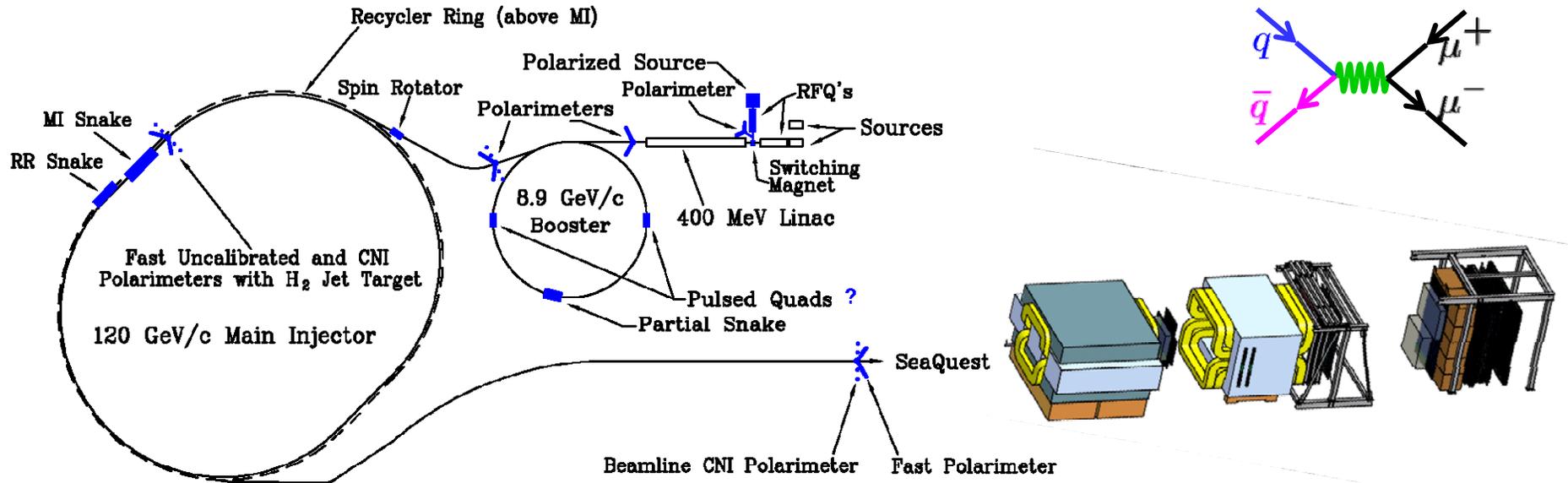
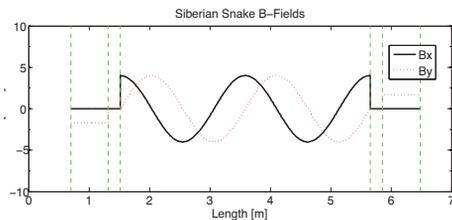
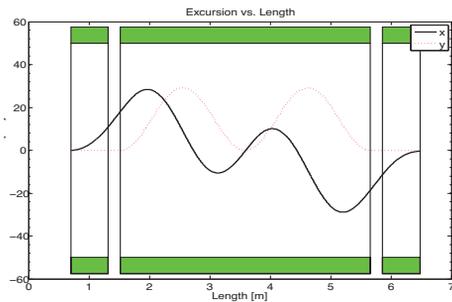
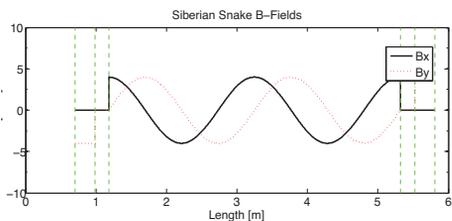
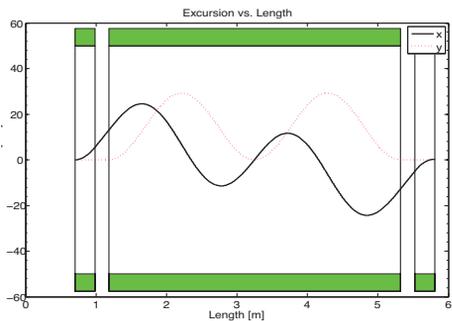


Polarized Drell-Yan at Fermilab Main Injector

- Polarize Beam in Main Injector & use SeaQuest dimuon Spectrometer
 - ➡ measure Sivers asymmetry



- Sivers function
 - ➡ captures non-perturbative spin-orbit coupling effects inside a polarized proton
 - ➡ is time-reversal odd:
 - ✓ leads to sign change:
Sivers function in DIS = - Sivers function in Drell-Yan
 - ✓ fundamental prediction of QCD



Summary

With 10% of the Main Injector beam time and a 50 cm long liquid hydrogen target, the time-averaged polarized beam luminosity should be $\sim 2 \cdot 10^{35} \text{ cm}^{-2} \text{ s}^{-1}$ or higher.

- The world's highest intensity polarized proton beam, with the simple hydrogen target, should allow precise studies of polarized Drell-Yan processes.
- This high intensity 120 GeV polarized beam should allow precise measurements of spin-asymmetries out to P_{\perp}^2 of 50-70 $(\text{GeV}/c)^2$ for inclusive hadron production.
- With a solid polarized proton target, it could also allow precise 1-spin, 2-spin and spin-averaged studies of elastic proton-proton collisions out to P_{\perp}^2 of 12 $(\text{GeV}/c)^2$.

- Being forced to switch from 2 snakes to 1 snake resulted in inventing a simple new Siberian Snake, which reduced the total polarized proton beam cost from **~\$26 Million to ~\$10 Million**.
- Producing, installing & testing the hardware should take ~ 2 -3 years after approval and funding.