

Group 2

Bubble Chamber Workshop

Who is this presentation for?

- Students in grade 12 or 1st year university (depends on the country and the program)
- Prerequisite knowledge:
 - Electric and magnetic fields
 - Conservation of charge
 - Conservation of linear momentum in 2D
 - Lorentz force, trajectory of charged particles in perpendicular magnetic fields (i.e. hand rule!)

Resources

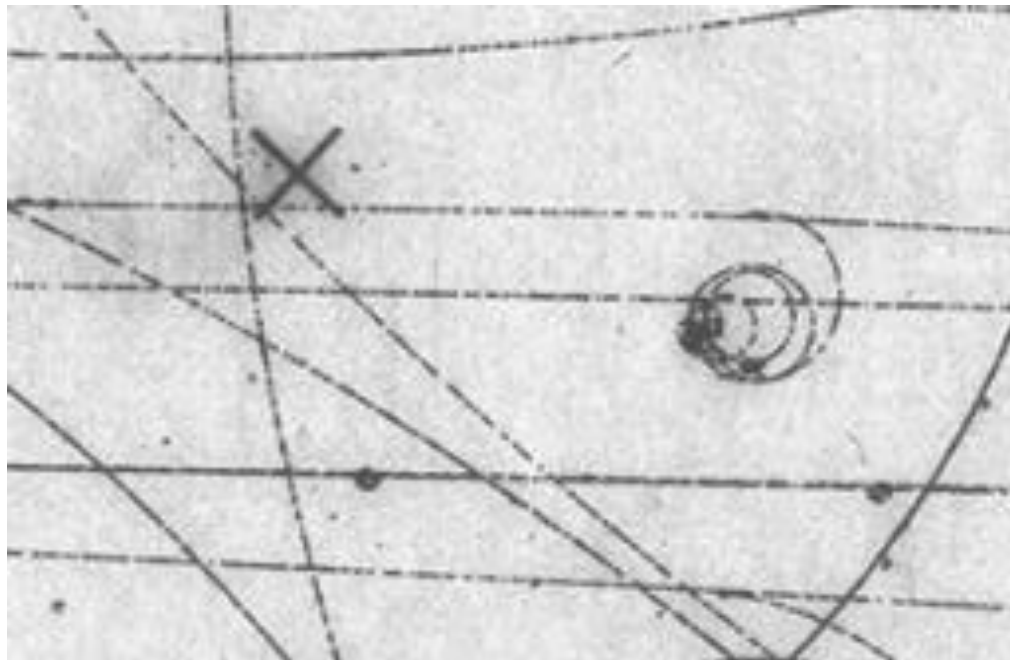


Activity

- What do you see?

Mini-lesson

- Which way are the smallest, spiraling tracks going within an individual photo? These are all made by electrons.



