RELATIVISTIC KINEMATICS

$E = mc^2$ and all that

(Actually it's $E^2 = p^2c^2 + m^2c^4$
where p is momentum
and m is the rest mass.)

Conversion of Mass into Energy

1 **microgram** (μg) → 89.876 **Megajoules** (MJ)

1 **milligram** (mg) → 8.9876×10^{10} Joules (J)

1 **gram** (g) → 8.9876×10^{13} J

1 **kilogram** (kg) → 8.9876×10^{16} J

46.58 mg → 1 **kiloton** (kt) of TNT ≡ 1 trillion calories = 4.186×10^{12} J

46.58 g → 1 **Megaton** (Mt) of TNT = 4.186×10^{15} J

4.658 kg → 100 Mt (largest man-made explosion ever)

A 1 Gigawatt (GW) reactor "burns" 11.13 μg of mass per second
or about 0.35 kg/year (actually about twice that, due to inefficiency).

Conversion of Energy into Mass

1 **electron Volt** (eV) = 1.602×10^{-19} **joules** (J)

1 **Mega electron Volt** (MeV) = 0.1602 **picojoules** (pJ)

1 **Giga electron Volt** (GeV) = 0.1602 **nanojoules** (nJ)

10 **Tera electron Volts** (TeV) = 1.602 **microjoules** (μJ)

electron rest mass (m_e) = 9.109×10^{-31} kg

$m_e c^2 = 0.511$ MeV

proton rest mass (m_p) = 1.673×10^{-27} kg

$m_p c^2 = 0.93827$ GeV

Higgs boson rest mass (m_H) $\approx 2.23 \times 10^{-25}$ kg

$m_H c^2 \approx 125$ GeV