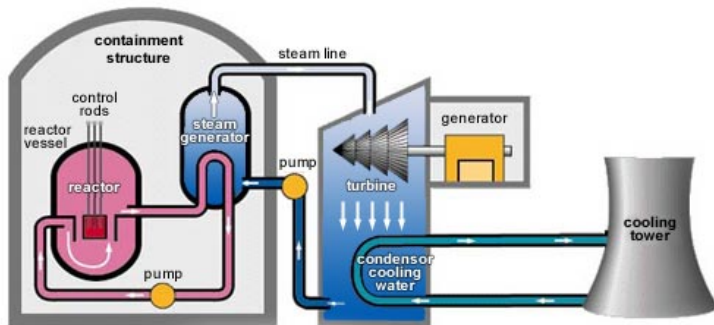


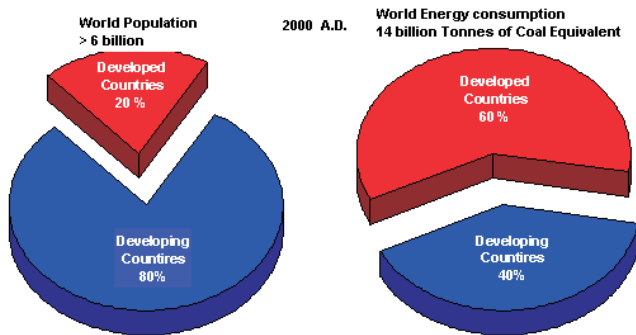
Thermal power plant - basic principle



The question:

?? WHAT TO BURN ??

World energy consumption



[credit:Energy Crisis and Environmental issues @ The World Reporter]

The 1GW (approx. Prague) annual power requirement

Coal

250 trains



Oil

11 super tankers



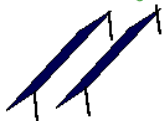
Fission

1.5 rail car load
Uranium Oxide



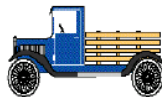
Solar

5000 acres of collectors
plus energy storage for
night and cloudy days

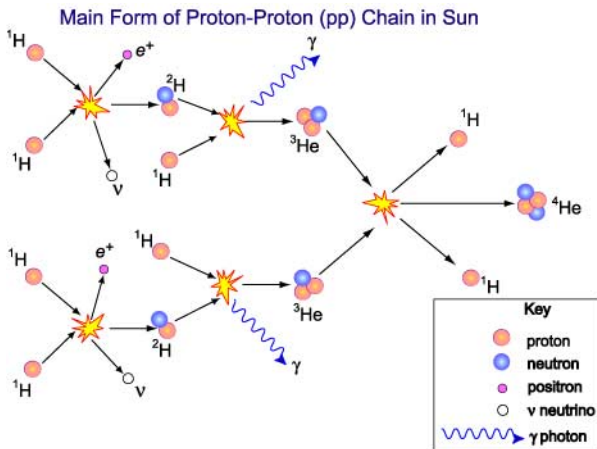


Fusion

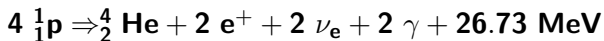
1/2 ton pickup truck
Deuterium & Tritium



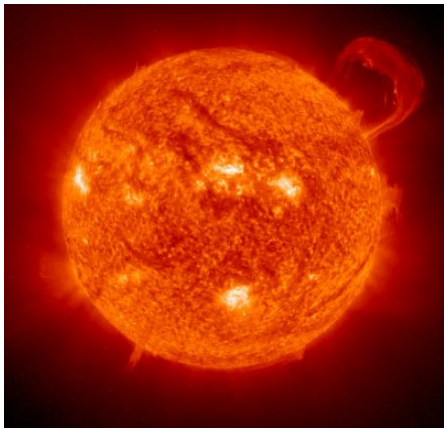
The Sun - Proton proton chain



[credit:CSIRO]



Harnessing the Sun's (star's) energy

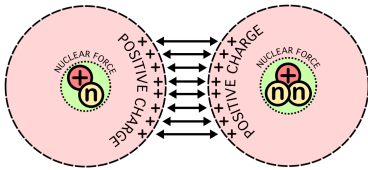


Core Burning Stages in a 25 Solar Mass Star:

<u>Fuel:</u>	<u>Products:</u>	<u>Temperature</u> <u>(K):</u>	<u>Minimum</u> <u>Mass:</u>	<u>Burning</u> <u>Period:</u>
H	He	4×10^6	0.1	7×10^6 years
He	C, O	1.2×10^8	0.4	5×10^5 years
C	Ne, Na, Mg, O	6×10^8	4	600 years
Ne	O, Mg	1.2×10^9	~8	1 year
O	Si, S, P	1.5×10^9	~8	~0.5 years
Si	Ni - Fe	2.7×10^9	~8	~1 day

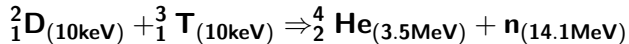
(Human body: 65% O, 18% C, 10% H, 3% N + Ca,P,K,S,Na,Cl,Mg ..)

