Non-Adiabaticity

Problems & Solutions

Non-Adiabaticity?

- **Conservation**
  Gradient of magnetic field is small within one cyclotron length $l_{cycl} = 2\pi \frac{\gamma_0 m_e}{eB} v_{\parallel}$

  $$\vec{\nabla} B = \frac{\Delta B}{B} \ll 1$$

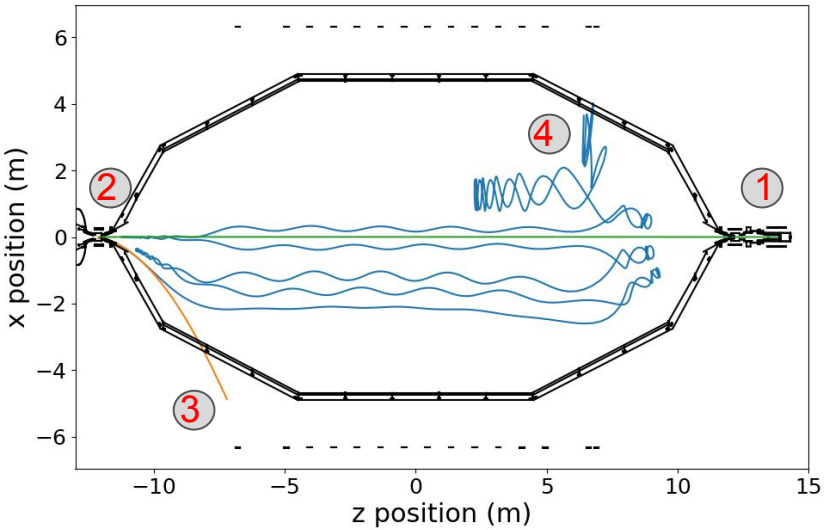
  Energy transformation between longitudinal and transversal components with respect to the guiding field line

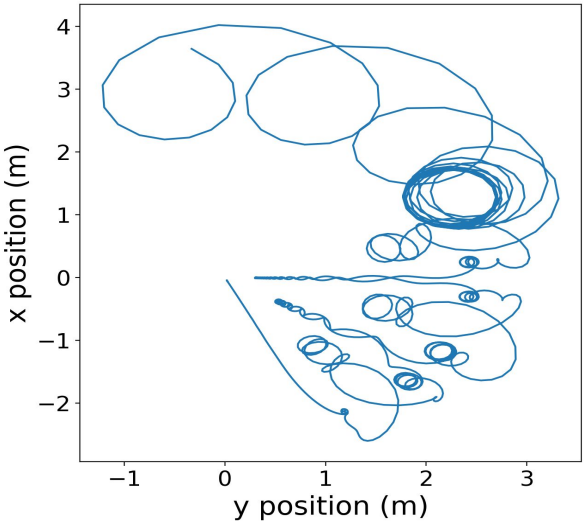
  $$\frac{E_{\perp}^{i}}{B^{i}} = \frac{E_{\perp}^{j}}{B^{j}}$$

