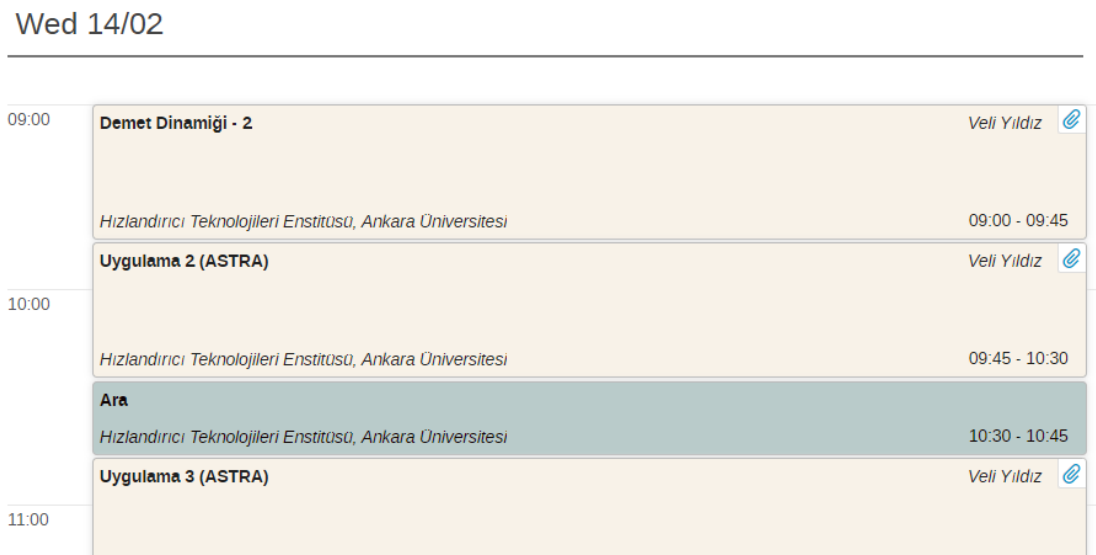
Hızlandırıcı Teknolojileri Enstitüsü Uygulamalı Kış Okulu 2024

