

**LIMITS FROM CGRO/EGRET DATA ON THE USE OF ANTIMATTER
AS A POWER SOURCE BY EXTRATERRESTRIAL CIVILIZATIONS**

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I argue that the existence of cold antimatter in bulk is not permitted by the Standard Model, so that if a γ -ray signature from antiproton annihilation were to be detected, it must represent either new physics or the action of intelligence. Time variability of the signal would strongly support the second alternative. The entire sky was scanned at the relevant energies (30-928 MeV) by the EGRET experiment on board the *Compton* Gamma Ray Observatory during 1991-1995. A search of this database for the antiproton annihilation signature yielded only upper limits on the flux (an intriguing spectrum detected from QSO 2206+650 = 3EG J2206+6602 is probably not related to SETI). The all-sky, long term 99% upper limit is 2.3×10^{-8} photons/(cm² s); it is a factor 10 worse in the Galactic plane due to the higher diffuse γ -ray background emission. I give brief, but quantitative, illustrations of what this limit means for nearby intelligent activities.

This is particularly interesting for SETI, which ideally desires observation of all the sky all the time. Vast numbers of small, omni-directional elements can be combined as computing power per dollar increases, with little increase in cost. Antennas comprising large numbers of small elements can perform deep surveys of the sky for SETI and conduct radio astronomy as well. However, omni-directional elements are small in area, and thus, larger collecting areas with more directional characteristics are being used in early phases of construction, while computing power is expensive.

In SETI, man-made interference is the principal impediment to a systematic survey of large numbers of stars. Primary methods of interference elimination, excision, nulling, and subtraction are now being modeled in the digital domain. Realistic simulations will be used to illustrate the differing merits of the three antenna types described above.