

# Binding Energy

Einstein's famous equation  $E = m c^2$

**Example**

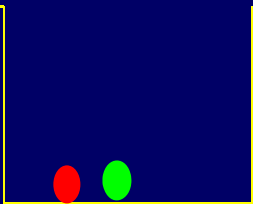
proton:

$$m c^2 = (1.67 \times 10^{-27} \text{ kg})(3 \times 10^8 \text{ m/s})^2 = 1.50 \times 10^{-10} \text{ J}$$

Proton:  $m c^2 = 938.3 \text{ MeV}$

Neutron:  $m c^2 = 939.5 \text{ MeV}$

Adding these, get  
1877.8 MeV



Deuteron:  $m c^2 = 1875.6 \text{ MeV}$

Difference is  
Binding energy,  
2.2 MeV

$$M_{\text{Deuteron}} = M_{\text{Proton}} + M_{\text{Neutron}} - |\text{Binding Energy}|$$