SOLENOID TRANSVERSE FOCUSING

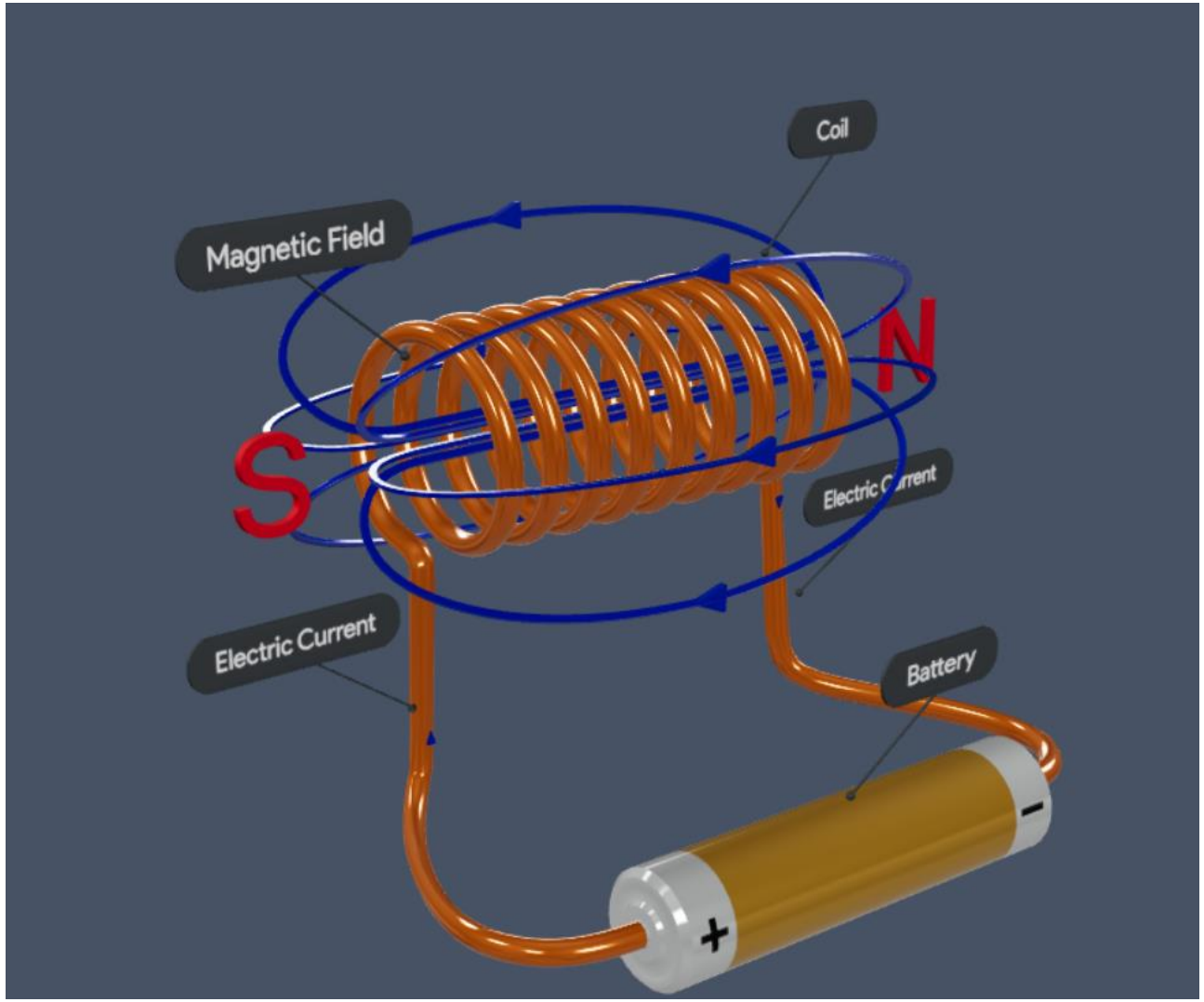
by MEHMET İNAN



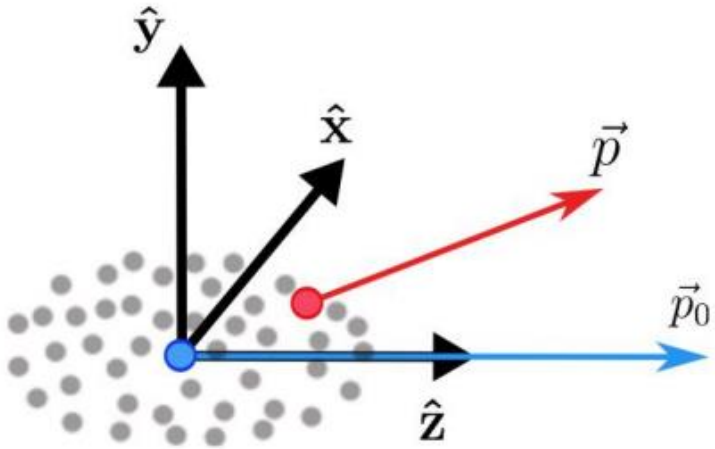
WHAT IS SOLENOID?

A solenoid is a type of electromagnet formed by a helical coil of wire whose length is substantially greater than its diameter, which generates a controlled magnetic field. The coil can produce a uniform magnetic field in a volume of space when an electric current is passed through it.

