Plasma: The Presentation

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A Practical Definition

- Plasma is the fourth state of matter. In plasma the electrons are unbounded from the nuclei due to very high temperatures or large voltage potentials.
Gas versus Plasma

**Electrical Conductivity:**
In gas it is very low, while in plasma it is extremely high.

**Interactions:**
Usually one-on-one collisions in gas.
In plasma each particle is constantly interacting with electric and magnetic fields over long distances.

**Velocity Distributions:**
Gas is usually assumed to be in thermodynamic equilibrium.
In plasma individual particles can have wildly different speeds.

**Form:**
Neither gas nor plasma have definite form or volume.
Cool versus Hot Plasma

Some plasma can form at low temperatures. This plasma (such as the type found in a plasma globe) may either have only a small fraction of its total mass ionized or have only electrons at high temperatures. Hot plasma is the term used to describe generic plasma such as in the sun.
Though naturally occurring plasma is rare on earth, it is the most plentiful form of matter in the universe.
Plasma in space

- Stars
- Coronas
- Solar wind
- Star nurseries
- In the magnetic fields of many planets
- Interplanetary, interstellar, and intergalactic mediums
- The accretion disks and accretion disk jets of black holes
Terrestrial Plasmas

- Fire (when hotter than 1500°C)
- Lightning
- Anything made of lightning
- Aurora Borealis
Artificial Plasmas

- Neon Signs and florescent lights
- Plasma Globe
- Arcs from arc welders
- Arcs from Tesla coils
- Sparks of static electricity
Modern plasma theory has developed to meet the demands of fusion research.

Because of the extreme heat of most plasmas, conventional materials cannot be used.

However, Plasma is an excellent conductor. This means it can be easily manipulated using magnetic fields.
Credits

http://www.thunderbolts.info/tpod/2005/arch05/051114currents.htm (img 1)
http://en.wikipedia.org/wiki/Plasma_%28physics%29(img 2 & 3)
http://en.wikipedia.org/wiki/Sun (img 4)
http://en.wikipedia.org/wiki/Lightning(img 5)
http://en.wikipedia.org/wiki/Plasma_globe(img 6)
http://energyclub.stanford.edu/ckfinder/userfiles/images/Dean1.jpg (img 7)
http://en.wikipedia.org/wiki/Neon_lighting (img 8)
http://tylercreatesworlds.deviantart.com/art/The-Ghost-Nebula-301172187 (img 9)
http://www.plasmas.org/plasma-physics.htm