
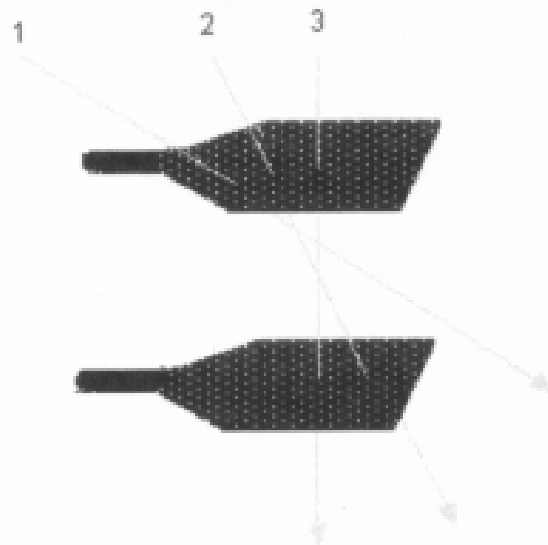
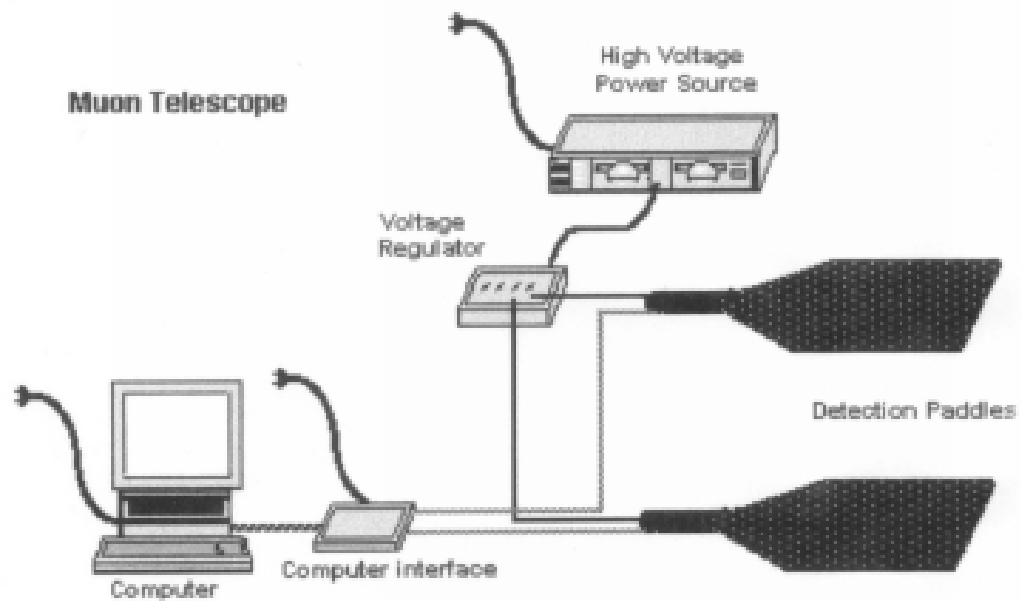


