

Strong Nuclear Force

- Rutherford experiment shows that all the positive charge is contained in a small nucleus
 - Size \sim few $\times 10^{-15}$ m (few fm)

- Let's estimate EPE of two protons separated by 1 fm

$$\begin{aligned} \text{EPE} &= kq^2/r \\ &= (9 \times 10^9)(1.6 \times 10^{-19})^2/10^{-15} \\ &= 2.3 \times 10^{-13} \text{ J} \\ &= 1.44 \times 10^6 \text{ eV} = 1.44 \text{ MeV} \end{aligned}$$

- Therefore, the force that binds protons and neutrons together to form a nucleus must be very strong in order to overcome Coulomb repulsion
- But the force acts over very short distances—of order few fm
 - Two atoms don't feel force