IAA-00-IAA.9.1.03

BEYOND THE SQUARE KILOMETER ARRAY

Robert L. DeBiase
Independent Consultant, Staten Island, New York, USA

The One Square Kilometer Array (SKA), currently being studied by a group of international participants, is the first instrument that approaches the needs of a search for planetary leakage from a putative extraterrestrial technological civilization. However, it would be able to detect leakage (such as we might produce with our radio and television transmissions) from only the nearest star system. In order to detect leakage from planetary systems tens to hundreds of light years away would require a detector with tens to hundreds of times the effective diameter (hundreds to tens of thousand times the effective collection area) of the SKA in order to succeed. Trying to place such a large detector array on Earth's surface could be problematic. Another problem with siting our dream leakage detector on Earth's surface (a limitation also faced by the SKA) is that the atmosphere restricts the search to frequencies less than about twenty gigahertz. In order to get beyond these restrictions, (as you would want to do for a true search of electromagnetic leakage) the array must be placed above the Earth's atmosphere in space. However, by placing the detector in space, we've replaced specific antenna costs of about six hundred dollars per square meter of collection area with specific costs of tens of thousands of dollars per square meter of collection area. These costs come primarily from the cost of launching units of the detector array into space. Clearly, even if the cost of launch were brought down by two orders of magnitude, the cost of such a large detector array would still be more than ten thousand times the cost of the SKA. Is there any way around this apparently hopeless situation?

This paper will consider a scheme to place the detector array near the Earth/Sun L2 site. At this location, the Earth (the single greatest source of artificial radio noise in the solar system) and the Sun (the single greatest source of natural noise in the solar system) are always in a single direction behind the telescope array. Moreover, the halo orbit around L2 that the space array is in guarantees that the rear side of the array is always illuminated by the Sun. Thus the geometry of this site provides a possible means of overcoming the exorbitant costs of constructing the detection array. We must use the rear side of the array to collect solar energy, a small part of which will be used to operate the array, the vast majority of which will be beamed back to Earth for sale as energy. The general idea is that as the array is incrementally expanded, the revenue stream from the sale of energy will also be expanding. The paper will endeavor to determine under what circumstances such a scheme might work.