ITSP -2015

Team -151

TEAM MEMBERS

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Project Topic: Cloud Chamber.

Motivation: It was one of the topics suggested by the mentors which caught our attention. Due to our interest in physics and its application in the real world we decided to work on this topic as it helps visualize particles we study about theoretically and solve numerical without having much references to how it actually works.

The **cloud chamber**, also known as the **Wilson chamber**, is a particle detector used for detecting ionizing radiation.

THEORY

When a charged particle interacts with the supersaturated vapor of water/alcohol (for example, an alpha or beta particle) interacts with the mixture, the fluid is ionized. The resulting ions act as condensation nuclei, around which a mist will form. The high energies of alpha particles mean that a trail is a left, due to many ions being produced along the path of the charged particle.

BROAD VISION

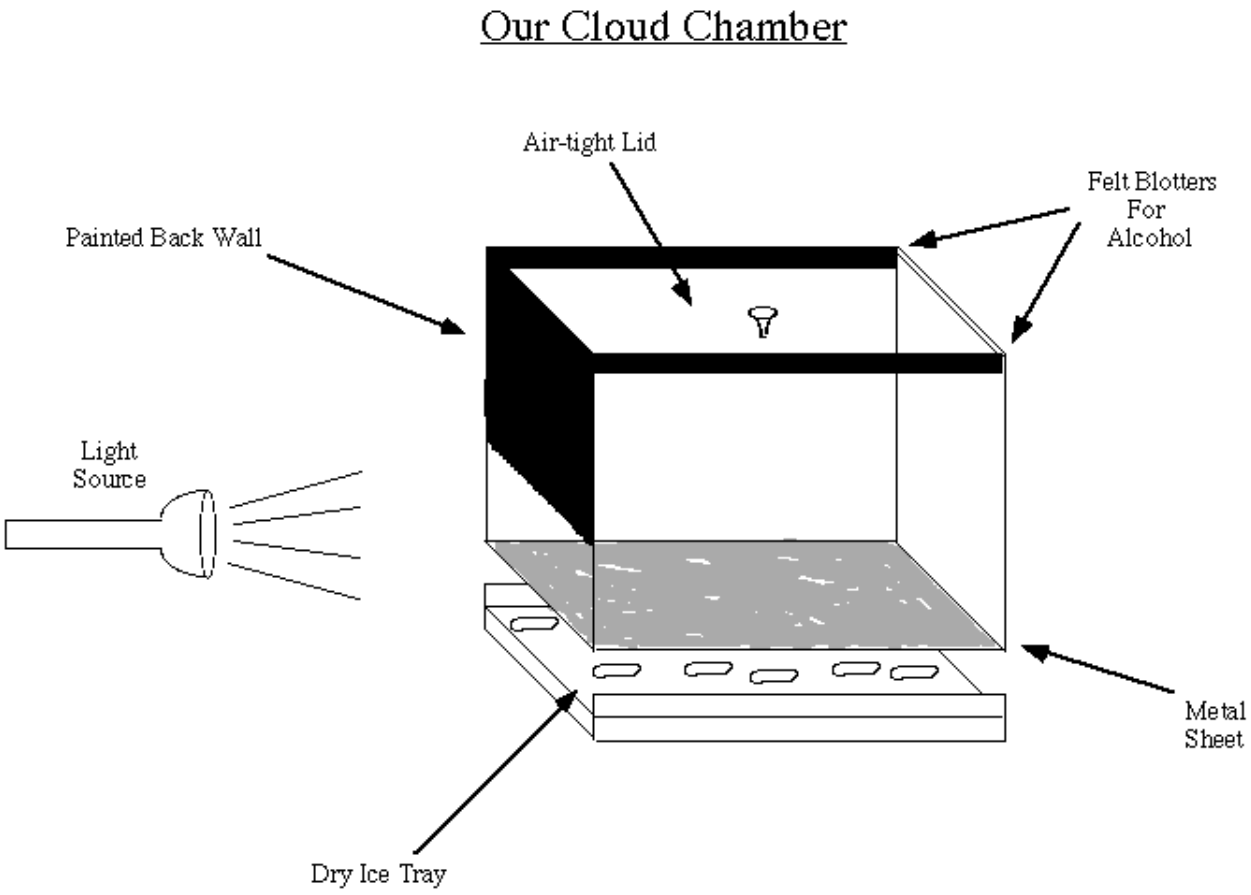
We hope to help students visualize and actually understand how these particles move about. It will help in all the courses involving radioactivity. The cloud chamber effectively depicts and brings to life what we only solve in theory and as a problem in exams. This will help the students with a deeper understanding of the working and also help them develop strong concepts. The cloud chamber on slight variations can also show different procedures and effect of external factors.The cloud chamber can also be updated to form a bubble chamber which detects more energetic particles at a relative ease.

DEMONSTRATION

The cloud chamber would demonstrate the path of various charged particles. It will also depict the path of the particles when in the influence of strong magnetic field. Placing several plates of metal

upright, one behind the other, in the chamber we will show how many plates the tracks can go through.

We hope to build on teamwork and help understand the physics involved at a deeper level helping us to thus understand a whole new set of different things with the above as a basis.



Parts & Supplies Required:

- A small 2-gallon rectangular aquarium (6" W x 12" L x 6" H) with a **transparent bottom**.
- A slide projector or other high intensity light
- A metal plate or cover for aquarium, from 1/32" to 1/16" in thickness
- A piece of thin cardboard (from a notebook or cereal box) the same size as the metal plate
- Black electrical tape
- Three pieces of 12" x 12" felt, any color (available at art supply stores)

- A box that snugly fits around the base of the aquarium, about 3" in height
- A piece of styrofoam or padding just less than 3" in height
- Duct tape
- Clear Silicone Sealant
- 12 oz. of 100% pure isopropyl alcohol (check with chemistry suppliers)

1 lb of dry ice, cut into thin (1/4" to 1/2" thick) slices if possible

LINKS AND SOURCES

- http://en.wikipedia.org/wiki/Cloud_chamber
- http://en.wikipedia.org/wiki/Bubble_chamber
- http://www.symmetrymagazine.org/article/january-2015/how-to-build-your-own-particle-detector
- http://www.amnh.org/education/resources/rfl/web/einsteinguide/activities/cloud.html
- https://teachers.web.cern.ch/teachers/document/cloud-final.pdf
- http://w4.lns.cornell.edu/~adf4/cloud.html
- http://hep.ucsb.edu/people/hnn/cloud/articles/ALangsdorfRSI10_91_1939.pdf

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