Activity

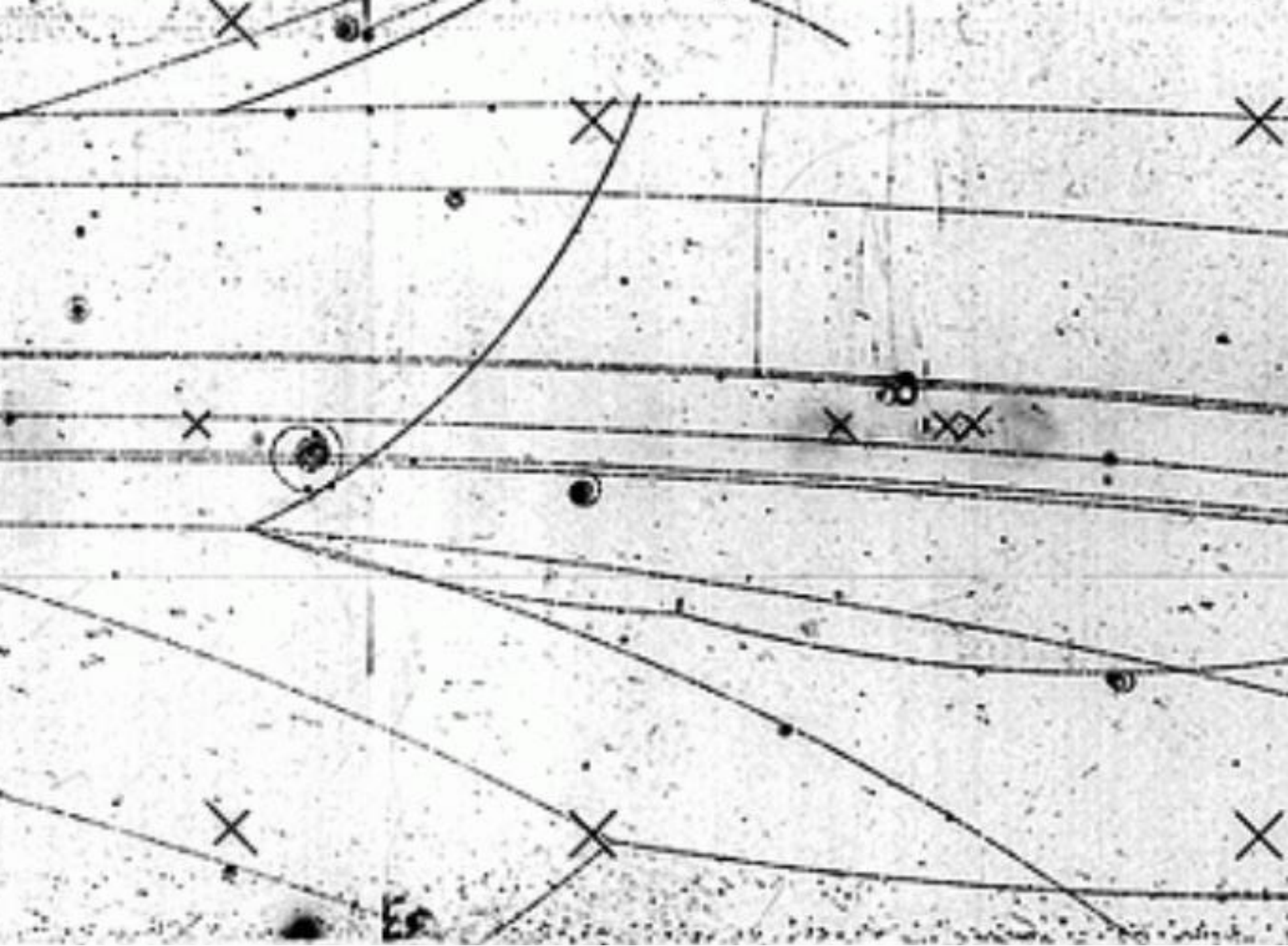
- What are the other tracks doing? What are their charges? What is the charge of the incoming beam?

Mini-lesson

- A bubble chamber is filled with liquid hydrogen gas.
- The particles that make up the incoming beam collide with the protons in the hydrogen gas. **Protons are always the target.**
- How do we apply conservation of charge to these interactions?

Activity: Applying cons. of charge

- Go back to your photographs....does using conservation of charge predict the same charges as you got previously from using the radius?



Mini-lesson

- Radius can be used to determine the momentum of the particle that made a track

Activity

- Measure the radius of each track.
- Use the radius to determine the momentum of the particle that made each track.

Mini-lesson

- How do we analyze the momentum of linear collisions in 2D?

Activity

- Set x and y axis on your photograph. Using a protractor to measure angles, measure the total momentum in the x and in the y before and after the collision.

Mini-lesson

- Why was momentum not conserved in some of the photographs?
 - Interaction might not be in the plane of the photograph
 - A neutral particle may have carried some of the “missing” momentum

Links to the LHC
