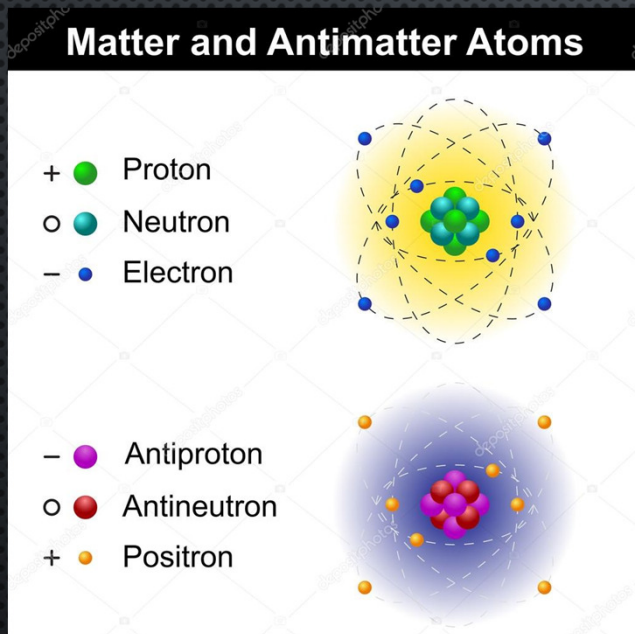


JOONAS AND JANNA PROUDLY PRESENT:

