A "Scaling" FFAG, almost a scaling FFAC

Pole angles ≡ D focus

ICOOL Method 2
Reference track

ICOOL Method 1
Reference circle Used here

Fixed Field Magnet

Pole angles

≡

A focus

"Scaling" FFAG, almost a scaling FFAC

03/25/05 Friday Meeting

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Studies of Summers Inverse Cyclotron
No gas, different momenta
Scatter & Straggle off Input ± 9% dp/dp
By Bending Fields
By vs azimuth modulo 1 turn (\(Y/R_{\text{ref}}\))

cells (4 to one turn)
Recap: Strong initial reduction of dp from wedge

Later increase of dp from neg dE/dx slope

p and 2*dp (GeV/c)
Crude lattice parameters from 3 tracks

betas fall with falling p
again beta falls with \( \beta \)
Emittance rises sharply from emittance exchange.
Azimuthal field to mix x and y
Add 0.2 T solenoid field to mix x and y

emit x (mm)

ref path (m)

0 20 40 60 80

0 10 20 30

init x without mixing

with mixing

init x
ref path (m)
emit y (mm)
no init y with mixing
200 Gaussian tracks with mixing - no scattering

Falling average momentum

Azimuthal angle ($\pi/4$) vs. mean $p$ (GeV/c) reference
Strong Longitudinal Cooling
Initial emittance = 2.1 π mm in x and y

Both transverse emittances at end = at start

net Gd cooling bay about 5

emit x emity (mm)
Losstransmision

azimuthal angle ($\pi/4$)

0
20
40
60

0.00
0.25
0.50
0.75
1.00

0
0.25
0.50
0.75
1.00

39.0

transmision
Serious loss - some mystery in error=-76
Initial emittance = 2.1 pi mm

50 tracks with emit x and y with scattering
transmision

Worse transmission

length (m)

0.00  0.25  0.50  0.75  1.00

0  0.25  0.50  0.75  1.00

0  20  40  60
Conclusion

but then initial energy spread limited and less 6D cooling

Will be better with less wedge

Problem is intrinsic to this energy loss injection

Did not help

Triied assymetric initial emittances without mixing

Initial beam?

would be better. I try Harold’s method of defining

poor transmission

did in long direction

Total cooling approx 5

Conclusion