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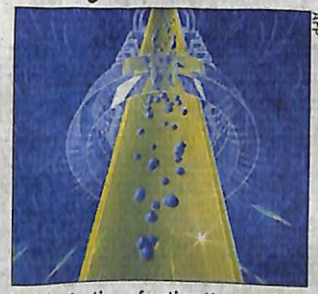
Right again, Einstein! Study shows how antimatter responds to gravity

In the world of "Star Trek", the starship Enterprise zips through space using a warp drive that harnesses antimatter. Suffice it to say, such technology remains in the realm of science fiction. But scientists are making important strides toward better understanding antimatter. Researchers said on Wednesday they have demonstrated for the first time that antimatter responds to gravity the same way matter does — by falling, as one might expect — in an experiment that once again buttressed physicist Albert Einstein's bedrock theory of general relativity.

All the stuff with which we are familiar — planets, stars, poodles and lollipops — is made of ordinary matter. Antimatter is the enigmatic twin of ordinary matter, possessing the same mass but with an opposite electrical charge. Almost all subatomic particles, such as electrons and protons, have an antimatter counterpart. While electrons are negatively charged, antielectrons, also called positrons, are positively charged. Likewise, while protons are positively charged, antiprotons are negatively charged. Under current theory, the Big Bang explosion that initiated the universe should have produced equal amounts of matter and antimatter. This, however, does not seem to be the case. There appears to be very little antimatter — and on Earth almost none. What's more, matter and antimatter are incompatible. If they touch, they blow up.



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An illustration of antimatter gravity experiment. Researchers said they have demonstrated for the first time that antimatter responds to gravity the same way matter does, by falling

The experiment was conducted at the European Center for Nuclear Research (CERN) in Switzerland by researchers from the international Antihydrogen Laser Physics Apparatus (ALPHA) collaboration. It involved the antimatter counterpart of hydrogen, the lightest of the elements. "On Earth, most antimatter that occurs naturally is produced from cosmic rays that collide with atoms in the air and create antimatter-matter pairs," said physicist Jonathan Wurtele of the University of California, Berkeley, co-author of the study published in Nature. This newly created antimatter lasts only until it hits a normal matter atom in the lower atmosphere. However, antimatter can be synthesized under controlled conditions, as in the ALPHA experiment, which used antihydrogen created at CERN. The antihydrogen was contained within a cylindrical vacuum chamber and trapped with magnetic fields at the top and bottom. The researchers reduced the magnetic fields to set the antimatter free in order to observe whether or not it would fall once the influence of gravity became apparent. It did, behaving as hydrogen would in same conditions. REUTERS