SUPERCONDUCTIVITY

► PHENOMENON FOUND IN SOME MATERIALS:

- No resistance to flow of electric current
- Requires extremely low temperatures

► THE HISTORY:

- 1911, ONNES (Holland), Hg at 4.2K (liquid He)--Nobel Prize 1913
- 1933, MEISSNER EFFECT explained: diamagnetism
- 1957, BCS Theory: Cooper pairs of electrons--Nobel Prize 1972
- 1986, IBM (Switzerland), LaBaCuO_x at 35K--Nobel Prize 1987
- 1987, CHU (Univ of Houston), YBa₂Cu₃O_x at 92K (use liquid N₂)
- Today, research has achieved 150K (-190F) superconductivity

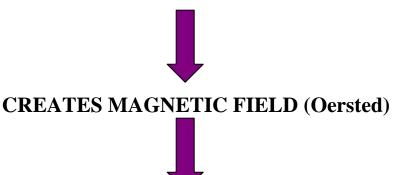
► THE PHYSICS OF TODAY'S DEMO -- MEISSNER EFFECT:

Electrons pair up (Cooper pairs) if below <u>critical current</u> and <u>critical temperature</u>:

PLACE Nd MAGNET NEAR SUPERCONDUCTOR



INDUCES CURRENT FLOW IN SUPERCONDUCTOR (Faraday)



OPPOSES THE APPLIED (Nd) MAGNETIC FIELD (diamagnetism)