

# 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



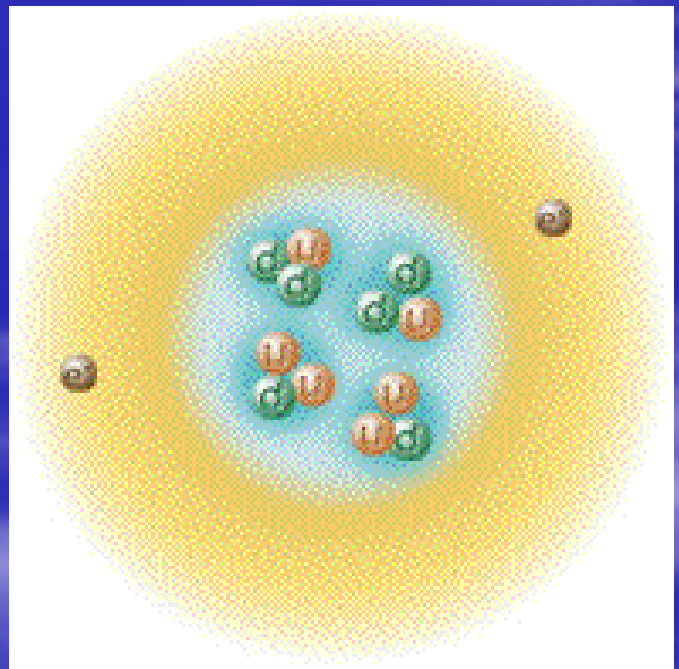
✓ Dumping salt or sand into soda

✓ 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!!!**

Ooooooh, pretty, but what were we looking at?

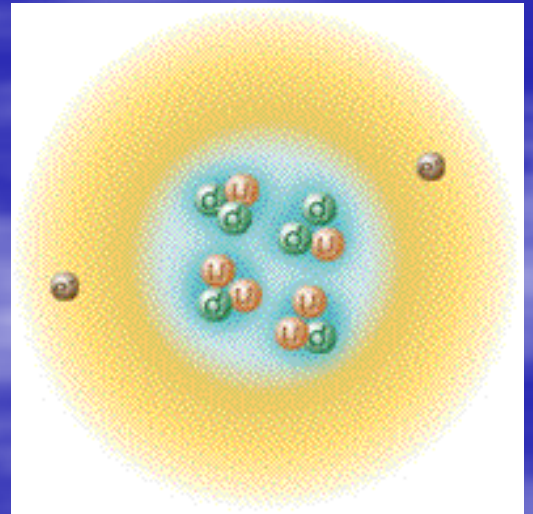
- Alpha particle – Thick, short, straight track

Helium Nucleus – Two protons, two neutron

- Beta particle – skinny, wispy, irregular tracks

Electron

Normally orbits the nucleus



Both of these are spit out by the nucleus

# Other things we saw

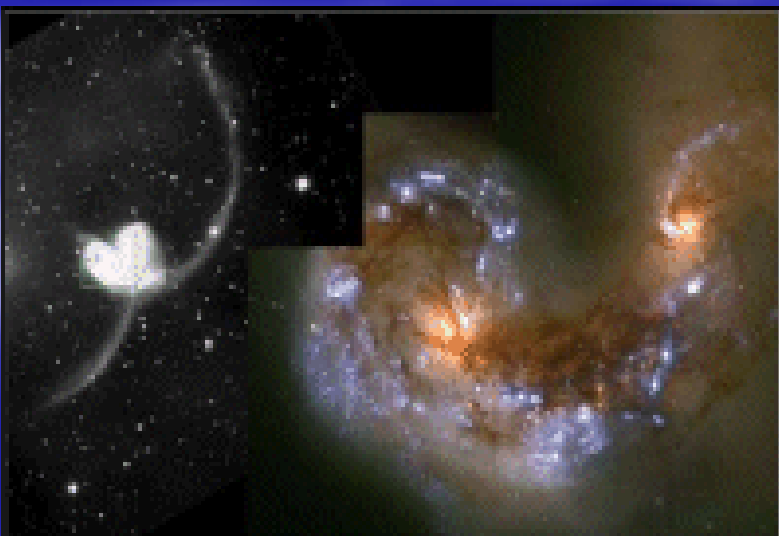
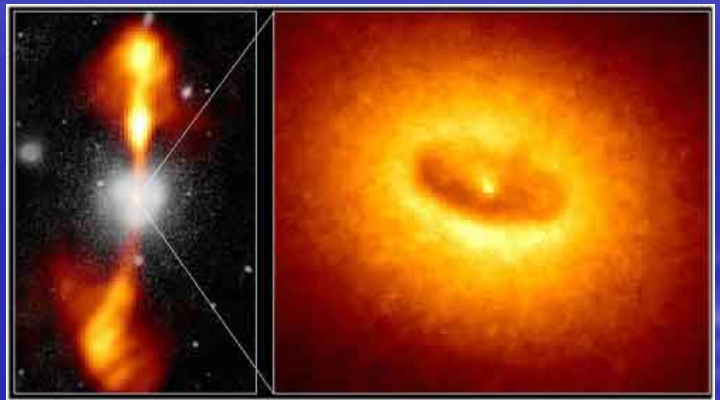
- Gamma particle – long, thin, straight track – very high energy light (a.k.a. photon)
- Muon – Longest track, straight, isolated, heavy copy of an electron
  - Comes from cosmic rays