# **Muon Telescopes**

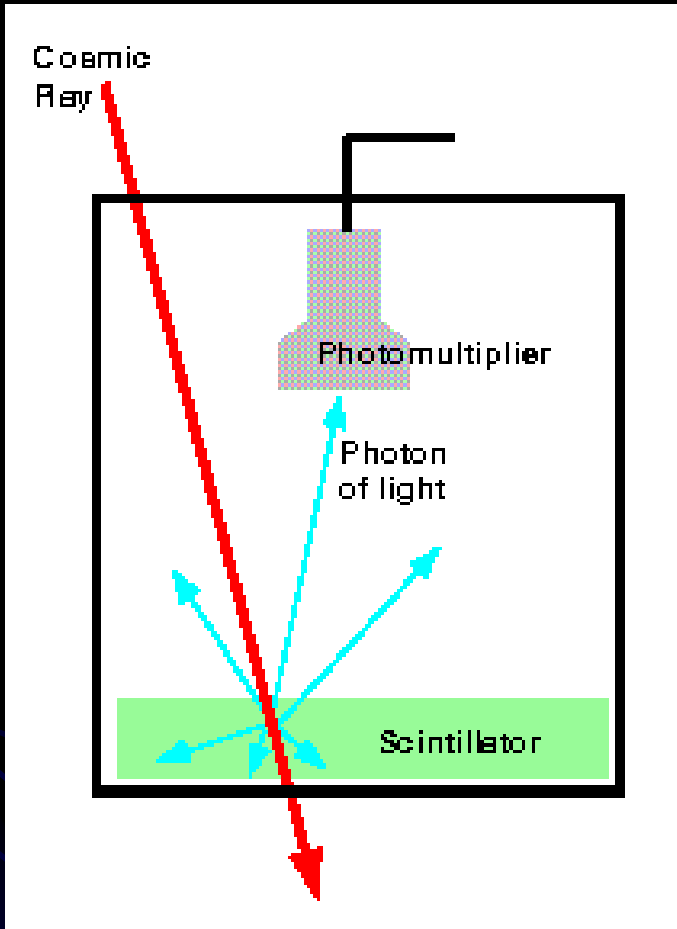


**Jesse Chvojka**  
**University of Rochester**  
**PARTICLE Program**

# The Setup




# The Paddles



# Cosmic Rays

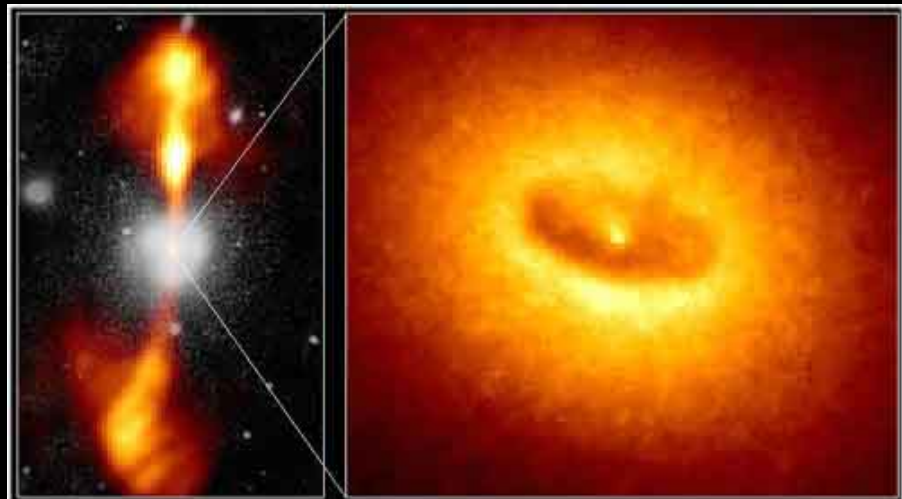
## What are they?

- ✘ Loose term – High energy particles that continually bombard the Earth from space
  - ✘ Usually photons, but also can be charge particles
  - ✘ Creates Showers in the atmosphere
- 

