

The Positron

Basics

- ▶ A positron is an [elementary particle](#) that behaves in all respects like an electron that has undergone certain symmetry operations that switched some signs - especially the sign of the elementary charge it carries.
 - Elementary particles with these reversed symmetries are called **anti-particles**, and *every* particle has an anti-particle as a partner in symmetry.
 - Even the photon has an anti-particle. However, since all photon properties for which the sign would be reversed upon the "anti"-operation are zero, the photon is its own anti-particle.
- ▶ Anti-particles can exist by themselves just as happily as "real" particles; they are, however, rare in *our* universe. There seems to be an excess of particles - all anti-particles have long since vanished. The prefix "anti", of course, just mirrors a human prejudice.
 - If a particle and an anti-particle meet, they annihilate each other in a burst of radiation; in the case of electrons (e^-) and positrons (e^+), two γ quanta with the combined energy of the two particles (according to $E=mc^2$) are sent out (**511 keV** each if the particles were at rest).
- ▶ Do *not* confuse *positrons* with *holes* (h^+).
 - Holes are merely missing electrons in energy levels that are otherwise completely filled with electrons; they do not exist by themselves outside of a crystal as positrons do!