

Exercise 5.20

vrijdag 18 september 2020

13:25

$$\frac{E_{tot}}{Nd} = \frac{\hbar^2 (3\pi^2 Nd)^{5/3}}{10\pi^2 m Nd} V^{-2/3}$$

$$= \frac{\hbar^2 3^{5/3} \pi^{10/3}}{10\pi^2 m} \left(\frac{Nd}{V}\right)^{2/3}$$

$$\frac{E_{tot}}{NdE_F} = \frac{2 \hbar^2 3^{5/3} \pi^{10/3} m}{10\pi^2 m \hbar^2} \left(\frac{Nd}{V}\right)^{2/3}$$

$$\frac{1}{3^{2/3} \pi^{4/3} \rho^{2/3}}$$

$$= \frac{2 \cdot 3 \pi^2}{10 \pi^2} \left(\frac{Nd}{\rho V}\right)^{2/3}$$

→

$$= 1^{2/3} = 1$$

$$= \frac{3}{5}$$

Thus $\frac{E_{tot}}{Nd} = \frac{3}{5} E_f$