# Where do they come from?

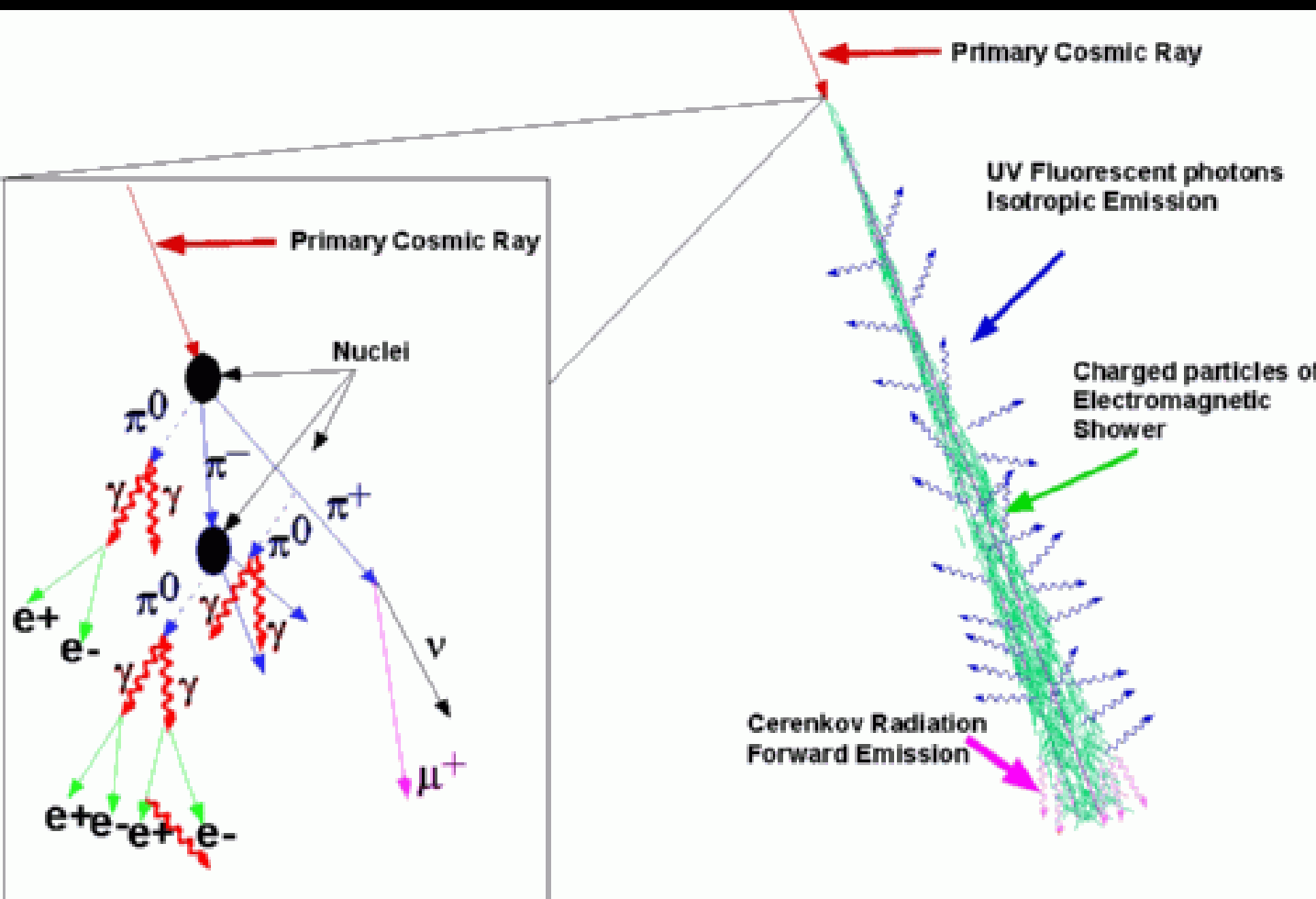
Origins are hard to describe

- Interstellar, intergalactic, our own sun, etc.
- In the case of photons, stars, black holes, quasars, etc.
- In the case of charged particles, anywhere within the galaxy

