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ENERGY OF EXTRA-TERRESTRIAL CIVILIZATIONS ACCORDING TO EVO-SETI THEORY

Abstract

In the last five years this author developed his "Evo-SETI" mathematical theory, describing Darwinian evolution and Human History as stochastic processes having a lognormal probability density function (pdf). His Peak-Locus Theorem means that the mean value of this process may be regarded as the geometric locus of all the peaks of a one-parameter (the peak time p) family of b-lognormals (lognormal pdf-s starting at time b (birth)). Since b-lognormals are pdf-s, the area under each of them always equals 1 (normalization condition) and so, going from left to right on the time axis, the b-lognormals become more and more "peaky", and last less and less in time. This is precisely what happened in Human History: civilizations that lasted millennia (like Ancient Greece and Rome) lasted just centuries (like the Portuguese, Spanish, French, British and American (USA) Empires) but they were more and more advanced in the "level of civilization". This "level of civilization" is what physicists call the Shannon ENTROPY of the corresponding b-lognormal.

May we extend this reasoning to ExtraTerrestrial (ET) Civilizations also? The answer is "yes", but, in addition to Entropy, we must take into account the different amount of ENERGY available to each ET Civilization, and that energy depends on the stellar type of the central star around which that Civilization orbits.

In this paper we show mathematically that:

1) It is necessary to replace the above b-lognormals by b-logpars, i.e. new curves in the time made up by a b-lognormal ranging between the birth and the historic peak of that Civilization followed by just a parabola ranging between the historic peak and the death.

2) The area between each b-logpar and the time axis is the TOTAL ENERGY available to that ET Civilization during its whole lifetime. Therefore the b-logpar curve is in reality a POWER CURVE, where the word "power" refers not only to the political sense, but especially to the physical sense, i.e. "total power measured in watts per lifetime."

3) This total power available to an ET Civilization critically depends on the amount of energy emitted by its own central star. So, we make a beginning in relating the quantum physics of the central star to how long will that orbiting Civilization last in time: not an easy task even for accomplished astrophysicists.