Uranium Nucleus

\[ m = 4 \times 10^{-25} \text{ kg} \]

Diameter, \( d = 1.5 \times 10^{-14} \text{ m} \)

Radius, \( r = d/2 = 7.5 \times 10^{-15} \text{ m} \)

Density:

\[ \rho = \frac{m}{V} = \frac{m}{\frac{4}{3} \pi r^3} \]

\[ \therefore \rho = 2.26 \times 10^{17} \text{ kg/m}^3 \]

Compare this to the values in Table 16.1:

- Air = 1.3 kg/m³
- Water = 1000 kg/m³
- Lead = 19 \times 10^4 kg/m³

Do such high densities exist anywhere else in nature?

Yes, Neutron Stars.
How much would a thimble of WS material weigh on Earth?

\[ V = \frac{1 \text{ cm}^3}{100 \text{ cm}^3} = 1 \times 10^{-6} \text{ m}^3 \]

\[ M = \rho V = 2.24 \times 10^{-11} \text{ kg} \]

Weight: \[ M g = 2.24 \times 10^{-12} \text{ N} \left( \frac{1 \text{ N}}{21.196 \text{ lb}} \right) = 4.98 \times 10^{-12} \text{ lb.} \]

\[ 1 \text{ N} = 2.24 \text{ lb.} \]