Comparison of the focal length of the solenoid

Sajini Wijethunga

Focal length

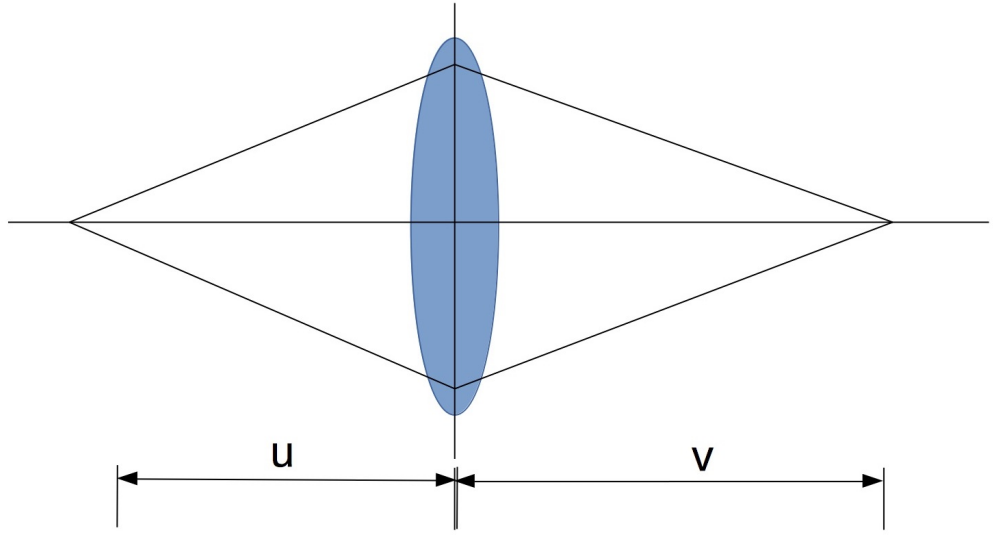
- For a Solenoid

$$\frac{1}{f} = \frac{e^2 \int B_z^2 dz}{4\beta_z^2 \gamma^2 m^2 c^2}$$

- From optics, lens equation

$$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$$

where, u-distance to the object, v-distance to the image



Lens	Viewer	f from the field (mm)	$f = \frac{uv}{u+v}$ (mm)
1	1	271.515	333.33
1	2	306.64	375.00
2	1	284.42	293.33
2	2	461.276	495.00

Table 1: Calculated f values, from field and from lens equation.

Beam divergence coming out of the gun and beam emittance.

Viewer	x (mm)	y (mm)
1	3.30973952	6.34969224
2	3.66200961	6.46479205

Table 2: Beam size on each viewer.

Angle and Emittance

		Viewer 1	Viewer 2
Angle (mrad)	x	1.85649301	1.56850481
	y	3.88312816	2.96989602
Emittance (mm mrad)	x	0.9746588	0.823465
	y	2.0386422	1.5591954

Table 3: Angle and beam emittance.