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- $\pi\lambda\alpha\sigma\mu\alpha$
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  $1/e$

$$\lambda_{De} = \sqrt{\frac{\epsilon_0 T_e}{e^2 n_0}}$$

  $n\frac{4}{3}\pi\lambda_{De}^3 \equiv N_D \gg 1 n\lambda_{De}^3 4 N_D \frac{e\phi}{T_e} \gg 1$

- $\Delta x \Delta x$

$$\frac{d^2\Delta x}{dt^2} + \frac{n_0 e^2}{\epsilon_0 m_e}\Delta x = 0$$

$$\omega_{pe} \equiv \sqrt{\frac{n_0 e^2}{\epsilon_0 m_e}} = \frac{v_{th,e}}{\lambda_{De}}$$

  $v_{th,e}$

-

$$\nu_{coll} \equiv \frac{n_0 e^4}{16\pi\epsilon_0^2 m_e^2 v_{th,e}^3}$$

-

- $$\rho \equiv \frac{mv_\perp}{|q|\, B}$$
- $$\omega_c \equiv \frac{v_\perp}{\rho} = \frac{|q|\, B}{m}$$

  $q > 0\mathbf{B}$
  $q < 0$

$$|\mu| \equiv IA = \frac{|q|\, \omega_e}{2\pi}\pi\rho^2 = \frac{mv_\perp^2}{2B} = \frac{E_{kin\perp}}{B}$$

  μ
  μ

- $$m\frac{d\mathbf{v}_\parallel}{dt} = qE_\parallel$$
- $$m\frac{d\mathbf{v}_\perp}{dt} = q(\mathbf{E}_\perp + \mathbf{V}_\perp \times \mathbf{B})$$

- $\mathbf{E} \times \mathbf{B}$

$$\mathbf{v_e} = \frac{\mathbf{E}_\perp \times \mathbf{B}}{B^2}$$

  ϕ

$$\mathbf{v_F} = \frac{\mathbf{F}_\perp \times \mathbf{B}}{qB^2}$$

  $\mathbf{E}\mathbf{E} \times \mathbf{B}$

-

  $\mathbf{B}$

$$\mathbf{F_c} = \frac{mv_\parallel^2}{R_B^2}\mathbf{R_B}$$

$$\mathbf{v_d} = \frac{\mathbf{F_c} \times \mathbf{B}}{qB^2} = \frac{mv_\perp^2}{qB^2R_B^2}(\mathbf{R_B} \times \mathbf{B})$$

- $\boldsymbol{\nabla} B \perp \vec{B})$

$$\mathbf{v}_{\boldsymbol{\nabla}\mathbf{B}} = \frac{mv^2}{2qB^3}(\mathbf{B} \times \boldsymbol{\nabla} B)$$

B_0
$m\frac{d\mathbf{v}}{dt} = q\mathbf{v} \times B$
$v_0 v_0 B_0$

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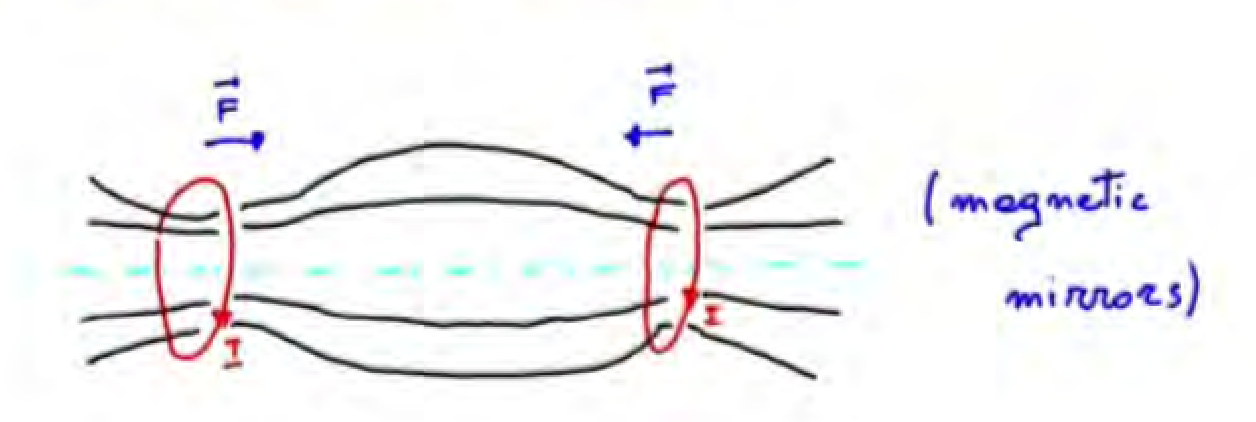