ANTIMATTER

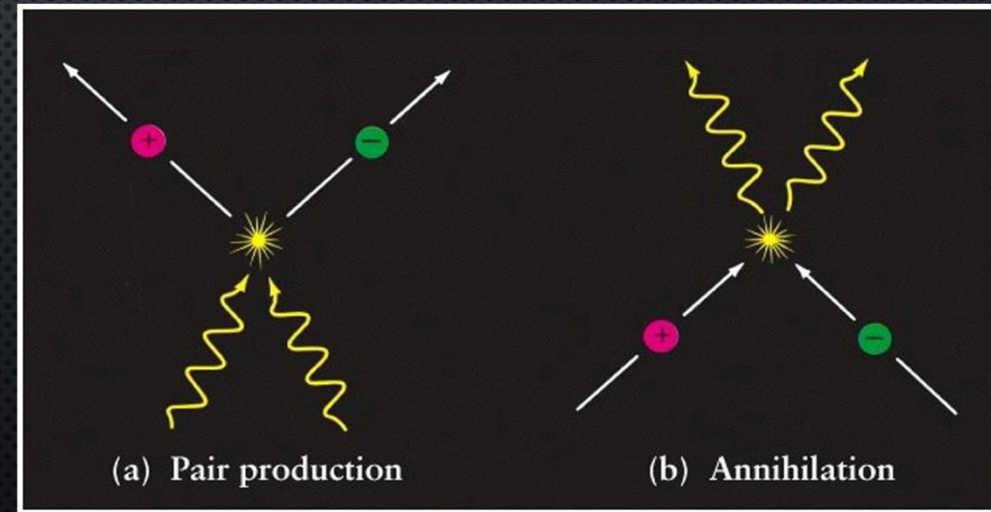
ANTIMATTER IN A NUT SHELL



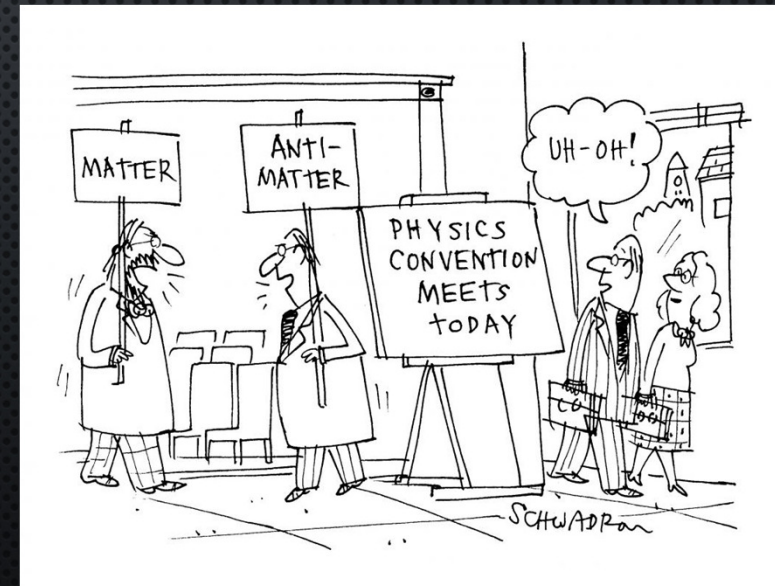
- ANTIMATTER IS MATTER THAT CONSISTS OF ANTIPARTICLES
- EVERY PARTICLE OF MATTER HAS ITS EQUIVALENT PARTICLE OF ANTIMATTER
- AN ANTIPARTICLE HAS AN ELECTRICAL CHARGE THAT IS OPPOSITE TO ITS COUNTERPART PARTICLE'S CHARGE
- ANTIPARTICLES HAVE THE SAME MASS AS NORMAL PARTICLES HAVE
- ANTIMATTER BEHAVES RELATIVELY THE SAME WAY AS MATTER DOES

THE BEHAVIOR AND OCCURRENCE

- IF MATTER AND ANTIMATTER COME IN CONTACT, IT LEADS TO THEIR MUTUAL DESTRUCTION AS KNOWN AS ANNIHILATION
- THE REACTION PRODUCT OF ANNIHILATION IS USUALLY GAMMA RADIATION
- THE AMOUNT OF ENERGY THAT IS RELEASED IN ANNIHILATION IS MASSIVE AND IT CAN BE CALCULATED USING EINSTEIN'S FAMOUS EQUATION $E=mc^2$
- SO ANTIMATTER CAN'T EXIST, ATLEAST NOT THAT LONG, IN A PLACE WHERE THERE IS MATTER, LIKE IN OUR WORLD
- IN BETA DECAY THE RADIOACTIVE NUCLEUS EMITS AN ELECTRON-POSITRON PAIR
- THERE HAS BEEN MADE STUDIES WHICH HAVE SHOWN THAT LIGHTNING STRIKES PRODUCE POSITRONS IN EARTH'S ATMOSPHERE



- SCIENTISTS HAVE SHOWN IN THEIR EXPERIMENTS THAT MATTER AND ANTIMATTER PARTICLES ARE PRODUCED IN PAIRS
- PHYSICISTS HAVE SPECULATED THAT IN THE BIG BANG THERE WAS CREATED MATTER AND ANTIMATTER WHICH CAME IN CONTACT AND ANNIHILATED
- THERE SHOULD'VE BEEN CREATED AN EQUAL AMOUNT OF BOTH, BUT THE EXISTENCE OF OUR WORLD INDICATES THAT THERE WAS MORE MATTER THAN ANTIMATTER
- PHYSICISTS AREN'T SURE WHY THAT IS
- THERE MIGHT BE AN UNKNOWN DIFFERENCE BETWEEN THESE TWO CONCEPTS THAT WOULD PROVIDE AN ANSWER TO THIS QUESTION