- **Violation** ⇨ Chaotic tracks

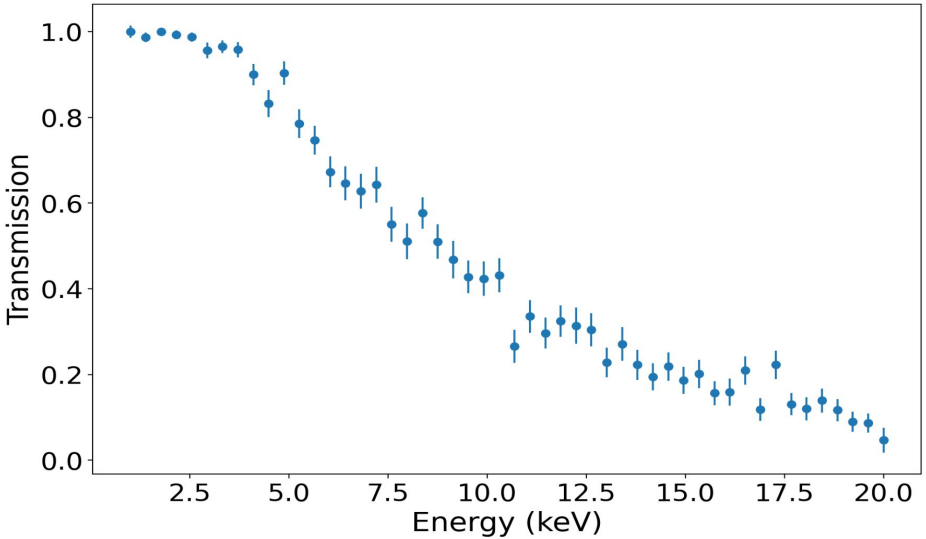
  Particles (surplus-)energy, field gradient, propagation path, curvature of magnetic field, length of region of low magnetic field

What happens to NA electrons?





How NA is the transport?



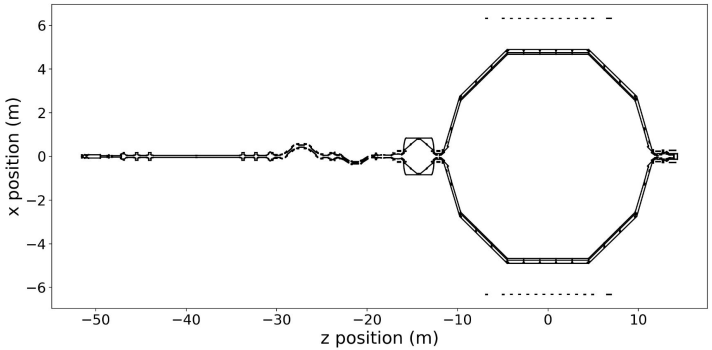
preliminary plot from A.Huber

70% Setting (10.000 events)

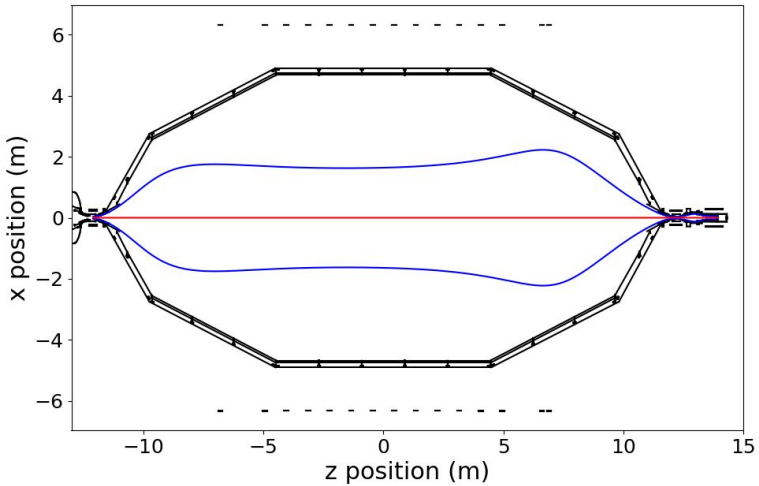
Bdet = 2.5 T

Bpch = 4.2 T

BPS2 = 3.2 T



When does NA occur the most?