Source :
https://en.wikipedia.org/wiki/Solenoid



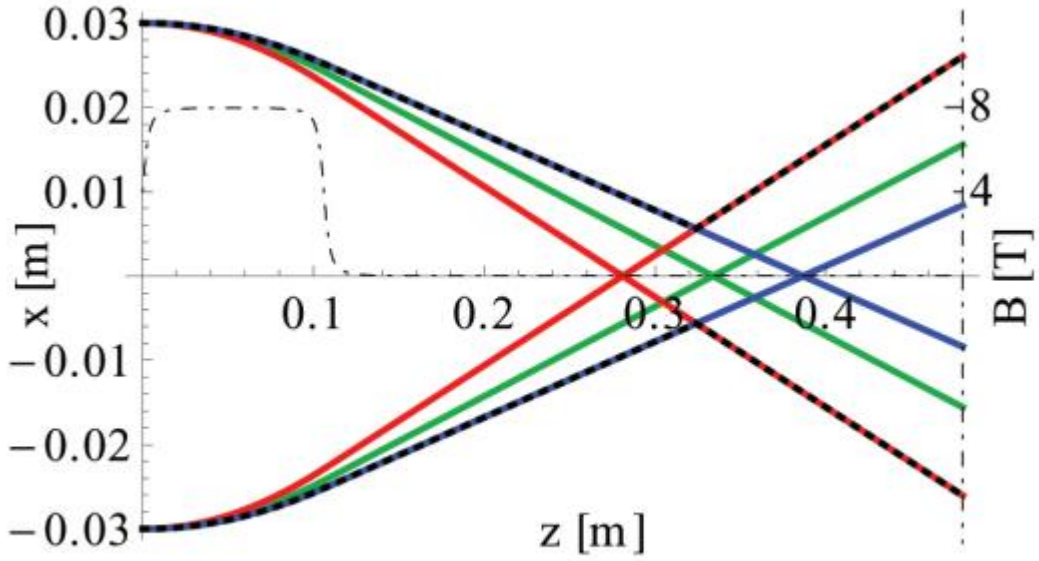
PARÇACIK PAKETINDEKI PARACIKLARI TANIMLAMAK



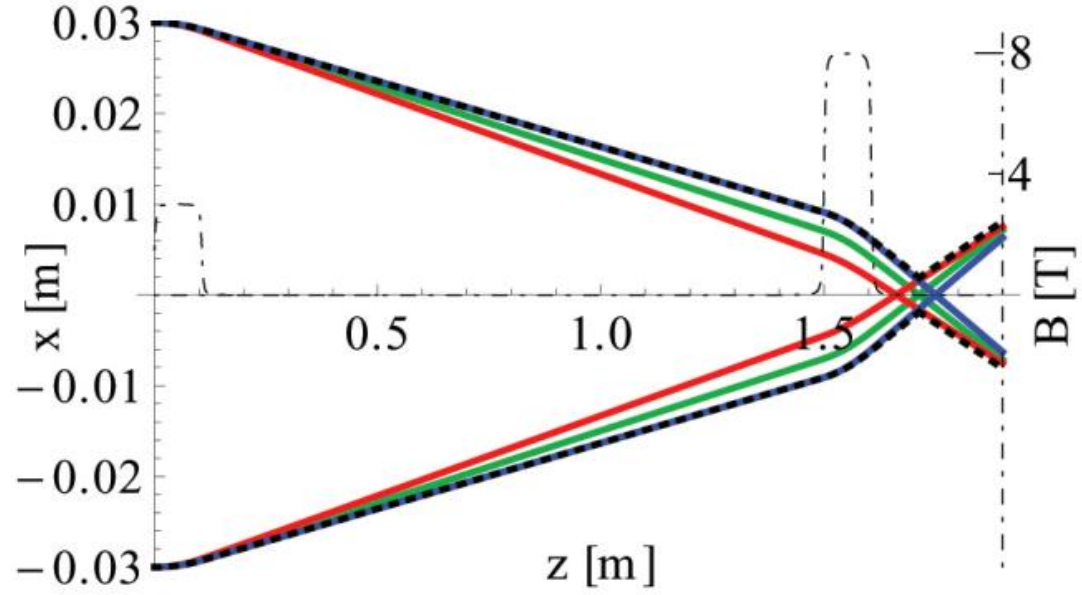
Her parçacığı 6 koordinatlı bir vektör olarak gösterebiliriz.

