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EFFICIENCY IN SETI

Abstract

While modern SETI experiments are often highly sensitive, reaching detection limits of 10**-25 watts/m**2-Hz in the radio, and 10**2 photoelectrons in the optical, the enormous interstellar distances imply that if extraterrestrial societies are using isotropic or broad-beamed transmitters, the power requirements for their emissions are enormous. Indeed, isotropic transmissions to the entire Galaxy, sufficiently intense to be detectable by our current searches, would consume power comparable to the stellar insolation of an Earth-size planet.

In this paper we consider how knowledge can be traded for power, and how, and to what degree, astronomical accuracy can reduce the energy costs of a comprehensive transmission program by putative extraterrestrials. Indeed, an exploration of how far this trade-off might be taken suggests that extraterrestrial transmitting strategies of civilizations only modestly more advanced than our own would be, as are our SETI receiving experiments, inexpensive enough to allow multiple efforts. We explore the consequences this supposition has for our SETI listening experiments.