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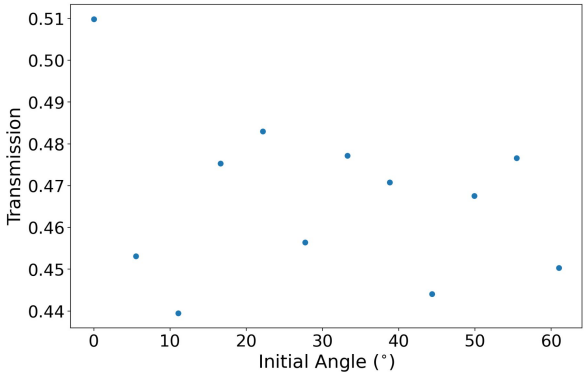
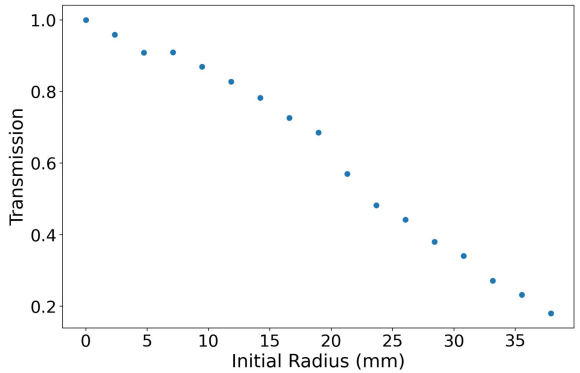


$$\theta_{accep} = \arcsin\left(\sqrt{\frac{B_i}{B_{pch}}}\right)$$



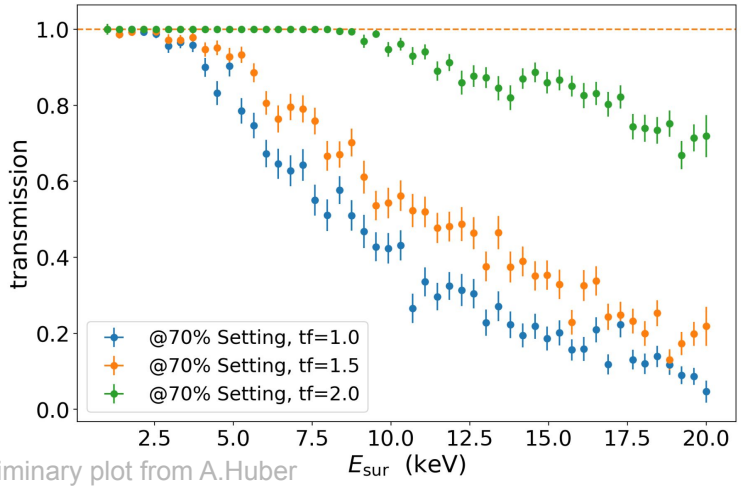
$$r < \sqrt{\frac{B_{det}}{B_i}} \cdot fpd$$

Solutions

Increase B-field in Main Spectrometer

Change LFCS setting

Contra: need cooling system

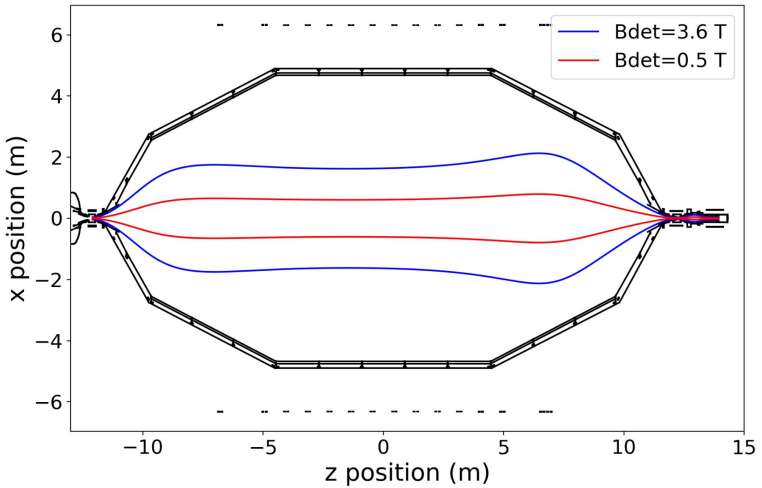


preliminary plot from A.Huber

Decrease B-field at Detector

$$\Phi = \int_A \vec{B} \cdot d\vec{A} = const.$$

Contra: lowers B-field in Main Spectrometer



Thank you :)