Plasma Power; Is Fusion Our Future? Script

**Slide 1**: The crucial component in our Universe is energy. Energy is what keeps civilizations running. On Earth, we have many types of resources, which can be summed up into renewables and non-renewables.

Non - renewables won’t last forever, and they are slowly killing our planet through toxins released into the air we breathe, the water we drink, and the food we eat. Renewables are a great eco-friendly option, but they simply are too weather dependent to power the entire world.

Nuclear fission, while providing us with effective energy, it produces toxic radioactive waste like plutonium. Disasters like Fukushima or Chernobyl are very devastating in terms of the radiation they released. Fusion energy, which is what the sun does, might be the ultimate option. Fusion is highly theoretical, and it requires hydrogen isotopes, deuterium and tritium. Deuterium is abundant, while tritium is extremely rare on Earth.

The main question that I will be focusing on is How Do We Use Fusion Energy on Earth with Easily Available Plasma?

**Slide 2:** Fusion is a process where plasma is heated to the point that its atoms are ripped apart, and they overcome the natural repulsion, such as how positive repels positive. The incredible pressure and heat fuse both the protons into a heavier element.

According to Einstein’s Equivalence of Mass and Energy formula, E = mc2, mass is lost and energy is gained. The mass of the fused element is lighter than what the mass would be if you added the mass of both protons. If the mass of the added protons is n, then the fused element’s mass is less than n. The lost mass is converted to energy.

Plasma is electrically charged, so we can control it with magnetism. Neutrons have a neutral charge, so they collide with the fusion reactor’s walls, producing heat, and the heat is used to heat water into steam, which can be converted to energy.

**Slide 3**: My thesis is that if there is sufficient and usable plasma in CMEs, then we could extract and contain the plasma using magnetic fields because it would make the fusion process easier and more durable.

It would make the thermonuclear fusion process less costly and it may give us a source of tritium and/or other isotopes of hydrogen that aren't available on Earth. The plasma being catapulted at Earth may contain hydrogen isotopes deuterium and tritium, which we can’t confirm until further testing.

The Sun is a main-sequence star that composes of hydrogen and helium. Although samples of the sun have never been directly observed, we can infer that there would be at least trace amounts of tritium, which could be beneficial for us.

The Sun’s magnetic field is controlled by plasma, and the plasma is controlled by the magnetic field. Since the plasma is moving, the magnetic field is inconsistent. That is the reason why the Sun releases plasma into the Solar System, called coronal mass ejections, or CMEs. CMEs occur once every five days on average when the Sun is calmer.

As the plasma interacts with the atmosphere, it produces light, or auroras. My idea is to collect the plasma in the atmosphere for a readily available plasma, which can make the fusion process easier.

**Slide 4**: Here is the criteria and factors for the proposed machine to collect plasma from CMEs:

Steps of Operation

* The plasma collector needs to able to travel high up into the atmosphere to collect plasma using magnetic forces
* Then, after confining the plasma, it needs to return to the surface
* It would be ideal if the plasma collector can also serve as a part fusion reactor on the surface, to save energy and costs of transporting plasma from the plasma collector to the fusion reactor

Factors Influencing the Plasma Collector

* Atmospheric pressure
* The magnetosphere of the Earth
* Friction with air
* Cost
* Availability of plasma through CMEs

**Slide 5:**

My next steps will be to meet up with some mechanical engineers and astrophysicists to create a workable blueprint that can be built. Although it isn’t certain that this idea will work, it is hugely worth trying this idea, since anything in science is only confirmed after experimenting and discovery.

An even more effective collector would be able to collect plasma near other planets or places in the Solar System that are closer to the Sun.

With a small collector, we could do tests and experiments, to see if the plasma from CMEs is compatible with our current fusion reactors. If the plasma is a good source of deuterium and tritium, then it will be an effective way of fusion. With all the background information collected on fusion, experimenting is the next step. During the experiment, we could research how effective collecting plasma from CMEs is and see if they are reliable for large-scale production. If this technology works, then energy on Earth will be changed forever.