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SETI I - Technical Aspects (1.)

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EFFECTS OF COLLISIONS UPON A PARTIAL DYSON SPHERE

Abstract

The supposition is that an advanced technological civilization will not remain on a single planet but will spread out into space. A multi-planet civilization may be sufficient to provide some redundancy, but to be a truly cosmologically long-lived civilization requires the capability of interstellar travel. The prodigious amounts of power required to achieve interstellar travel, in turn, provides the rationale for the civilization to expand beyond planetary habitations into systems of space colonies. The scenario continues with the advanced civilization dismantling its planets in order to expand its system of space colonies so that it becomes a Dyson sphere, collecting a significant portion of the entire output of its star. Searches for Dyson spheres and partial Dyson spheres have been unsuccessful so far. Could it be that there are diminishing returns for expanding the space colony architecture too far? This paper will explore the effects of collisions as a limiting factor to the expansion of a system of space colonies into a Dyson sphere or partial Dyson sphere. The paper is based upon computer modeling giving rough estimates of the amount of time it takes for an initial arrangement of equally spaced habitats in circular orbits to become disordered, the power requirements to maintain a highly ordered arrangement, average time between collisions for a system of habitats that have become disordered and the collision rate thus implied.