Bubble Chamber Basics

NOVA Activity The Elegant Universe

Physicists once used a device called a bubble chamber to record particle interactions. The illustration on your Tracking Particle Paths activity sheet represents the kinds of particle interactions that were commonly recorded by bubble chamber detectors. Today, bubble chambers have been replaced by detectors that can measure energies a thousand times larger, and can look for particles a billion times more rare. However, bubble chamber tracks are useful to show the kinds of interactions that can occur between particles. Read the information in the Tracking Particle Paths activity sheet to learn more about bubble chambers and the kinds of tracks they produce. Then answer the questions below.

Questions
Write your answers on a separate sheet of paper.

① Which letter(s) represent electron-positron pairs in this illustration? Which side of the pair(s) represents the electron? Which side represents the positron? Explain your answer.

② Which track(s) show a Compton electron that has been knocked out of an atom? Explain.

③ Assuming that tracks C and D were formed by the same kind of particles and are the actual lengths shown, which pair had greater momentum? Explain.

④ Identify a track that did not come from the particle beam. How do you know? Where might this track have originated?

⑤ What might track F represent? Explain.

⑥ What were the main types of particle interactions recorded?

⑦ What particles would not leave tracks in a bubble chamber? How can you detect where unseen particles would have been in the illustration?