HOW ANTIMATTER CAN BE MADE



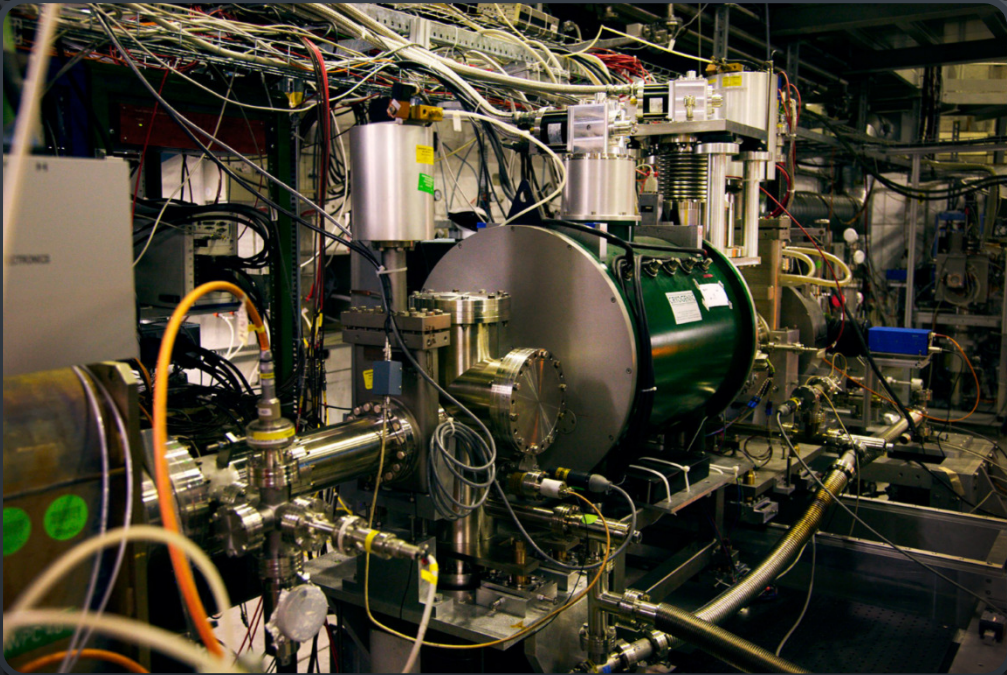
- ANTIMATTER CAN BE MADE ARTIFITICALLY BUT IT ALSO OCCURES IN NATURE
- ANTIPROTONS ARE MADE ARTIFITICALLY IN PARTICLE ACCELERATOR, WHEN YOU SPEED UP HYDROGEN IONS ALMOST UP TO LIGHT SPEED AND THEN MAKE THE IONS CRASH INTO AN OBJECT SUCH AS METAL PLATE (COPPER)
- AFTER THAT ANTIPROTONS ARE DEVIDED FROM PROTONS BY MAGNETS AND THEN THEY ARE KEPT IN NEAR- PERFECT VACCUUM WITH POSITRONS
- POSITRONS AND ANTIPROTONS FORM ANTIHYDROGEN THAT CAN BE "TRAPPED" WITH TWO POWERFUL SUPERCONDUCTING MAGNETS.
- POSITRONS CAN BE MADE MUCH EASIER.
- THEY CAN BE MADE IN BETA DECAY FOR EXAMPLE FROM NATRIUM.

HISTORY

- IN 1928 BRITISH PHYSICIST PAUL DIRAC WROTE DOWN AN EQUATION THAT BASICALLY EARNED HIM A NOBEL PRIZE IN 1933. PAUL PREDICTED THE EXISTENCE OF ANTIMATTER WITH HIS EQUATION
- IN 1932 CARL ANDERSON DISCOVERED ANTIELECTRONS AND CALLED THEM POSITRONS
- ANTIPROTONS WERE FOUND IN 1955 AND A YEAR LATER ANTINEUTRONS WERE DISCOVERED
- THE FIRST OBSERVATIONS OF ANTINUCLEI WERE MADE IN 1965



Paul Dirac



ANTIMATTER TODAY

- ANTIMATTER COULD BE THE BEST ENERGY SOURCE IN FUTURE, BECAUSE EVEN A ONE KILOGRAM OF ANTIMATTER HAS AS MUCH ENERGY AS THE BIGGEST THERMONUCLEAR BOMB EVER BUILT (Tsar Bomba)
- SO WHY WE DONT USE IT?
- WELL FIRSTLY IN TODAY IT WOULD TAKE ABOUT 100 BILLION YEARS TO MAKE A 1 GRAM OF ANTIMATTER.
- SECONDLY IT'S NOT COST EFFECTIVE. THE ENRGY AMOUNT OF OPERATING THE PARTICLE ACCELERATOR AND THE STORAGING UNIT IS ENORMOUS AND CERN CLAIMS THAT IT HAS SPENT HUNDRED MILLION EUROS JUST TO PRODUCE ONE BILLIONTH OF A GRAM.

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