Findings on Cloud Chambers

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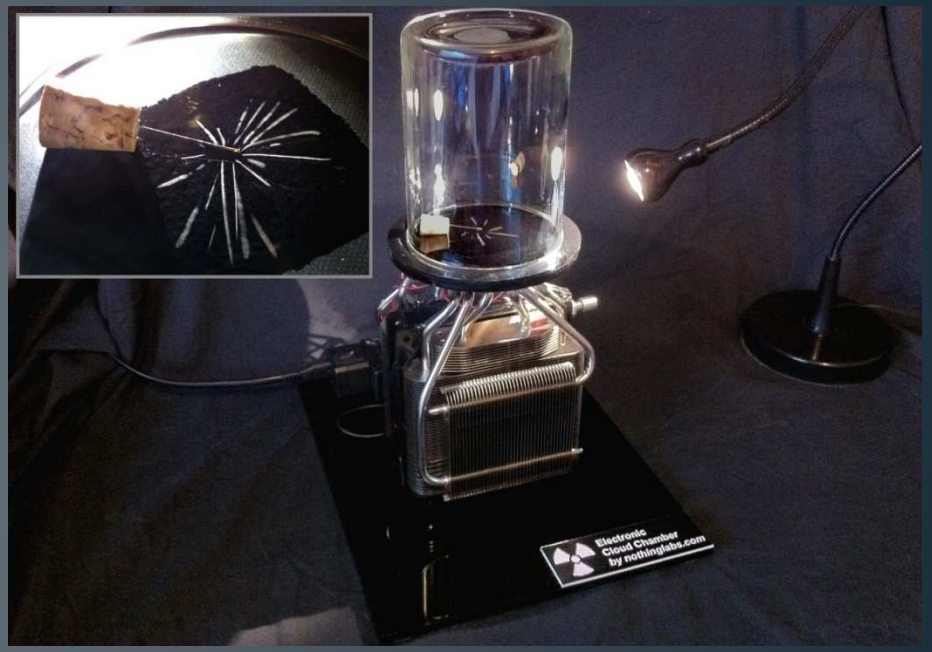
QuarkNet Outreach

2 Designs

- Peltier Cooled – More expensive, no dry ice, more control over temperature, quicker cooling. Cons: coolers are small and require outside heatsink.
- Dry Ice Cooled – Significantly cheaper, many different build designs online, cooler temperature than single Peltier (-30°F vs -109°F). Cons: Need dry ice…

Example of Peltier Cooled

- Peltier Cooled Glass Jar
  - Temp: -30°F
  - Cool Time: 10 minutes
  - Tracks Seen: Mainly from samples, although reports can see CR tracks.
  - Price: $750 + Shipping
  - Nothinglabs.com



Example of Dry Ice Cooled

- Dry Ice Cooled Plastic Container
  - Temp: < -30°F
  - Materials: Plastic fish tank, cooking sheet, container for dry ice
  - Price: < $50
  - http://iopscience.iop.org/0031-9120/47/3/338

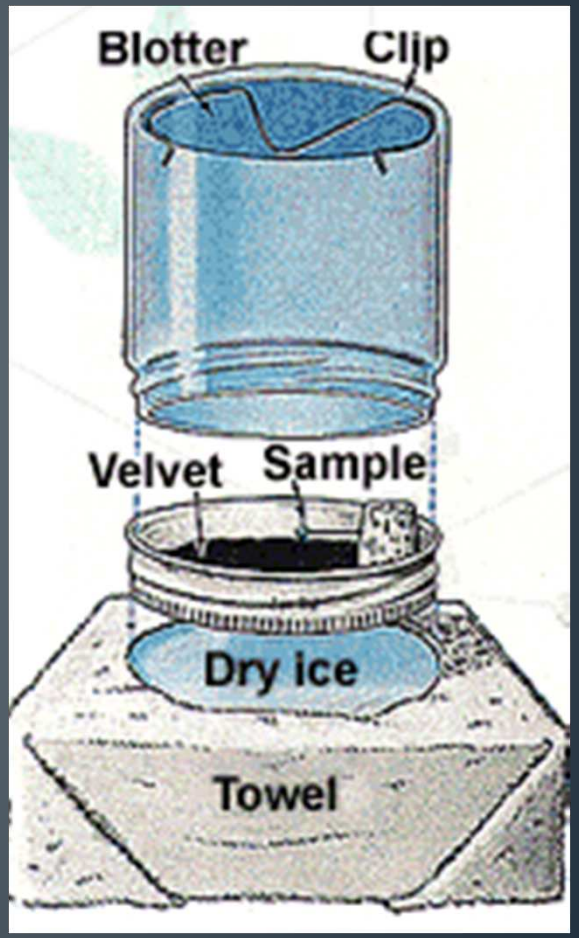
So We'll use a Dry Ice model!

Design Considerations

- According to Pruitt and Simpson, larger chambers lead to higher temperature gradients.
- Have seen many designs that say wrapping most of the viewing area in dark paper helps visibility.
- Cheaper and easier the build, the better.

BizarreLabs Design

- Glass “bell” jar
- Container for dry ice
  - With towel over
- Black Velvet
- Sponge (or more velvet)
- Black construction paper
- Light



My Design Proposal

- Large 1 gallon glass pickle jars that can be recycled from work
- LED flashlight
- The rest of previous design
- Potentially warm rag over top (evidence for this in Donoghue).
- Price: ~$20 + dry ice
- Construction time/complexity: Negligible

- What I am worried about: glass breaking.

References not yet listed:

- Donoghue, A. (2010). Design and Construction of Thermal Diffusion Cloud Chamber. Retrieved from http://digitalcommons.calpoly.edu/cgi/viewcontent.cgi?article=1014&context=physsp
- Pruitt, S. & Simpson II, M. A Continuously Sensitive Cloud Chamber. Retrieved from http://motor1.physics.wayne.edu/~cinabro/cinabro/education/wsucure/reports/pruitt-simpson.ps