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THE FERMI PARADOX REVISITED: TECHNOSIGNATURES AND THE CONTACT ERA

Abstract

A new solution to the Fermi Paradox is presented: probes or visits from putative alien civilizations have very low probability until a civilization reaches a certain age (called the Contact Era) after the onset of radio communications (Wandel 2022, Astrophys. Journal). If biotic planets are common, putative advanced civilizations may preferentially send probes to planets with technosignatures, such as radio broadcastings. The contact probability is defined as the chance to find a nearby civilization located close enough, so that it could have detected the earliest radio emissions (the "radiosphere") and sent a probe that would reach the Solar System at present. It is found that the current contact probability for Earth is very low, unless civilizations are extremely abundant. Since the radiosphere expands with time, so does the contact probability. The "Contact Era" is defined as the time (since the onset of radio transmissions) at which the contact probability becomes of order unity. At that time alien probes (or messages) become more likely. Unless civilizations are highly abundant, the Contact Era is shown to be of the order of a few hundred to a few thousand years and may be applied not only to physical probes but also to transmissions (i.e. SETI). Consequently, it is shown that civilizations are unlikely to be able to inter-communicate, unless their communicative lifetime is at least a few thousand years.