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DEPARTMENT OF THE AIR FORCE WASHINGTON, DC



OFFICE OF THE SECRETARY

14 January 2015

SAF/AAII (FOIA) 1000 Air Force Pentagon Washington DC 20330-1000

Mr. John Greenewald

Dear Mr. Greenewald

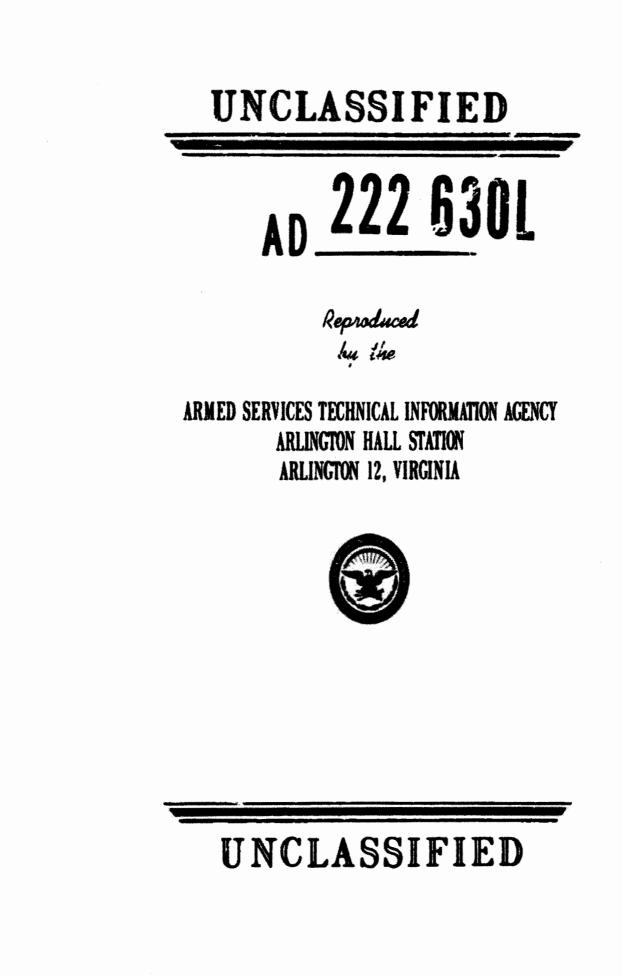
This is our final response to your 31 December 2014, Freedom of Information Act request for copy of DTIC Document AD0222630, Antigravity, Jan 1958. We received it from NASA FOIA under their Ref: 15-HQ-R-0003.

The document was previously reviewed and released in its entirety by Air Force Space Command Los Angeles FOIA. Copy of document is attached.

Please direct your questions to the undersigned at (703) 693-2736 and refer to case 2015-01899-F. Department of Defense Regulation 5400.7/Air Force Manual 33-302 indicated fees be assessed for processing this request; however, there are no applicable fees in this instance.

Sincerely ESPINAL.JOHN. M.1184810375 JOHN M. ESPINAL Government Information Specialist

