Physicists Often Describe Spectrometers by as having a certain momentum of Kick for example a 200 $\frac{\text{MeV}}{c}$ Kick (though they would usually say 200 MeV)

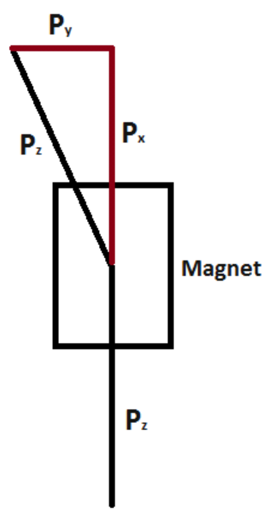
This document shows what that means

From Eric Prebys Grad Physics Accelerator School slides "Basic E&M and Relativity" USPAS, Austin, TX 2012

$$\Delta\theta = \frac{Bl}{B\rho}$$

$$B\rho = \frac{10}{2.9979} p \quad (*\text{with P in } \tfrac{\text{GeV}}{c} \text{ and } B\rho \text{ in tesla meters}*)$$

$$\Delta\theta = \frac{Bl}{\frac{10}{2.9979} p}$$



$$\text{Sin}\,\Delta\theta = \frac{P_y}{P_z}$$

$$\text{Sin}\left(\frac{Bl}{\frac{10}{2.9979} p_z}\right) = \frac{P_y}{P_z}$$

Next Taylor Expand Sin . . . . .

In[3]:=
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Series[Sin[x], {x, 0, 7}]
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Out[3]= $x - \frac{x^3}{6} + \frac{x^5}{120} - \frac{x^7}{5040} + O[x]^8$

It is a small angle thus throw out everything but the first term

$$\frac{Bl}{\frac{10}{2.9979} p_z} = \frac{P_y}{P_z}$$

$$\frac{3}{10} P_z \frac{\mathrm{Bl}}{p_z} = P_y$$

$$\frac{3}{10}\mathrm{Bl} = P_y \quad (*\text{in } \frac{\mathrm{GeV}}{c} \text{ and } B\rho \text{ in tesla meters}*)$$

Yagmur Says:

$$\int B\,dl \approx 3\,\frac{\left(\frac{\mathrm{MeV}}{c}\right)}{T\,\mathrm{cm}}\,\mathrm{B\,L}$$

$$\int B\,dl \approx 3\left(\frac{\mathrm{MeV}}{c\,T\,\mathrm{cm}}\right)\mathrm{B\,L}$$

$$\int B\,dl \approx 3\left(\frac{100\,\mathrm{cm}}{1\,\mathrm{meter}}\right)\left(\frac{\mathrm{MeV}}{c\,T\,\mathrm{cm}}\right)\mathrm{B\,L}$$

$$\int B\,dl \approx 3\left(\frac{100}{1\,\mathrm{meter}}\right)\left(\frac{\mathrm{MeV}}{c\,T}\right)\mathrm{B\,L}$$

$$\int B\,dl \approx 3\left(\frac{100}{1\,\mathrm{meter}}\right)\left(\frac{\mathrm{MeV}}{c\,T}\right)\mathrm{B\,L}$$

$$\int B\,dl \approx 3\left(\frac{100}{1\,\mathrm{meter}}\right)\left(\frac{\mathrm{MeV}}{c\,T}\right)\left(\frac{1\,\mathrm{GeV}}{1000\,\mathrm{Mev}}\right)\mathrm{B\,L}$$

$$\int B\,dl \approx 3\left(\frac{100}{1\,\mathrm{meter}\,1000}\right)\left(\frac{\mathrm{GeV}}{c\,T}\right)\mathrm{B\,L}$$

$$\int B\,dl \approx 3\left(\frac{1}{10}\right)\left(\frac{\mathrm{GeV}}{c\,T\,m}\right)\mathrm{B\,L}$$

$$\int B\,dl \approx \left(\frac{3}{10}\right)\frac{(\mathrm{GeV}/c)}{T\,m}\,\mathrm{B\,L}$$

e

As an excercise for a later day,
we see here that a change in Momentum in the Y Axis is equated to
a change in Angle of the beam. Can this be used to show why $\frac{\mathrm{Dp}}{\mathrm{P}} = \frac{\mathrm{D}\theta}{\theta}$