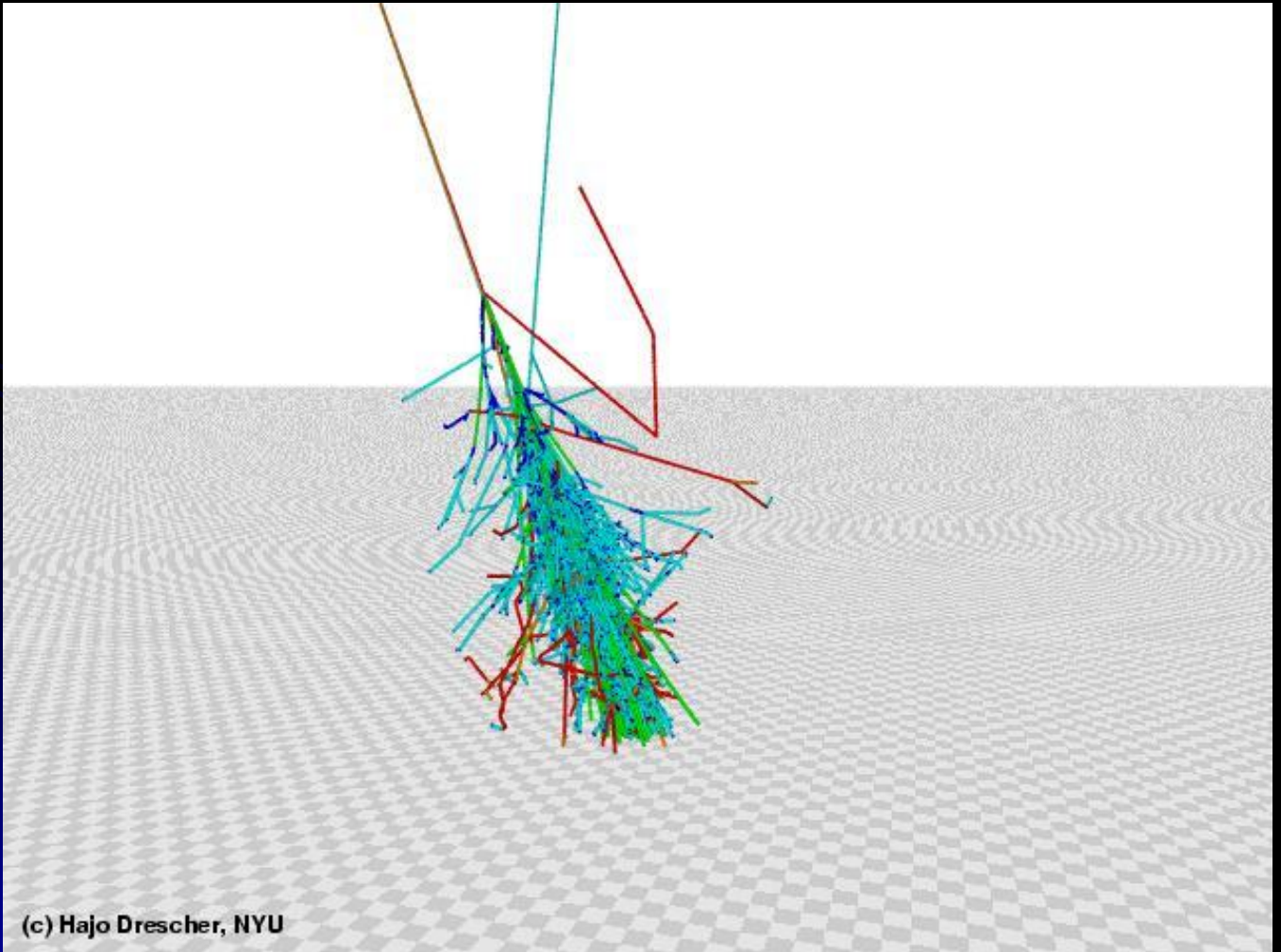


# Air Shower

- What you'll really be detecting are air showers from cosmic rays



# Simulation of Air Shower

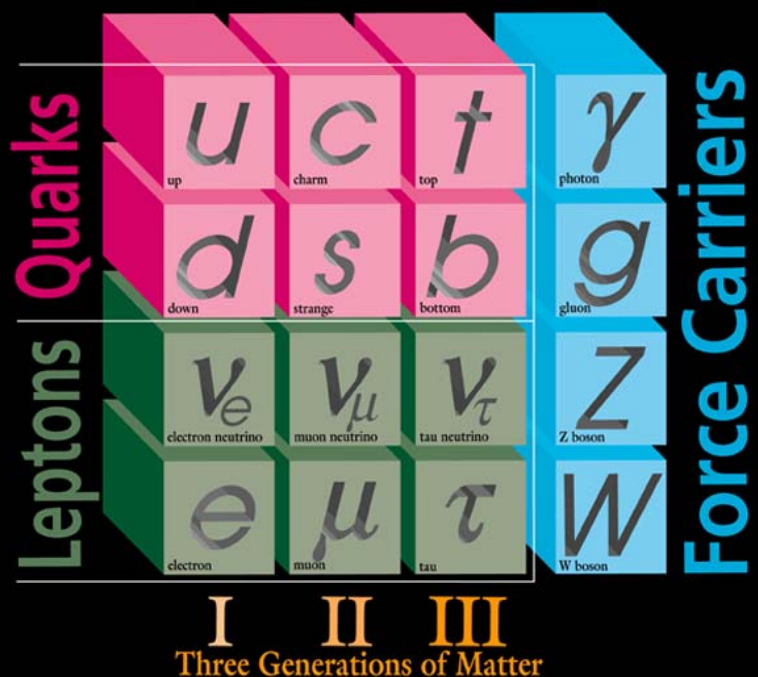


(c) Hajo Drescher, NYU

# So What is a Muon?

- ❖ Heavier cousin to the electron (by a factor of 200)
- ❖ Has a charge of + or – one (matter vs. antimatter)
- ❖ Unstable (yet it still makes it miles through the atmosphere)

## ELEMENTARY PARTICLES



# But Why Muons?



- Penetrates all the way through the atmosphere to sea level and even through this building
- Other radiation from cosmic rays is stopped by atmosphere
- Can do coincidence run to filter out signals other than muons
- Neat way to see bizarre particle

# What can you do with this experiment?



- Look at properties of cosmic rays
- Figure out how fast these things are going
- Figure out life time of the muon (it is an unstable particle)
- Use your imagination