

ANTIMATTER HARVESTING IN SPACE

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NASA has already identified antimatter as the ultimate energy storage medium for exploration at the outer reaches, and outside, of the solar system, a goal well within its mission. Antiprotons naturally produced by the collisions of cosmic rays with dust and solar wind protons have a very low density. However, the solar system is vast. Just as in certain mathematical problems wherein the product of two variables respectively approaching infinity and zero can yield a finite number, the harvesting of antimatter in our solar system can produce finite and significant quantities given a big enough net. The challenge is to envision a revolutionary capture and delivery architecture that generates a sufficient return on investment. Using the fact that the observed peak in the antiproton spectrum is in a kinetic energy band of 1-2 GeV, the underlying revolutionary apparatus envisioned is a set of large concentric spheres that are biased electrostatically at 1 GV to provide deceleration of antiprotons while warding off the solar wind protons. Once decelerated, the residual spread in antiproton kinetic energies is reduced by electron cooling and positron scattering within previously capture antihydrogen. The ultimate goal of this project is to identify and explore the economic, technological, safety, and environmental challenges of architecture capable of harvesting copious quantities of antimatter in our solar system. The proposed work is consistent with the NASA mission to “Explore the solar system and the universe beyond, understand the origin and evolution of life, and search for evidence of life elsewhere.”