CPEP - Brief Summaries of the Activities to Accompany the Chart

A/B. Simulating Fusion/Testing a Physical Model
This uses bottle tops with Velcro attached that are placed in a box and which is then shaken. Some of the tops will "fuse" together and this is used to demonstrate how time, particle density and temperature affect the number of fusions produced in a hypothetical reactor. The emphasis is on producing a physical model from thinking about a hands-on simulation.

C/D. Long Range Repulsion, Short Range Attraction/Modeling Interactions in a Nucleus
Strong magnets (or magnets with Velcro) can be seen to repel when far apart and attract when brought closer. This presents a kind of analogous situation to nuclei repelling when far apart and attracting to fuse when closer. This can also be used to explore the nature of induced magnetic moments.

E/F. The Physics of Plasma Globes/ Plasma Globe Spectra
In this activity the students first develop a set of reference spectra using spectrum tubes. Then the spectra from a plasma globe is observed and compared with the references. Also, they investigate some of the electrical effects of the plasma globe.

G. Plasma Globes and "Body Capacitance"
This activity is designed to guide students in understanding how plasma globes work through a series of hands-on steps which compare what happens in a plasma globe to what happens in a simple-to-construct capacitor with aluminum foil parallel plates.

> **Studying the Electric Field Near a Plasma Globe**
> Students use simple "antennas" to detect the electric fields produced by a plasma globe. Investigations lead to some understanding of the fields produced by the oscillating RF source and by the plasma streamers in the globe.

H. Resistance of a Fluorescent Bulb: Plasma Tube with Power Supply Version
Students investigate the current versus voltage for a fluorescent bulb and see how the resistance of the bulb varies with voltage and current. By developing an understanding of the nature of the resistance in the bulb they learn some of the characteristics of plasmas such as are present in the bulb.

Videos are available on youtube (search for CPEP PHYSICS)
Video - Magnetic Confinement Demonstration:
Motion of Charged Particles in a Magnetic Field
This video uses the electron beam in an oscilloscope to demonstrate the actual physics of magnetic confinement. Bar and electromagnets are used to twist the paths of electron beams so that a line on the scope screen is seen to rotate.

Video - Properties of a Plasma: Half-Coated Fluorescent Bulbs
This video shows the spectra of the uncoated and coated parts of the fluorescent bulb and compares them to the spectra of reference sources and to the spectra of incandescent bulbs. The effects of magnetic fields on the plasma in the fluorescent bulb are also illustrated.

Video – Plasma and Fusion Demonstrations
This video shows the spectra of a plasma globe and compares it to the spectra of several reference sources. The field around a plasma globe will also be observed.