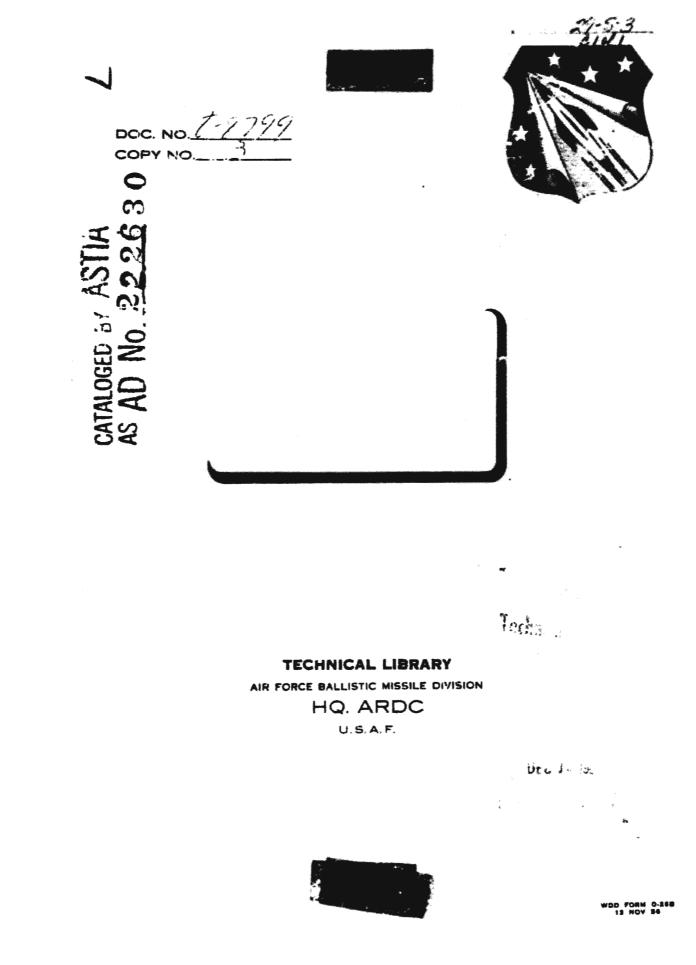
1 Attachment



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According to Dirac there in for each elementary particle of ordinary matter, a conjugate particle of opposite properties. This "antimatter" has been produced only recently, and only in quantities too small for the performance of gravitational experiments. Since no experiment exists which either proves or disproves the repulsion of matter and antimatter, it is legitimate to explore the possibilities of such a concept. However, it appears that the use of antimatter for engineering purposes would be most impractical, uneconomical and disastrous.

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ANTICRAVITY

by W. K. Ergen

Scient "is speculation has arisen as to the possibility that matter and antimatter may gravitationally repel each other.^{1,2,3} The word "antimatter" refers to a concept introduced by Dirac, according to which there is, for each elementary particle of ordinary matter, a conjugate particle of opposite properties. Thus, for the ordinary proton, which carries a positive charge, there is an antiproton which is negatively charged. Similarly, there are particles conjugate to neutrons, namely, the continent.cons " Antiprotons and antineutrons interact in exactly the same manner as protons and neutrons, and hence atomic nuclei can be built of antiprotons and antineutrons. Each such nucleus would correspond exactly to a nucleus built of ordinary matter. The nuclei made of antiprotons and antineutrons combine with positruns to form atums and molecules, just as ordinary muclei combine with electrons. The term, "antimatter", comprises antiprotons, antineutrons, and the atoms and molecules made of these particles and positrons.

If matter and antimatter get into contact they annihilate each other, that is, the matter and antimatter disappear, and a relatively very large amount of radiation energy appears. Conversely, energy can be converted into matter and antimatter, and single antiprotons and antineutrons have been "created" in this way, although it takes the highest energy accelerators avrilable today to do this and the process is extremely inefficient on the basis of the comparison of the electrical energy consumed to the energy contained in created particles.

If matter and antimatter would gravitationally repel each other, Einstein's principle of equivalence between a local gravitational field and a uniform ac-

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celeration would be violated. This principle has been verified experimentally with great accuracy and in a variety of ways. However, none of these experiments involved antimatter, which was produced only recently and only in quantities too small for the performance of gravitational experiments. It is therefore legitimete to engage in scientific speculation as to the consequences of the assumption that matter and antimatter repel each other gravitationally.

It should be mentioned that these speculations lead to is ther unsatisfactory theories, but this is beyond the scope of the present study

If matter and antimatter repelled each other gravitationally, the earth, consisting of matter, would repel a body of antimatter. As to the idea of connecting such a body to a body of matter to obtain a weightless combination, the following remarks may suffice:

1) Nobody claims the gravitational repulsion of matter and antimatter to be a fact. It is only pointed out that no experiment exists which either proves or disproves the assumption of such a repulsion. (The "proposed" experiments in this direction 2,3 are acutally quite unfeasible because of the smallness of the effects.) The mere fact that the repulsion has not been checked even on the smallest experimental scale proves that it would not be practical to use such repulsion for engineering purposes, even if the repulsion existed.

2) Even assuming 10% of the theoretical maximum efficiency in the "creation" of antimatter from energy (an assumption which is far too optimistic) the production of an amount of antimatter required to make a man weigh*less would require the total electrical output of the TVA system for eight centuries, and this electrical energy would cost twenty times the value of all the gold at Fort Knox.

3) If the antimatter were connected to the man to make him weightless, annihilation radiation would result and the man would make his entrance into heaven in a flash equivalent to two hundred thousand 20-kiloton bombs.

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2. Morman Strak: "An Experimental Search for Gravitational Repulsion."

3. Roberta U. Cordova: "The Use of Antimatter as a Means of Overcoming Gravitational Attraction."