
4. THE PARTICLE EXPLOSION

The number of different subatomic particles, which had been growing steadily during the 1950's, suddenly began to explode in the early 1960's. By 1964 the total exceeded a hundred different species. Most of these new particles were heavy, short-lived cousins of the lighter mesons and baryons. More than any other factor, a new experimental device was responsible for this great burst of discovery: the *bubble chamber*.

A bubble chamber consists of a large volume of liquid—commonly hydrogen, freon, or propane—maintained extremely close to boiling and exposed to a high-energy beam of subatomic particles. Just as they are about to hit, the pressure on the liquid is suddenly lowered, which boosts

the liquid above its boiling point. Tiny bubbles begin to form spontaneously along the trail of a charged particle as it tears through the atoms of the liquid. By flashing a bright light into the bubble chamber at just the right instant, one can photograph the tracks left by charged particles, which appear as lines of tiny bubbles.

The bubble chamber had been invented in 1952 by Donald Glaser, then a research associate at the University of Michigan. His first prototypes were tiny, thimble-sized tubes of liquid ether. Experimental groups at Brookhaven and Berkeley seized on Glaser's novel invention, for which he eventually won the Nobel prize, and built far larger chambers containing liquid propane and hydrogen.

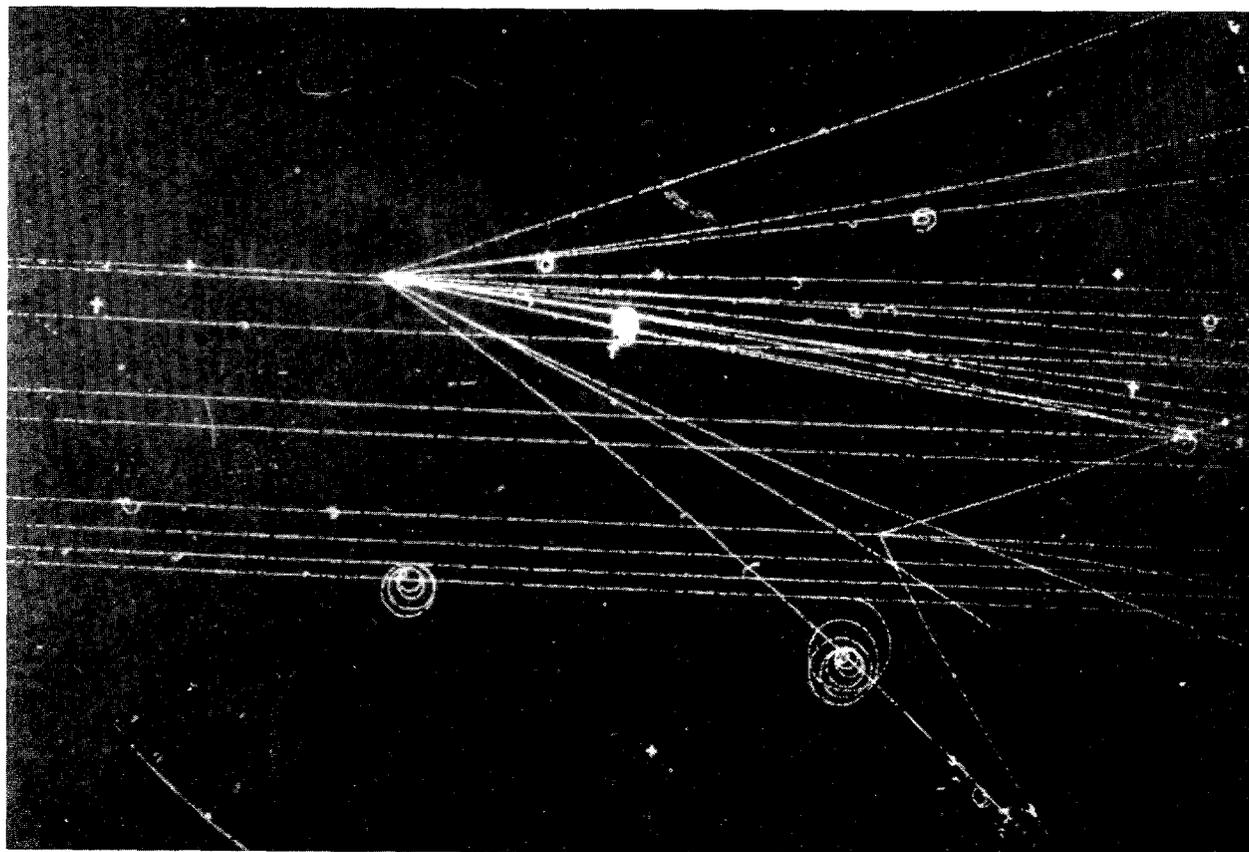


Figure 7. Bubble chamber picture of a pion-proton collision. The pion enters from the left.