

# PLASMA SCIENCES EXPO 2011

November 17 and 18

Suggested Student Questions

## Brigham Young University

Ross Spencer (ross\_spencer@byu.edu)

By literally "waving your hands" explain the difference between transverse and longitudinal waves. What kind of a wave is involved in the "singing rod?" What kind of wave is involved in the Chladni plate?

How are the waves in the singing rod and Chladni plate excited?

What kind of wave interference is a standing wave and why do soldiers break their marching cadence when they cross a bridge?

## Contemporary Physics Education Project (CPEP)

Sam Lightner (lightner@westminster.edu)

Cherie Harper (gsphysics@live.com)

Of the three types of energy-releasing reactions (chemical, fission, fusion) which one releases the most energy per kg of fuel?

List three naturally occurring plasmas that exist in space beyond the Earth's atmosphere.

In the fusion simulation done at the booth, what specific nuclei do the large and small bottle tops represent?

## General Atomics

Rick Lee (leer@fusion.gat.com)

What is gaseous plasma and why is it referred to as the 4th state of matter?

## **General Atomics – Continued**

What is the most abundant element in the universe? Through what process is this element incorporated into heavier elements?

How is electricity generated that comes into your home?

Suppose oil production peaked (maxed out) in 15 years. How old will you be? How will you rely on oil in 15 years? How will you rely on oil in 30 yrs? How will your children rely on oil?

## **The Laboratory for Laser Energetics (University of Rochester)**

Reuben Epstein (reps@lle.rochester.edu)

What do the letters in the name LASER stand for?

What amount of seawater contains an amount of fusion energy equivalent to the energy in the world's oil reserve? In other words, what volume of seawater, in cubic kilometers, would this be?

What kind of rocket is used to compress fusion fuel to high density?

## **Lawrence Livermore National Laboratory**

Steve Allen (allens@fusion.gat.com)

Josh King (kingjd@fusion.gat.com)

How do radio waves, visible light, and X-rays differ as components of the electromagnetic spectrum?

Why do astronomers use radio, visible light and X-ray telescopes to collect data about the sun and other stars?

## **Lawrence Livermore National Laboratory –continued**

What COLOR is common to the plasmas that we see on earth (like the tokamak) and in the sky (like the Orion Nebula)?

## **MIT Plasma Science and Fusion Center**

Paul Rivenberg (rivenberg@psfc.mit.edu)

Name at least four examples of plasmas.

Why are magnets used to confine plasmas in some fusion experiments?

Name two ways plasmas could be used to help people.

## **MIT's UV Protection Test**

Phil Michael (michael@psfc.mit.edu)

What is UV? What does the UV index signify in the daily weather report?

What are possible long-term effects of UV exposure on skin?

What does the "SPF" mean on a tube of sun block? What does the SPF rating indicate?

### **MIT's UV Protection Test – continued**

How effective are YOUR sunglasses or favorite sunscreen at protecting you from the sun's UV? (Bring sunglasses).

### **Nevada Terawatt Facility (University of Nevada)**

Phyllis Schmidt (phylliss@unr.edu)

How does the sun produce light and energy?

What does an electric current traveling through a wire produce?

If you have an electric current traveling through a wire, what does it produce around the wire?

### **Princeton Plasma Physics Laboratory**

Deedee Ortiz (mortiz@pppl.gov)

What is the difference between a gas and a plasma?

Name a naturally occurring plasma and a human-produced plasma.

The plasma inside a fluorescent light is approximately 10,000 degrees Kelvin. Why is the glass of the bulb warm but not hot?

### **U.S. ITER Office, Oak Ridge National Laboratory**

Jamie Payne (paynejp@ornl.gov)

What is the ITER project?

What kind of reaction, which occurs naturally on the Sun, does the ITER project hope to achieve on Earth?

What are the advantages of fusion energy?

**Institute for Research in Electronics and Applied Physics**  
**University of Maryland**

William Young ([wcyoung@umd.edu](mailto:wcyoung@umd.edu))

What is resonance? Name an example?

How do sparks and lightning make sound?

How does a fluorescent light bulb work, and how can they light up without anything connected?

**University of Utah**

Doug Baird ([doug.baird@utah.edu](mailto:doug.baird@utah.edu))

Christophe Boehme ([boehme@physics.utah.edu](mailto:boehme@physics.utah.edu))

Where does a capacitor store its charge?

What happens when you charge a human to 50,000 volts?

What will happen if a stack of pie tins is placed on top of a Van de Graaff generator, which is then turned on?

## **Utah State University – Society of Physics Students**

Eric Held (eric.held@usu.edu)

How does the vandegraff build up charge and how is this different than what is in the wall circuit?

What are the four states of matter? How does liquid nitrogen help to show these?

## **Utah State University – continued**

How does the microwave interact with the grape to create plasma?

What's the difference between an incandescent and a fluorescent light bulb, and how does each bulb create light?

## **The Wonders of Physics (University of Wisconsin)**

Mike Randall (randall@physics.wisc.edu)

How does a plasma globe work?

## **Wonder of Physics – continued**

What is a Tesla Coil?

How does the Ring Launcher work?