$$\vec{X} = \begin{bmatrix} x \\ p_x \\ y \\ p_y \\ z \\ p_z \end{bmatrix}$$

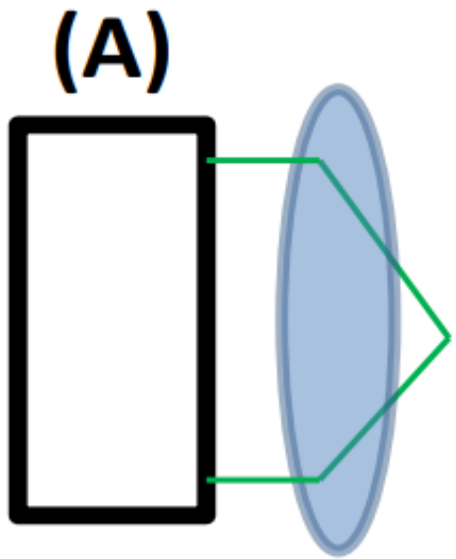
$\vec{p}$: parçacığın momentumu:
$p_x\ p_y\ p_z$ bileşenlerine ayrılabilir.

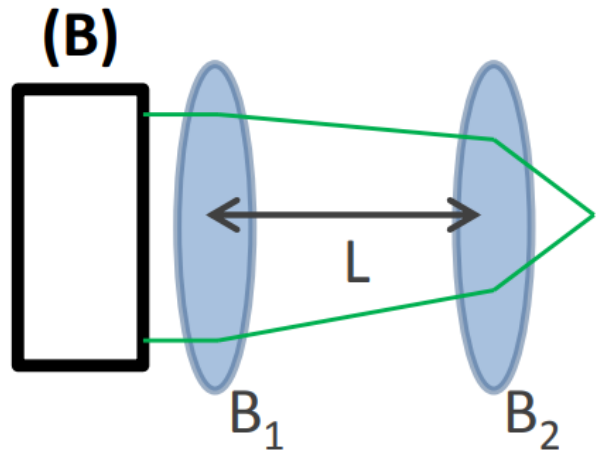


(a) One final focusing solenoid scheme, where B=8T.



(b) Two solenoid scheme, where B_1=3T, and B_2=8T. The solenoids are separated by a distance of L=1.5m.





