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GALACTIC-SCALE SIGNATURES FOR INTERSTELLAR ARCHAEOLOGY AND THE SEARCH FOR LIFE AND INTELLIGENCE IN THE UNIVERSE.

Abstract

"Interstellar archaeology", searching for cosmic-scale signatures of intelligence, is a different way to look for intelligence and life. Unlike most radio SETI approaches, interstellar archaeology does not involve intent to communicate on the part of the originating party. An interesting example of a possible interstellar archaeology artifact is a Dyson sphere, a shroud around a star to harvest the visible light coming from the star. The shroud converts the light output to infrared. A Dyson sphere is an illustration of a so-called Kardashev Type II civilization, one that exploits the energy of a star. A Type III civilization would utilize the energy of a galaxy. One way to construct a Type III civilization would be to convert many of the stars in a galaxy to Dyson Spheres. Interestingly, going from one Dyson sphere to many millions is a matter of replication and slow, reasonably tractable space travel. A spreading Dyson sphere-based galactic civilization might give rise to voids of visible light with corresponding increased infrared emission hotspots. Elliptical galaxies, more uniform than spiral galaxies, are logical places to look for these "Dyson-Annis voids" of visible light. This presentation reviews a recent analysis of five nearly circular elliptical galaxies for Dyson-Annis voids. The analysis has been aimed at exploring the possibilities and challenges of this avenue for searching for intelligence in the universe. Interestingly, there has been little discussion of galactic habitable or intelligence zones for elliptic galaxies. Existing models for spiral galaxies could be converted to elliptical galaxies. In a seminal paper on habitability within the Milky Way, Gonzalez, Brownlee, and Ward raised doubts about elliptical galaxies as harbors for intelligence because of changing environments encountered in the course of irregular stellar orbits. While interesting, this factor deserves further investigation. For example, the apparent visual homogeneity observed in a typical elliptical galaxy would seem more stable for the development of life and intelligence than the spiral galaxy environment.