Positrons

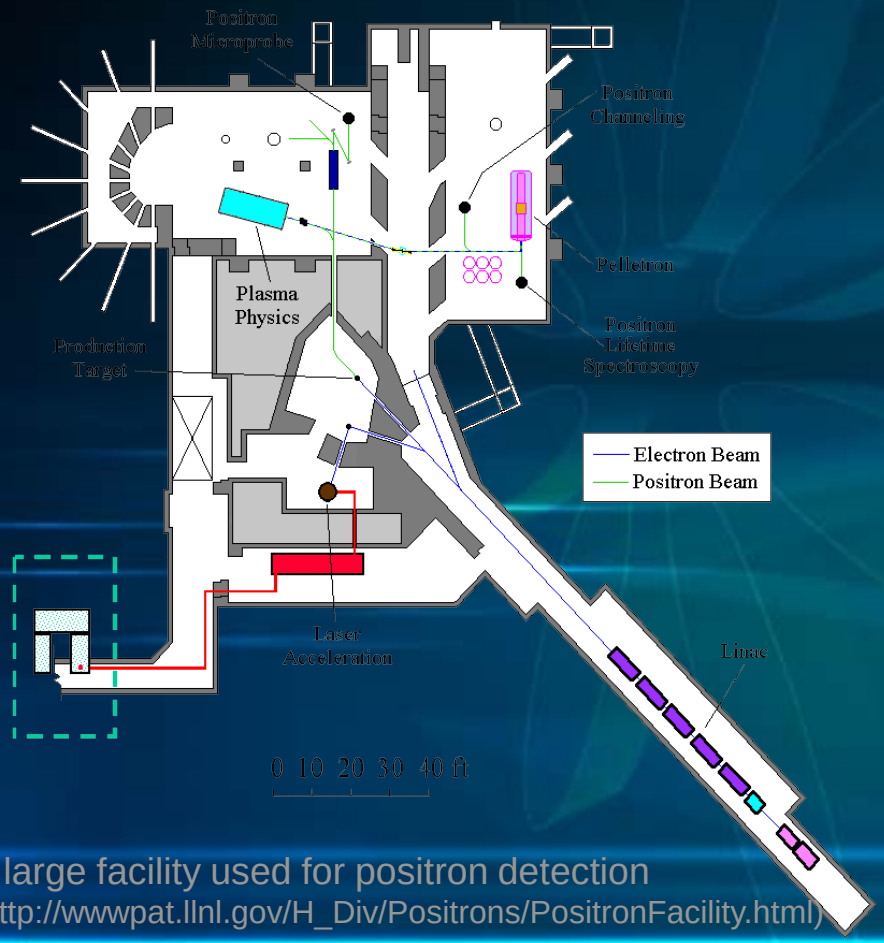
- Positrons are the antimatter equivalents of electrons
- Positrons have a mass equal to that of an electron, but have an opposite charge and certain quantum properties different from those of the electron

Artist's conception of the Lawrence Livermore National Laboratories' electron linac[1], used for positron detection

Electron-positron Annihilation

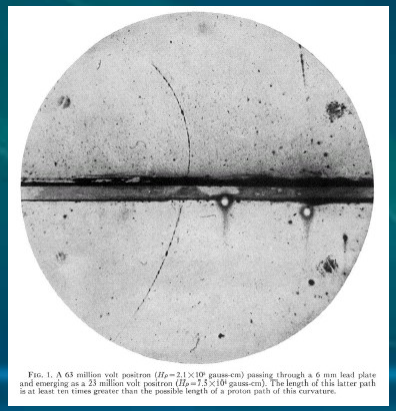
- When matter and anti-matter collide, they destroy each other in a flash of high-energy radiation
- The gamma rays emitted in the annihilation are easily detectable
- In an electron-positron annihilation the γ–rays are emitted linearly
- Sometimes the electron and positron form a brief bond through the electromagnetic force, creating Positronium
- When electron-positron pairs first form Positronium, the direction of the energy emitted from their annihilation will not be linear

Positron detection



A large facility used for positron detection (http://wwwpat.llnl.gov/H_Div/Positrons/PositronFacility.html)

- The most practical method for detecting positrons is measuring the gamma emission of their annihilation with electrons
- Many larger experiments utilize particle accelerators, but we used simpler apparatus



Photograph of the first detection of the anti-electron (positron), in 1932 at CERN

http://athena-positrons.web.cern.ch/ATHENApositrons/wwwathena/anderson.html