

42. We note from track 1, and the quantum numbers of the original particle (A), that positively charged particles move in counterclockwise curved paths, and – by inference – negatively charged ones move along clockwise arcs. This immediately shows that tracks 1, 2, 4, 6, and 7 belong to positively charged particles, and tracks 5, 8 and 9 belong to negatively charged ones. Looking at the fictitious particles in the table (and noting that each appears in the cloud chamber once [or not at all]), we see that this observation (about charged particle motion) greatly narrows the possibilities:

$$\begin{aligned}\text{tracks } 2, 4, 6, 7 &\leftrightarrow \text{ particles } C, F, H, J \\ \text{tracks } 5, 8, 9 &\leftrightarrow \text{ particles } D, E, G\end{aligned}$$

This tells us, too, that the particle that does not appear at all is either B or I (since only one neutral particle “appears”). By charge conservation, tracks 2, 4 and 6 are made by particles with a single unit of positive charge (note that track 5 is made by one with a single unit of negative charge), which implies (by elimination) that track 7 is made by particle H . This is confirmed by examining charge conservation at the end-point of track 6. Having exhausted the charge-related information, we turn now to the fictitious quantum numbers. Consider the vertex where tracks 2, 3 and 4 meet (the Whimsy number is listed here as a subscript):

$$\begin{aligned}\text{tracks } 2, 4 &\leftrightarrow \text{ particles } C_2, F_0, J_{-6} \\ \text{tracks } 3 &\leftrightarrow \text{ particle } B_4 \text{ or } I_6\end{aligned}$$

The requirement that the Whimsy quantum number of the particle making track 4 must equal the sum of the Whimsy values for the particles making tracks 2 and 3 places a powerful constraint (see the subscripts above). A fairly quick trial and error procedure leads to the assignments: particle F makes track 4, and particles J and I make tracks 2 and 3, respectively. Particle B , then, is irrelevant to this set of events. By elimination, the particle making track 6 (the only positively charged particle not yet assigned) must be C . At the vertex defined by

$$A \rightarrow F + C + (\text{track } 5)_-,$$

where the charge of that particle is indicated by the subscript, we see that Cuteness number conservation requires that the particle making track 5 has Cuteness = -1 , so this must be particle G . We have only one decision remaining:

$$\text{tracks } 8, 9 \leftrightarrow \text{ particles } D, E$$

Re-reading the problem, one finds that the particle making track 8 must be particle D since it is the one with seriousness = 0. Consequently, the particle making track 9 must be E .