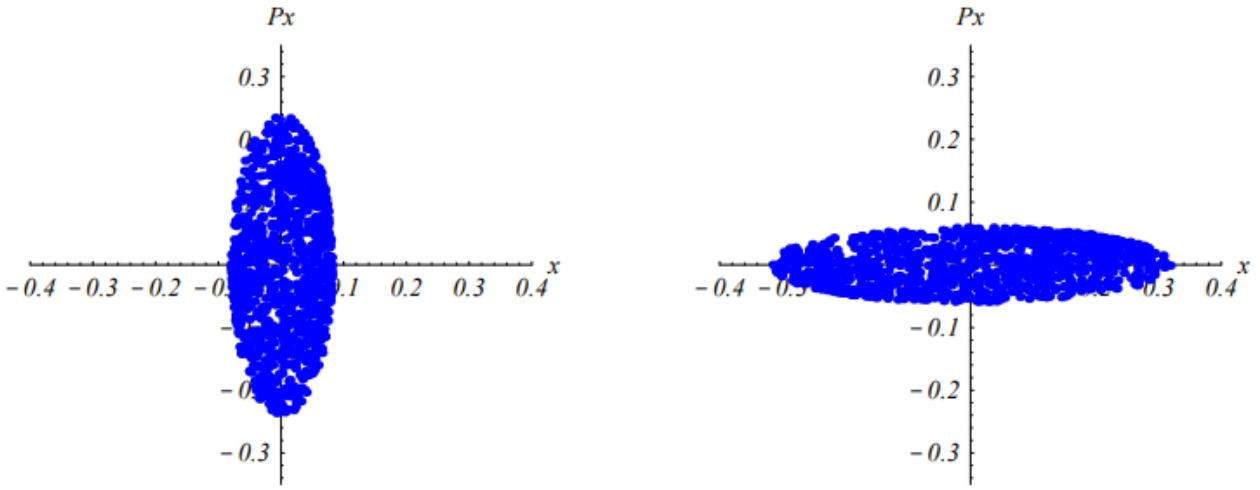
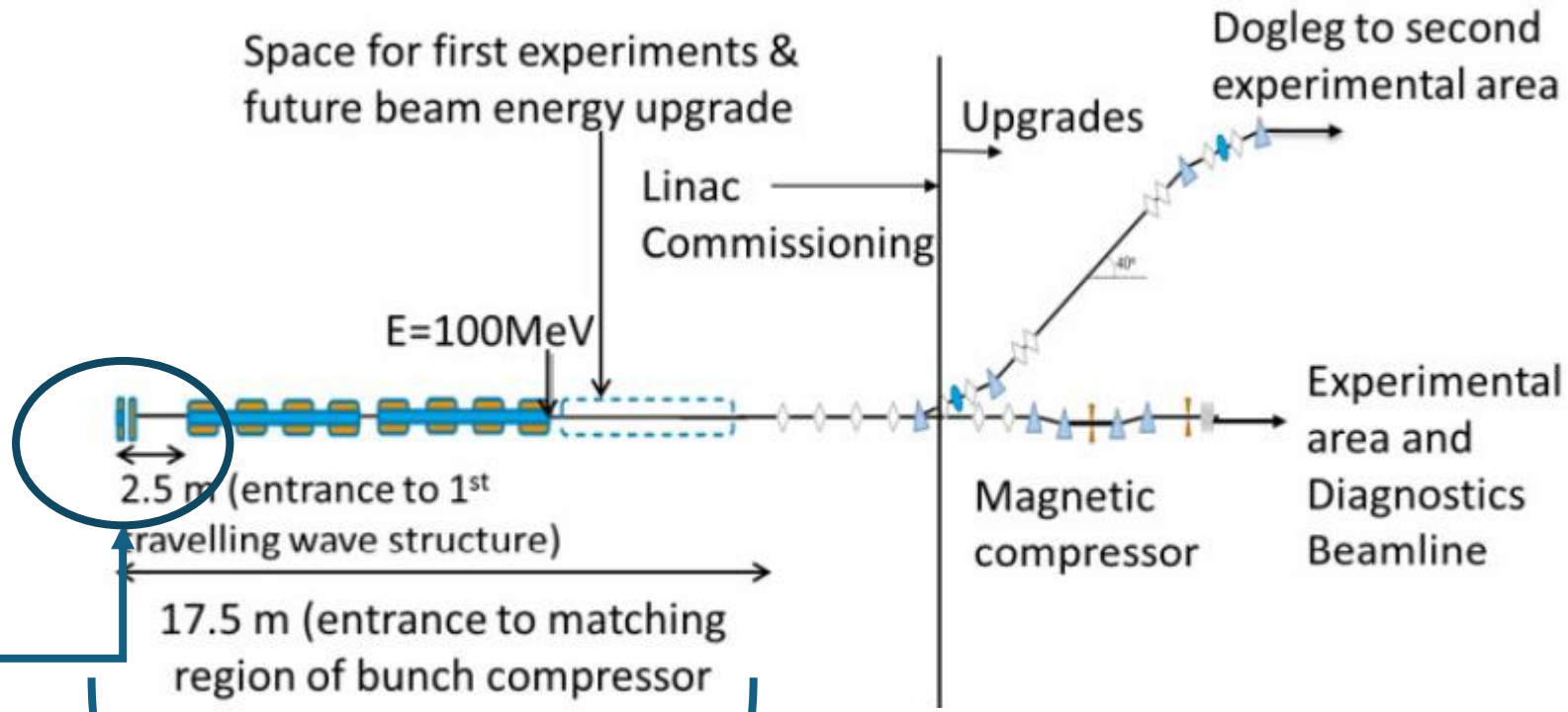
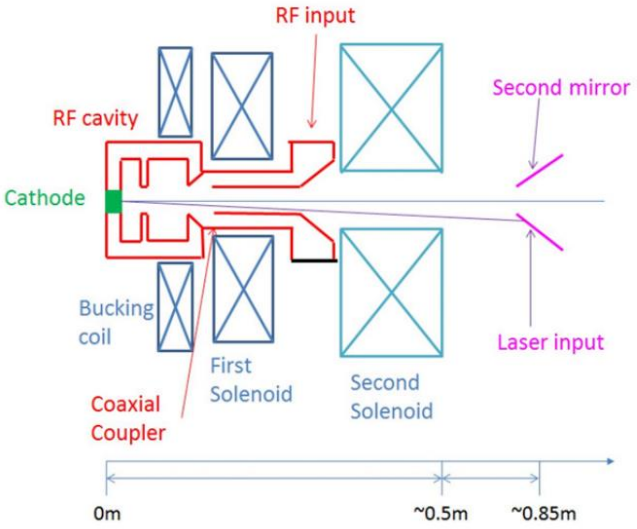
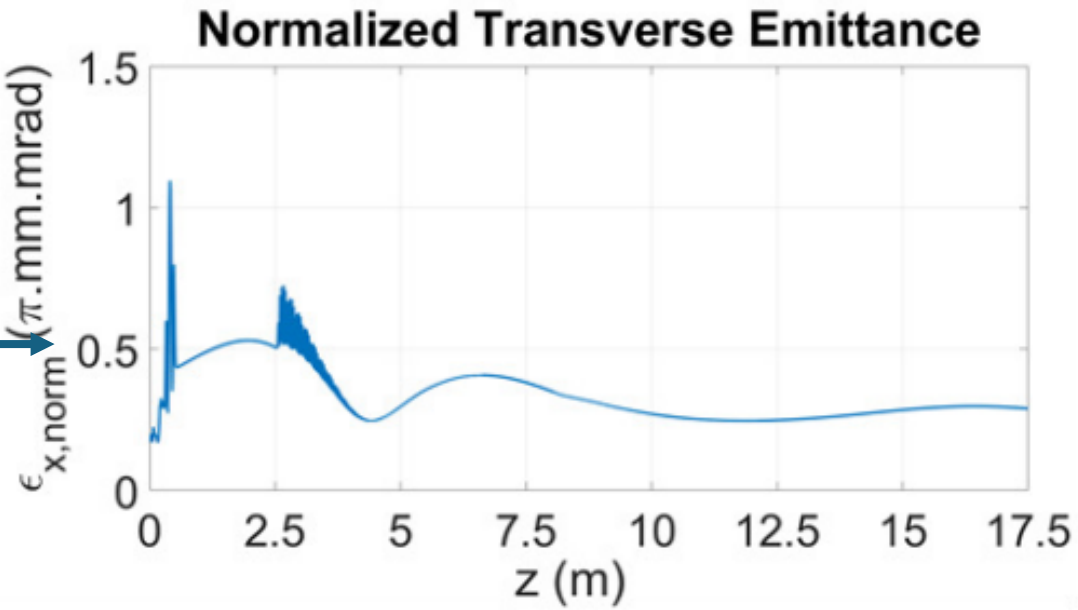


Figure 3: Transverse phase space evolution through the adiabatic device in one transverse plane from the input (target) to the output.

Adiabatic refers to a process in which no heat is transferred into or out of a system, and the change in internal energy is only done by work.


Space for first experiments &
future beam energy upgrade
Upgrades
Dogleg to second
experimental area
Linac
Commissioning
E=100MeV
Experimental
area and
Diagnostics
Beamline
2.5 m (entrance to 1st
travelling wave structure)
Magnetic
compressor
17.5 m (entrance to matching
region of bunch compressor


RF input
RF cavity
Second mirror
Cathode
Bucking
coil
Laser input
First
Solenoid
Second
Solenoid
Coaxial
Coupler
0m
~0.5m
~0.85m


Normalized Transverse Emittance
1.5
1
0.5
0
0
2.5
5
7.5
10
12.5
15
17.5
z (m)
$\epsilon_{x,norm}$ (π.mm.mrad)

REFERENCES

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- https://iopscience.iop.org/article/10.1088/1742-6596/1067/3/032019/pdf