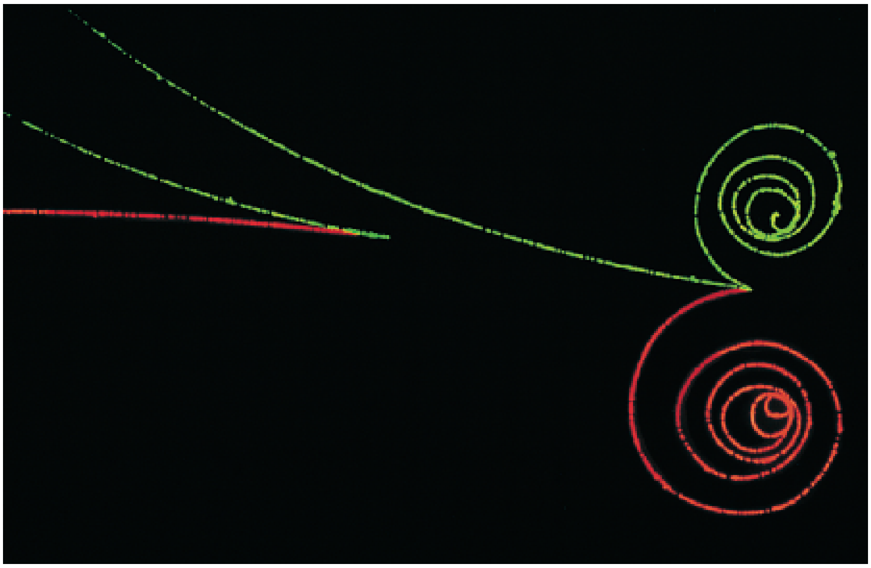

Figure 1
The red and green spirals shown here are the paths of a positron and an electron moving through a magnetic field. Note that these paths have about the same shape but are opposite in direction.

Once formed, a positron will most likely soon collide with an oppositely charged electron in a process known as *pair annihilation.* This process is the opposite of pair production—an electron-positron pair produces two photons. In the simplest example of pair annihilation, an electron and a positron initially at rest combine with each other and disappear, leaving behind two photons. Because the initial momentum of the electron-positron pair is zero, it is impossible to produce a single photon. Momentum can be conserved only if two photons moving in opposite directions, both with the same energy and magnitude of momentum, are produced.

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Antimatter produced in a particle accelerator

After the positron was discovered, physicists began to search for the anti-proton and anti-neutron. However, because the proton and neutron are much more massive than the electron, a much greater amount of energy is required to produce their antiparticles. By 1955, technological advances in particle accelerators brought evidence of the anti-proton, and evidence of the anti-neutron was found a year later.

The discovery of other antiparticles leads to the question of whether these antiparticles can be combined to form antimatter and, if so, how that antimatter would behave. In 1995, physicists at the CERN particle accelerator in Geneva, Switzerland, succeeded in producing anti-hydrogen atoms, that is, atoms with a single anti-electron orbiting an anti-proton. Researchers observed nine anti-hydrogen atoms during a three-week period. Unfortunately, the anti-hydrogen atoms had a short lifetime—less than 37 billionths of a second—because as soon as an anti-hydrogen atom encountered ordinary matter, the two annihilated one another. Attempts to produce antimatter for greater time periods are currently under way.