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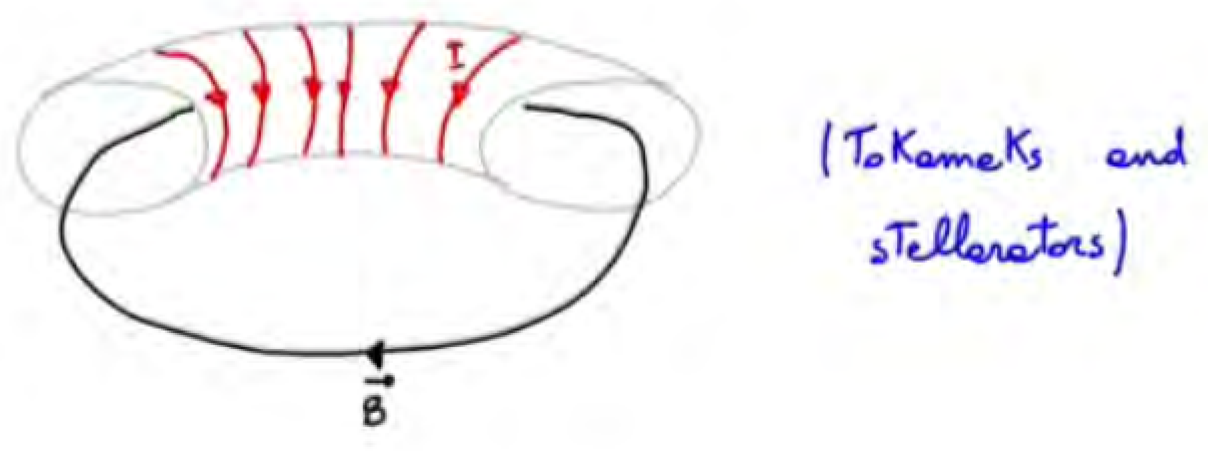

