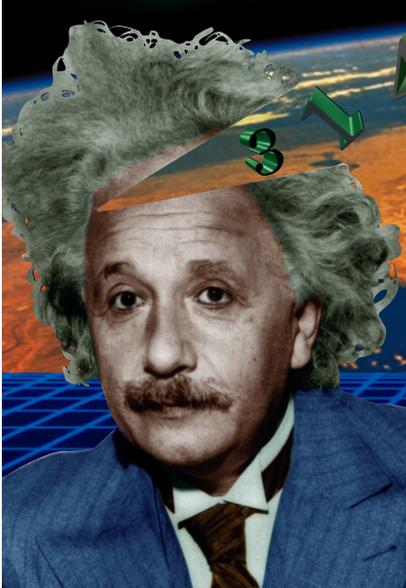


# FUSION

## ENERGY



$$E=mc^2$$

### What is fusion?

- The combination of two light atomic nuclei to form a heavier nucleus resulting in the release of energy.
- In fusion mass is converted to energy using Einstein's famous formula  $E = mc^2$ .
- This is the process taking place in the stars and is the source of sunlight here on earth.

### How much electrical energy do we use in the United States?

- On average a person uses around 1400 Watts of continuous electrical power.
- In one day, this can be provided by 14 kg (29 lbs) of coal, 10 liters (3 gal) of gasoline, or 367 jelly doughnuts.

### What reactions are best for fusion?

- The easiest is deuterium + tritium  
→ helium + neutron + energy.
- Or in science jargon  
 $2\text{H} + 3\text{H} \rightarrow 4\text{He} + \text{n} + 17.6 \text{ MeV}$ .
- $2\text{H} + 3\text{H}$  are the hydrogen isotopes deuterium and tritium.

### What happens if you just mix deuterium and tritium?

- Nothing, since nuclei are positively charged, and repel each other.
- Very high temperature (around 10,000,000 °C) is needed to push the isotopes together.

### Where can we get fusion fuels?

- Deuterium from water.
- Tritium from an auxiliary nuclear reaction with a lithium nucleus.

### Why do energy research?

- Worldwide demand for energy is growing and the supply is shrinking.
- World oil supplies will run out early in the next century.
- Other fossil fuels (coal and natural gas) may last a bit longer.
- Burning fossil fuels comes at a cost to the environment.

### Why fusion?

- Wide-spread availability of fuel; think of water versus oil.
- A lot of energy from a small amount of fuel; the top 1 inch of San Diego Bay could supply the city with enough energy for 50 years.

### Where is fusion research happening?

- USA: San Diego CA, Princeton NJ, Boston MA, Livermore CA, etc...
- England, France, Germany, Japan, Russia, etc...

For further information visit us on the Web at <http://FusionEd.gat.com>

If you have technical questions on poster content, send e-mail to [wizard@gat.gat.com](mailto:wizard@gat.gat.com)