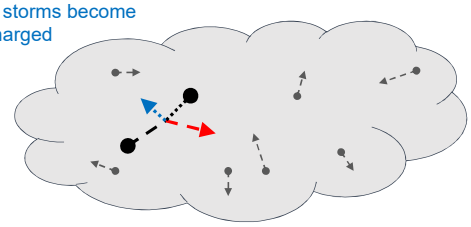
Electrostatic Applications

Lightning
Laser Printer
Air Filters
Cathode Ray Tube
Faraday Cage
Fueling

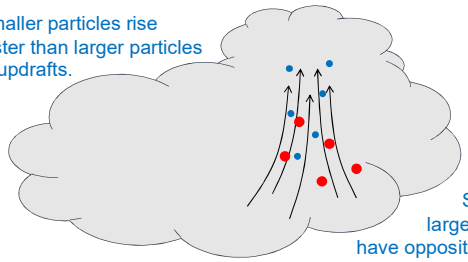
Lightning

Frozen particles colliding in storms become charged

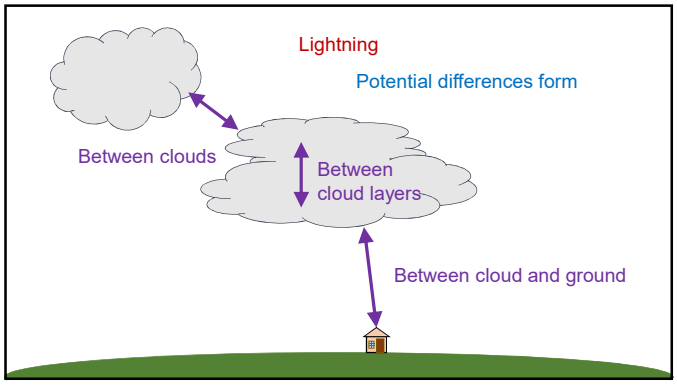


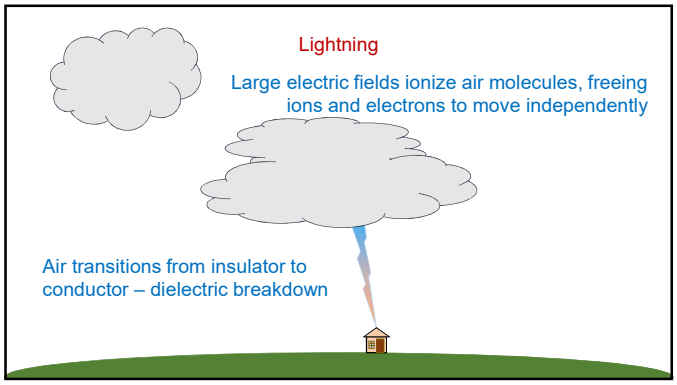
Lightning

Smaller particles rise faster than larger particles in updrafts.



Small and large particles have opposite charge.

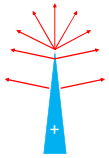




Lightning

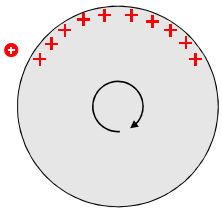
Lightning tends to strike along the path of greatest electric field strength

- At high points $\left(E = \frac{V}{d}\right)$
- At sharp points

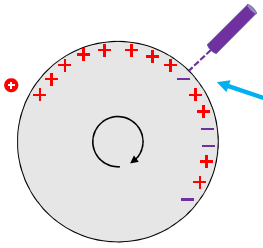


Laser Printer

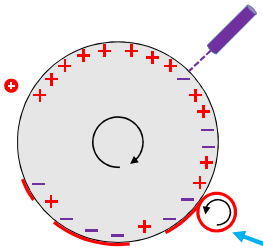
Positive charges from highly charged corona wire attach to rotating drum.