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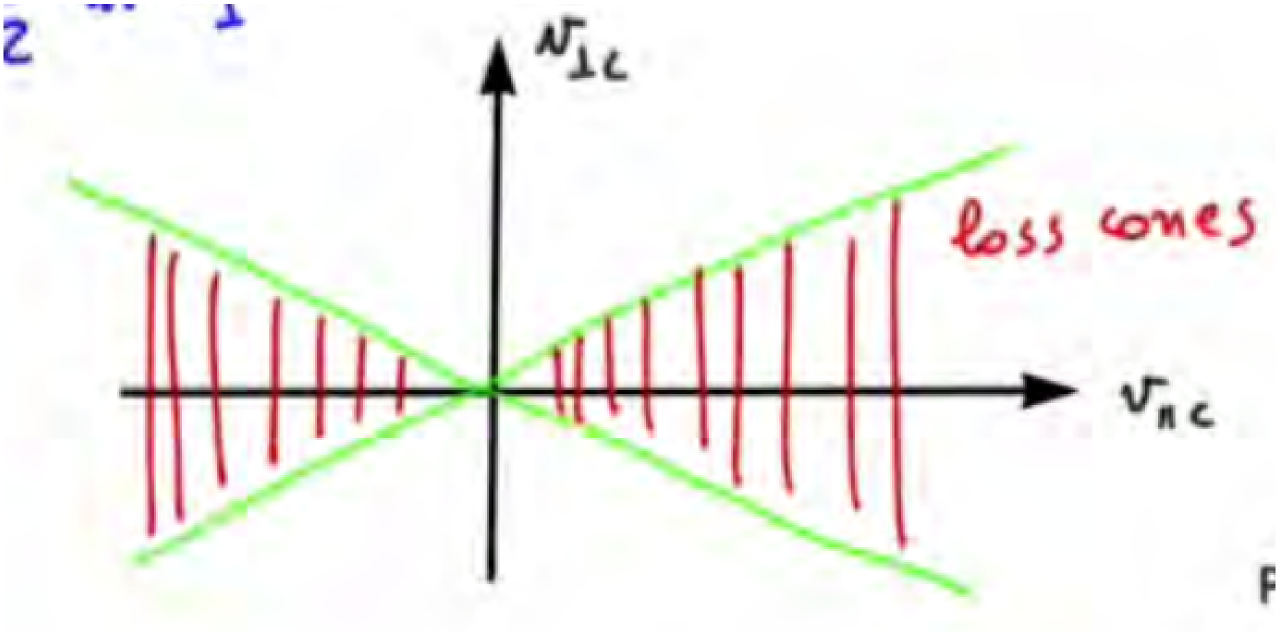
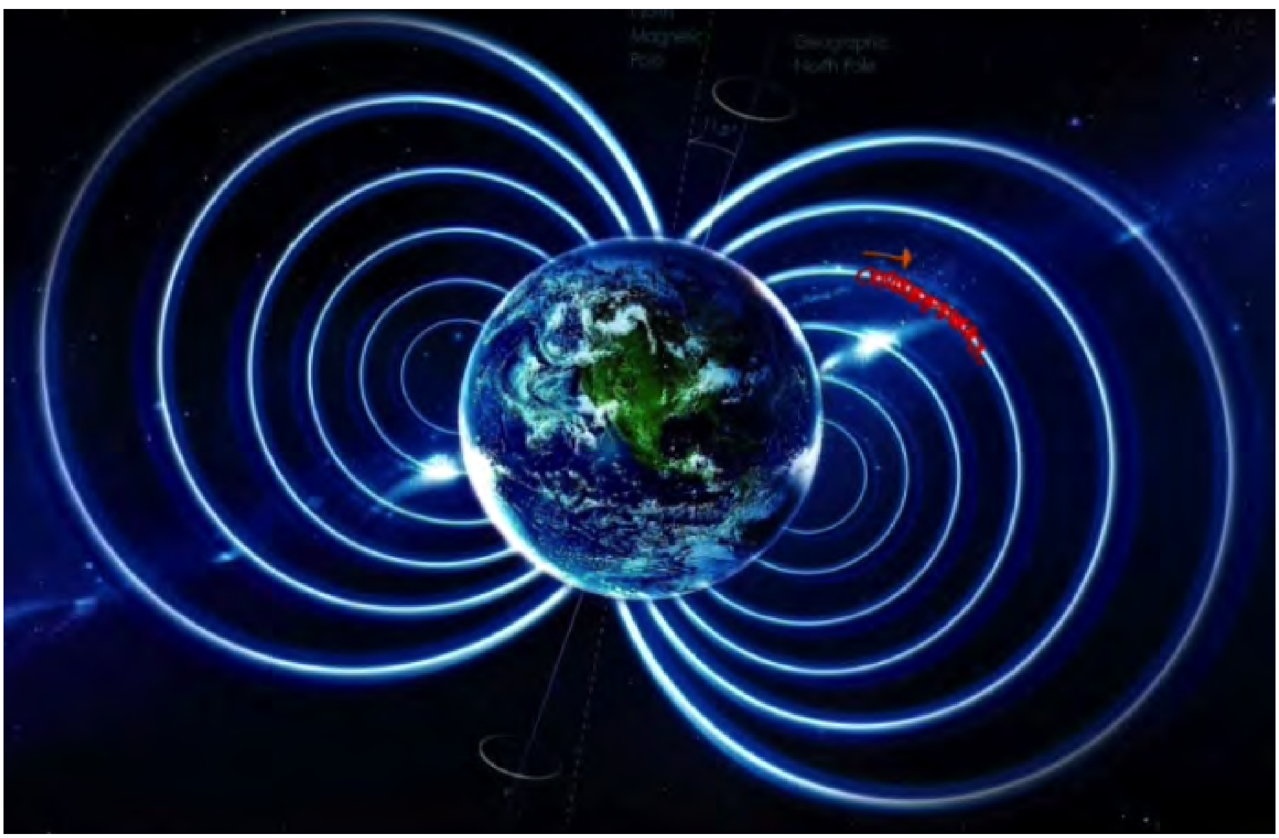
$$F_z = -\mu\,|\boldsymbol{\nabla} B|$$

$v_\parallel B_{max}$

$$\frac{v_\perp^2}{v_\perp^2 + v_\parallel^2} > \frac{B_{min}}{B_{max}}$$





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$E \times B$

$\rightarrow$

$\rightarrow$