5) magnetic concentration (see eqs. 5.23-5.25)

$$n(B) = n(0)\cosh(mB/\tau) \simeq n(0)\left(1 + \frac{m^2B^2}{2\tau^2} + \dots\right)$$

$$\Rightarrow \frac{n(B)}{n(0)} \simeq 1 + \frac{m^2B^2}{2\tau^2}$$ ← bad approximation in this case!

$$\Rightarrow \frac{m}{\tau} = \frac{\sqrt{2}}{B}\left(\frac{n(B)}{n(0)} - 1\right)^{1/2}$$

$n(B) = 2\cdot 10^9\,cm^{-3}$, $n(0) = 2\cdot 10^7\,cm^{-3}$ $\quad B = 2$ tesla $= 20\,kG$

$$\Rightarrow \frac{m}{\tau} = \frac{\sqrt{2}}{2}\left(100 - 1\right)^{1/2}\,\text{tesla}^{-1} = \frac{10}{\sqrt{2}}\,\text{tesla}^{-1} \simeq \underline{\underline{7\,\text{tesla}^{-1}}}$$

$$\mu_B = 10^{-24}\,J\,\text{Tesla}^{-1}$$

$T = 300\,K \Rightarrow$

$$m = 7\,\text{Tesla}^{-1}\,\tau = 7\cdot 300\cdot k_B\ K/\text{Tesla}$$

$$= 2.1\cdot 10^3\cdot 1.38\cdot 10^{-23}\ J/\text{Tesla} =$$

$$= 2.9\cdot 10^{-20}\ J/\text{Tesla} = \underline{\underline{2.9\cdot 10^4\,\mu_B}}$$