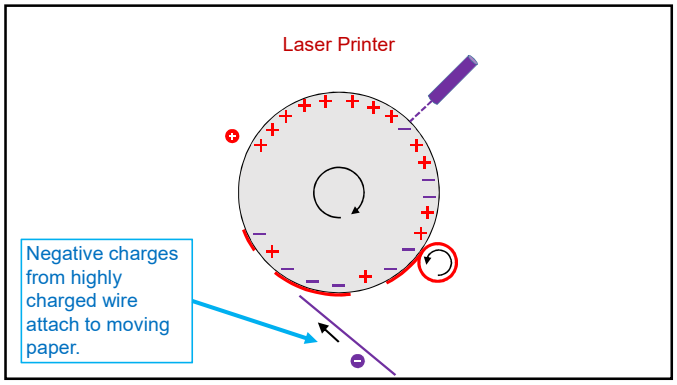


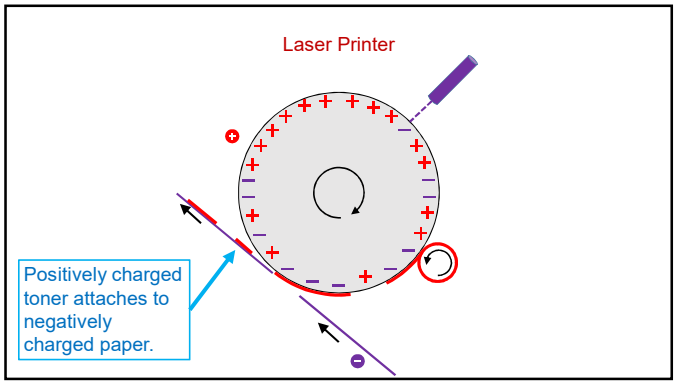
Laser Printer

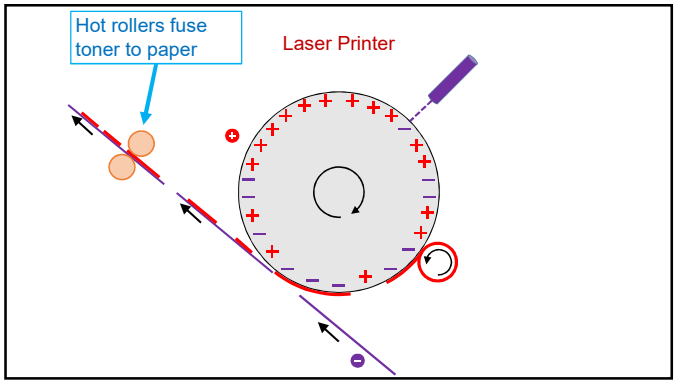


Laser Printer



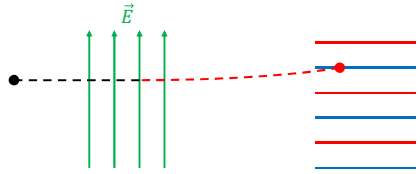

Laser Printer
Negative charges from highly charged wire attach to moving paper.


Laser Printer
Positively charged toner attaches to negatively charged paper.

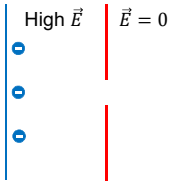

Hot rollers fuse toner to paper
Laser Printer

Electrostatic Air Filter

- Air passes through region with high electric field where dust particles get charged.
- Air passes through oppositely charged surface where dust particles adhere.

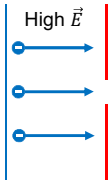


Cathode Ray Tubes and Other Particle Accelerators



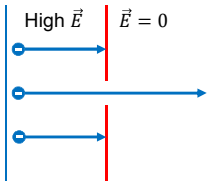
Large electric field releases charges from plate.

Cathode Ray Tubes and Other Particle Accelerators



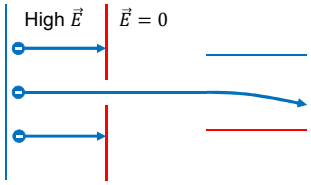
Large electric field accelerates charges across gap.

Cathode Ray Tubes and Other Particle Accelerators



Charges that make it through the gap continue at constant speed in zero field region.

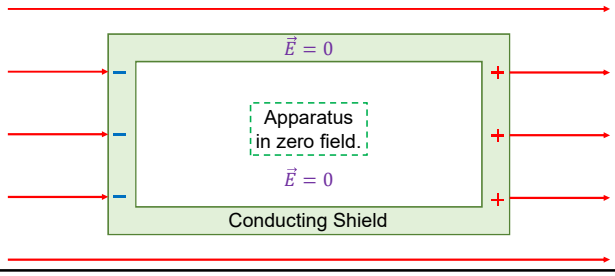
Cathode Ray Tubes and Other Particle Accelerators



Charge path may be turned by electric and or magnetic fields.

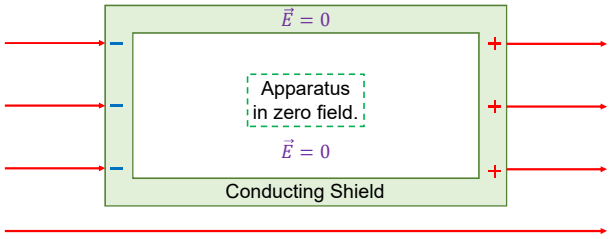
Faraday Cage

A conducting shield intended to keep out electric fields



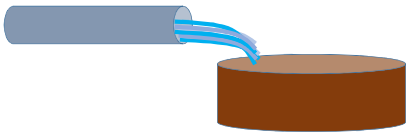
Faraday Cage

Perfectly excludes static fields.
Imperfectly excludes electromagnetic waves.



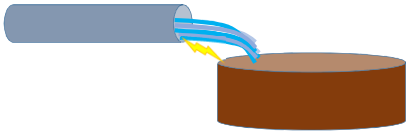
Fueling

The process of fuel flowing through a hose can charge the fuel and the hose resulting in a potential difference between the hose and the receiving container.



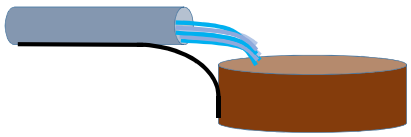
Fueling

If the potential difference is large enough it can produce a spark between the hose and the container igniting the fuel.



Fueling

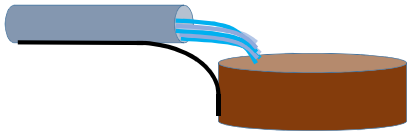
A conducting connection between the hose and container will keep the two at the same potential.



Fueling

The hazard is generally low for small transfers of fuel.

Examples of significant hazards include filling or emptying tanker trucks and fueling airplanes.



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Additional Applications

Plastic Cling Wrap
Electroplating