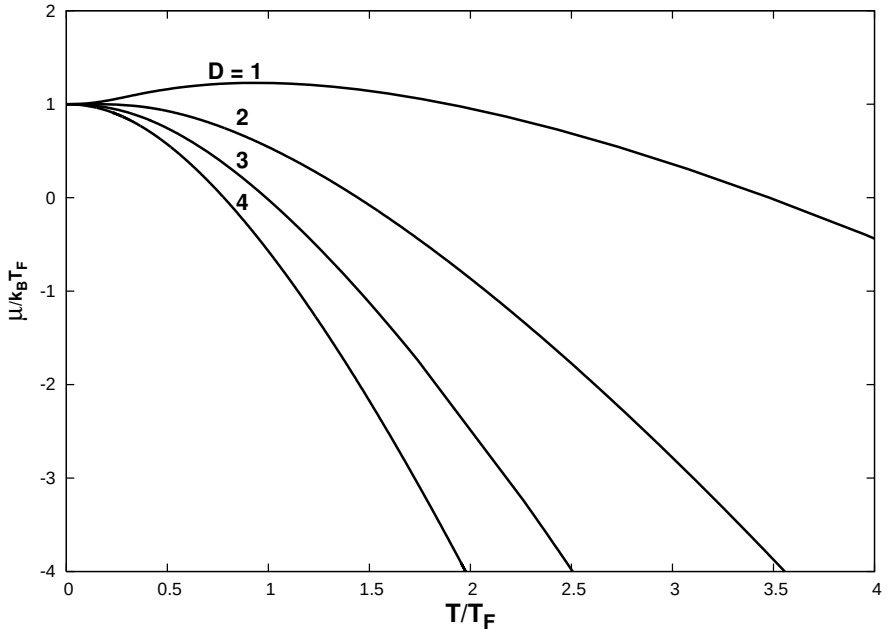
Ideal Fermi-Dirac gas: chemical potential [tsl43]

Fugacity z from $x = f_{\mathcal{D}/2}(z)$, where

$$x = \frac{\lambda_T^{\mathcal{D}}}{v}, \quad v \doteq \frac{gV}{\mathcal{N}}, \quad \lambda_T = \sqrt{\frac{h^2}{2\pi m k_B T}}.$$

Chemical potential [tex117]: $\dfrac{\mu}{k_B T_v} = \dfrac{T}{T_v} \ln z, \quad \dfrac{T}{T_v} = [f_{\mathcal{D}/2}(z)]^{-2/\mathcal{D}}.$



Reference temperature: $k_B T_v = \dfrac{\Lambda}{v^{2/\mathcal{D}}}, \quad \Lambda \doteq \dfrac{h^2}{2\pi m}.$

For a complete list of reference values see [tln71].

Fermi energy: $\lim_{T \to 0} \mu = \epsilon_F = k_B T_F.$

Fermi temperature: $\dfrac{T_F}{T_v} = [\Gamma(\mathcal{D}/2 + 1)]^{2/\mathcal{D}} \overset{\mathcal{D} \gg 1}{\rightsquigarrow} \dfrac{\mathcal{D}}{2e}.$