Template

Gyrotime from B calculations

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$m_e = 9.109 \times 10^{-31}\,kg$ $q_e = -1.602 \times 10^{-19}\,C$ $q := |q_e|$

Electron rest mass energy $E_{eo} := 0.510998910MeV$

1 keV

Non-relativistic electron speed

$$v_e := \sqrt{\frac{2 \cdot 1.0\,keV}{m_e}} = 18755373 \quad m\,s^{-1}$$

Relativistic electron speed

$$v_{er} := c\sqrt{1 - \left(\frac{E_{eo}}{E_{eo} + 1.0\,keV}\right)^2} = 18727897 \quad m\,s^{-1}$$

$$\frac{18727897.}{18755373} = 0.99853503$$

Gamma for 1 keV electron

$$\gamma_{1k} := \frac{1}{\sqrt{1 - \frac{v_{er}^2}{c^2}}} = 1.001957$$

Conversion constant from nT to μs

$$nT2\mu s := \frac{\gamma_{1k}\, 2\,\pi\, m_e}{q} = 35793.775394 \quad nT\ \mu s \qquad \frac{nT2\mu s}{100\ nT} = 357.938 \quad \mu s$$

500 eV

Non-relativistic electron speed

$$v_e := \sqrt{\frac{2 \cdot 0.5\,keV}{m_e}} = 13262052 \quad m\,s^{-1}$$

Relativistic electron speed

$$v_{er} := c\sqrt{1 - \left(\frac{E_{eo}}{E_{eo} + 0.5\,keV}\right)^2} = 13252328 \quad m\,s^{-1}$$

$$\frac{13252328.}{13262052.} = 0.99926678$$

Gamma for 500 eV electron

$$\gamma_{500} := \frac{1}{\sqrt{1 - \frac{v_{er}^2}{c^2}}} = 1.000978$$

Conversion constant from nT to μs

$$nT2\mu s := \frac{\gamma_{500}\, 2\,\pi\, m_e}{q} = 35758.820461 \quad nT\ \mu s \qquad \frac{nT2\mu s}{100\ nT} = 357.588 \quad \mu s$$

$$\frac{\gamma_{1k}}{\gamma_{500}} = 1.000978$$