Electrostatic force - like charges repel

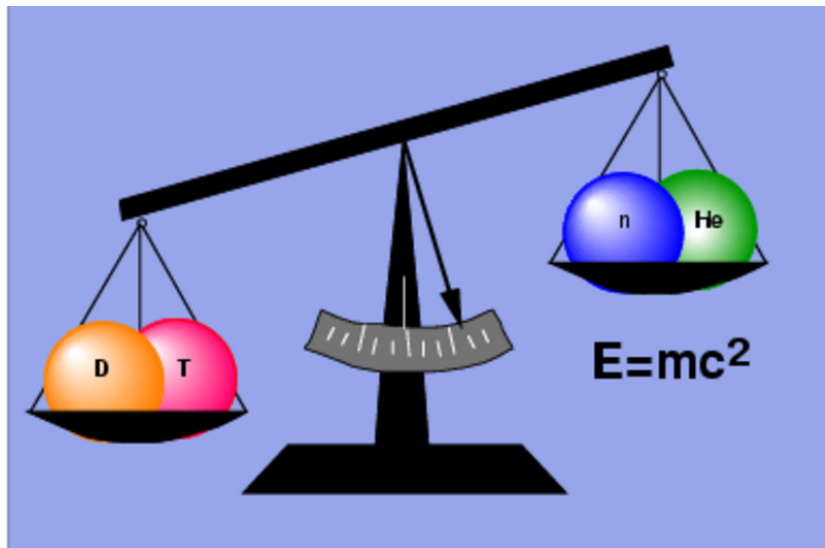


- Coulomb law:

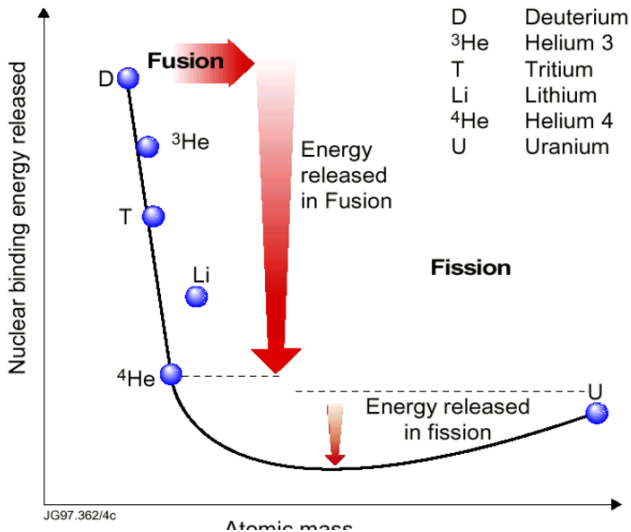
$$F_E = \frac{1}{4\pi\epsilon_0} \frac{Q_1 Q_2}{r^2}$$



Binding energy releasing I

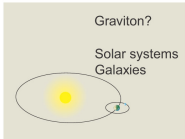


Binding energy releasing



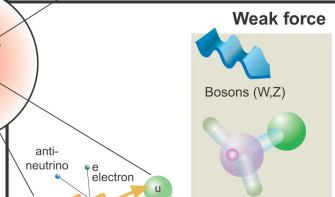
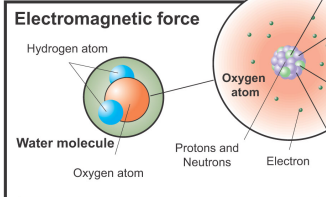
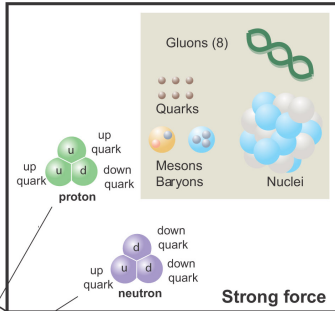
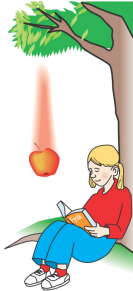
Fundamental forces (to confine?)

Illustration: Typoform



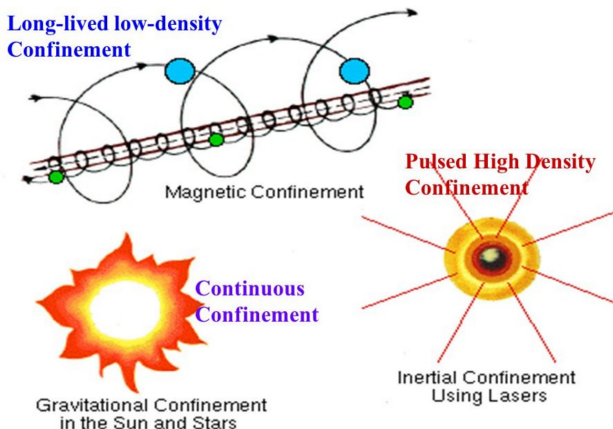
Gravity Force

Graviton?
Solar systems
Galaxies

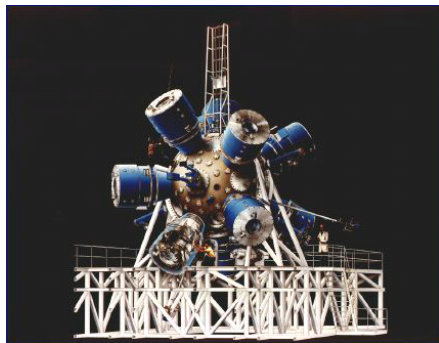
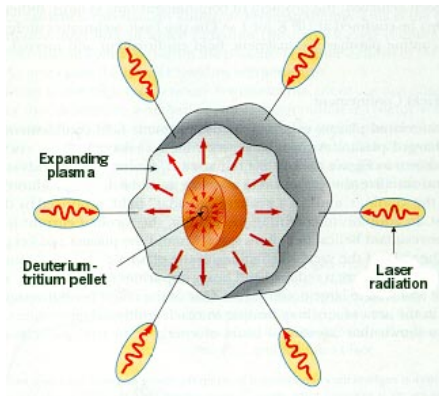


Three ways to confine plasma

$$\text{Lawson criterion: } nT_E \geq 1.5 \cdot 10^{20} \frac{\text{s}}{\text{m}^3}$$



Inertial fusion



Tokamak magnetic confinement concept

