Exercises, part 7

Thursday 2003-11-27 - Thursday 2003-12-04 16:00

1. Momentum measurement   6 points

a) Derive the formula for the sagitta,

$$s = \frac{e\,B\,L^2}{8\,p_B} = 0.3\,\text{m}\,\frac{\text{B/T}\,(\text{L/m})^2}{8\,p_\text{B}/\text{GeV}}$$

b) In D0 the muon momentum is measured from the track direction in front and behind the iron toroid ($L = 1.09\,\text{m}$, $1.9\,\text{T}$). Assume that each measurement is precise to $\Delta\alpha = 0.3\,\text{mrad}$. Calculate for $\eta = 0$ both c_{det} and c_{MS}.

2. Magnetic fields   4 points

a) CMS: calculate the the magnetic flux ($\int \vec{B}\,d\vec{A}$) in the solenoid and compare it to the flux through the return yoke in the barrel. Comment, please.

b) Estimate the energy stored in the magnetic field generated by the ATLAS air toroid.