The Cloud Chamber

What is it and what can we learn from it?
What is it?

- A super saturated cloud of alcohol vapor in a plexiglass case
- Cooled by liquid Nitrogen Temperature: -320° F
- Can see tracks in the cloud as particles move thru the chamber
Examples of tracks

- Trail from an airplane
- Dumping salt or sand into soda
- So how does a particle leaves tracks?
Let’s Look at an atom

- An atom is made up of a **nucleus** (which is made up of **protons** and **neutrons**) with **electrons** orbiting it.
- **Particles** fly thru the cloud and **ionize** the gas stripping **electrons** from gas atoms.
Gas is ionized, but what then?

• Well, alcohol is a “polar” molecule
• Polar – means one side of a molecule is slightly positive, the other side is slightly negative
• The slightly negative part of alcohol is attracted to the positively ionized gas nuclei

And that forms tracks!!!
Oooooooh, pretty, but what were we looking at?

- **Alpha particle** – Thick, short, straight track
- **Helium Nucleus** – Two protons, two neutrons
- **Beta particle** – Skinny, wispy, irregular tracks
- **Electron**
  Normally orbits the nucleus

Both of these are spit out by the nucleus
Other things we saw

- **Gamma particle** – long, thin, straight track – very high energy light (a.k.a. photon)

- **Muon** – Longest track, straight, isolated, heavy copy of an electron
  - Comes from cosmic rays

But what created this radiation?
Back to Cosmic Rays

Where do they come from?

- Our sun
- Other stars
- Black holes
- Supernova
- Other galaxies and a variety of other sources
Air Showers

- Cascade of particles bombarding us from air showers
- Protons/Helium nuclei hit atmosphere, create shower of bizarre particles
Radiation, It’s Everywhere

Sources of Radiation on Earth

- Bricks (Uranium)
- People
- Dirt
- Radon
- Potassium (bananas)
The End