth and death. Then the integral of such a curve in the time is of course a polynomial of the fifth degree representing the energy absorbed by that Civilization from its own star.

For instance, we know that the Sun was born about 4.5 billion years ago and will presumably reach its death as a red giant in, say, four to five billion more years. Thus, we firstly compute the quartic power curve of the Sun over about ten billion years of time. Then the integral (total area) under such a curve is the Sun's total energy output over 10 billion years. Computing how much of that energy reached and will reach the Earth over the Sun's lifetime will give us an upper bound for the energy available to humans now and in the future. In other words, we may try to quantify the advancement of the Human Civilization in terms of energy and, consequently, in terms of Shannon Entropy (= Information), assuming that this EvoEntropy is a stochastic process with exponential mean value (Geometric Brownian Motion = GBM), as we always did in Evo-SETI Theory.

The same mathematical model applies to all stars, and so to all ET civilizations as well.