**But what created this radiation?**

# Back to Cosmic Rays

## ❖ Where do they come from?

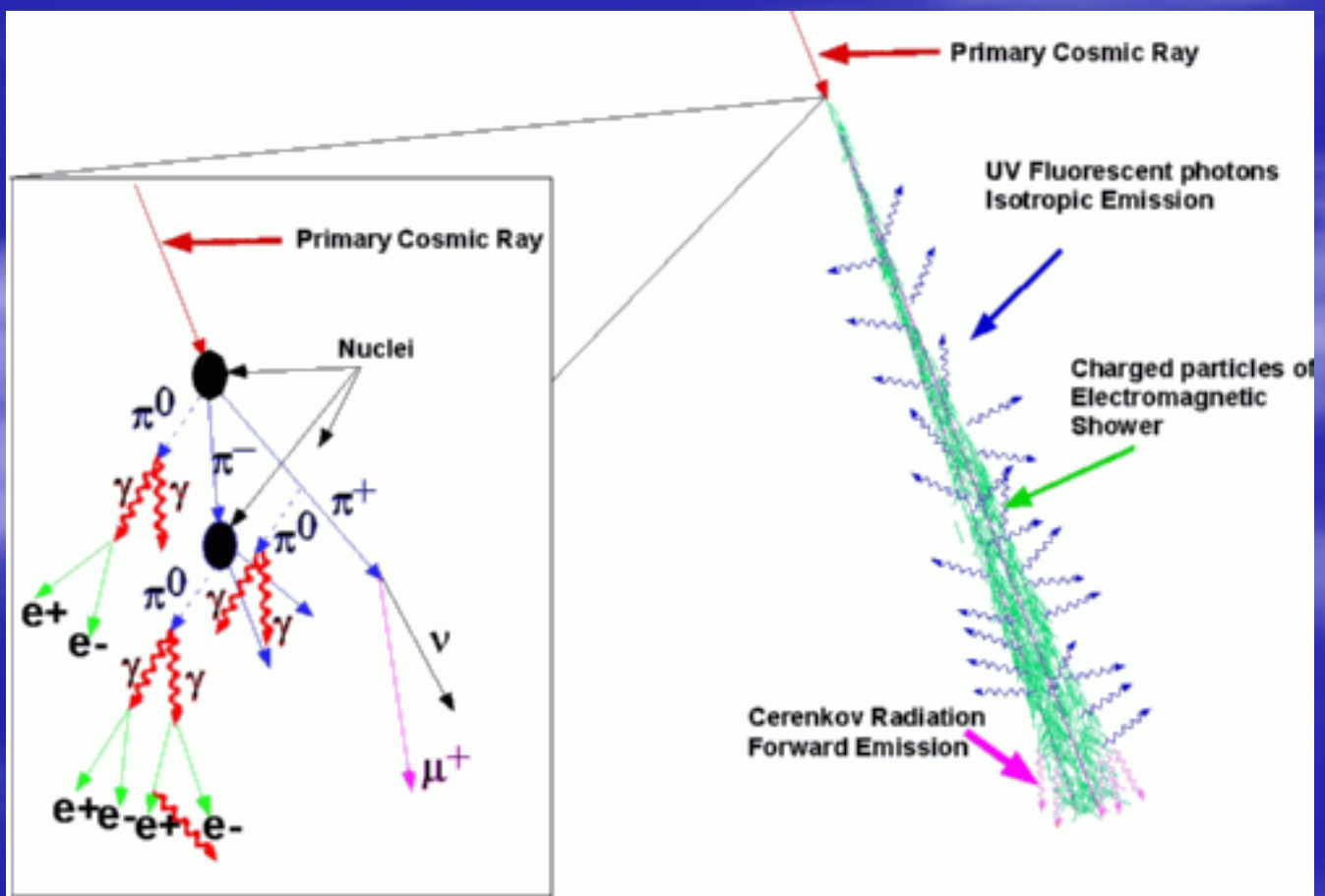
- ▶ Our sun
- ▶ Other stars
- ▶ Black holes
- ▶ Supernova
- ▶ Other galaxies and a variety of other sources



Colliding Galaxies NGC 4038 and NGC 4039  
Hubble Space Telescope - Wide Field and Planetary Camera 2

# Air Showers

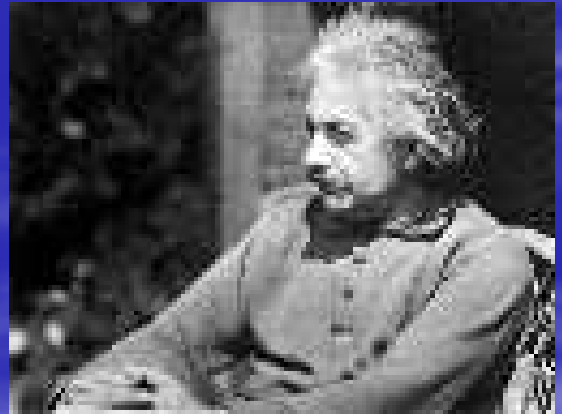
- Cascade of particles bombarding us from air showers
- Protons/Helium nuclei hit atmosphere, create shower of bizarre particles



# Radiation, It's Everywhere

## Sources of Radiation on Earth

- ✓ Bricks (Uranium)
- ✓ People
- ✓ Dirt
- ✓ Radon
- ✓ Potassium (bananas)



**The  
End**