

THE PHYSICS OF A LIGHTSABER

Standing Waves and Resistor Lattice Lightsaber

Tungsten Lattices

- Filaments fabricated of tungsten lattices emit more energy.
- Input energy can only leave in desired frequency bands controlling color.
- High enough energy can heat surrounding gas into plasma.

Standing Waves Math

- Initial Values: Specific Heat of Air: 1.069
 Temp: 4600K
 Length of Saber: 1 meter
- $u = B^2/2\mu_0 + \epsilon_0 E^2/2 = 2014/2\pi r^2 h$
- $E = 6.02e8 \text{ V/m}, E_0 = 1.09e10 \text{ V/m}$

Proton Accelerator Lightsaber

How Does a Cyclotron Work?

- Charged particles are initially injected into DEE 1 with a small velocity from an ion source. They move in a semicircle in DEE 1 and arrive at a gap between DEE 1 and DEE 2 after time T.
- The alternation of the potential is adjusted so that DEE 1 is at a higher potential than DEE 2 when that particles arrive at the gap between them. Each particle is therefore accelerated across the gap by the electric field across the gap and gains energy

Lightsaber Math

- Number of particles needed per second: $1.8e28 \text{ Molecules/s}$
- Energy per Second: $4.49e11 \text{ J/s}$

Electric/Plasma Arc Lightsaber

Electric/Plasma Arc Theory

- An electric arc is an electrical breakdown of a gas which produces an ongoing plasma discharge, resulting from a current flowing through a normally nonconductive medium.
- Ionized inert gas (ex: argon)
- Frees and accelerates electrons toward workspace.
- High density electron cloud moves at high velocity; high temperature
- Melts most materials known to man.

