Impedance problems
- keeping with 2-stage coll system -

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/Text/LHC/2003/cpm_z_21mar.cpmz.tex

Transverse impedance, rough, following LV

- All Copper $Z = 1$ (relative) , judged acceptable
- All C + ($L \rightarrow 2L$) $Z_{all\ C} = 10$, judged too large
- Dump kicker: horizontal $\Rightarrow$ need C for H collimators, 30% of all jaws
  Impedance contribution from C : $Z_C = 0.3 Z_{all\ C} = 3$
- Fo the rest: Be (70%) , $Z_{Be} = 0.7 \times 2 \times Z_{Cu} = 1.4$
  (factor 2 for length + assume that $\sqrt{resistivity}$ $\pm$ compensated by 'Inductive bypass')
- TOTAL $Z_{C+Be} = 3 + 1.4 = 4.4$ vs. $Z_{Cu} = 1$

Margins

- Assume that FR+LV specify $Z_{spec} = 3$ vs. 4.4
  $\Rightarrow$ Need improvement by $4.4/3 = 1.5$
- $Z \sim b^{-3} \rightarrow \frac{\delta B}{B} = 0.15$
  $\Rightarrow n_1 = 6 \rightarrow n_1 = 6.9$ STILL INSIDE APERTURE SPEC
- And little harm on efficiency and tertiary halo size

Additional factors

- L.Vos Z-data for circular aperture, will be smaller with slit aperture
  $\rightarrow$ need to know this factor
- May compromise a bit on jaw length
- Optimise primary/secondary length ($3\times$ less primaries)

About injection failures - a comment

- With preloaded kickers (both MKI and MKE) interlocked to 'beam permit',
  A full injected batch kicked at fixed amplitude is excluded
- We must consider only published failure modes
  (in all cases , a sweep occurs, in my remember)
- And about MKE: updated re-triggering time in critical path
  REMEMBER: POTENTIAL GAIN [2-4] LIES THERE and 3 OK with graphite

Questions to FR + LV

- What the acceptable relative $Z_\perp$ between [1,10]
- What is the ratio $\frac{Z_{\rm slit}}{Z_{\rm circ}}$ for same b
- What is the thickness of Be on C which looks like massive metal
- What thickness of C on Be (or metal) is Z-harmless
- What time is needed to get a precise numerical simulation of a resistive slit
- Shall $Z(\omega)$ be considered instead of only $Z = Z$(8kHz)

My temporary conclusions

- I suggest to hold strong with the robust two-stage system
- With the 3-stage system,
  TCDQ, Sec.jaws and Tertiaries near Exp.
  all at similar aperture ($\sim 10\sigma$)
  will induce unstable beam loss maps $\rightarrow$ difficulties to manage
  BLM system
- Experiments will not swallow this scheme easily $\rightarrow$ TIME
- Time to evaluate the 3-stage system will be long (4-6 months)
- Keep the 3-stage system as a last rescue only
- We need C - collimators in all schemes
  $\rightarrow$ Go on with design
  $\rightarrow$ But keep pressing Z-experts