

Accelerator Flux

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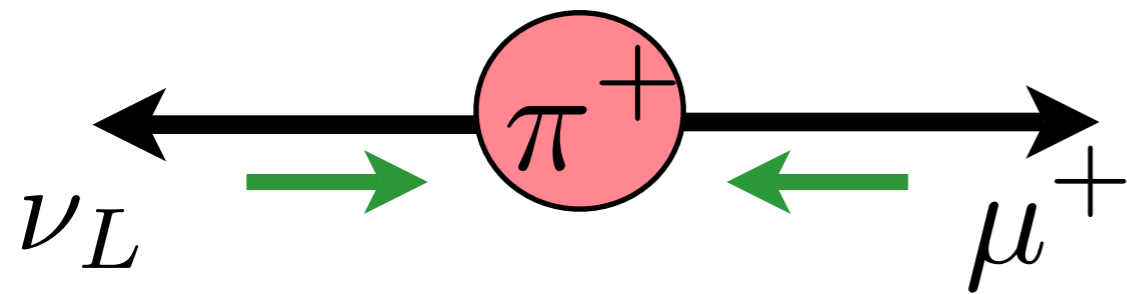
Phrasing of Question

1. First thing to answer: how does accelerator effects influence physics (FD and ND)?
2. Question later: how well do we need to measure these effects at various places?

Musings on:

- Accelerator effects
 - Polarization
 - Energy Spread
 - Divergence
 - Current

Polarization

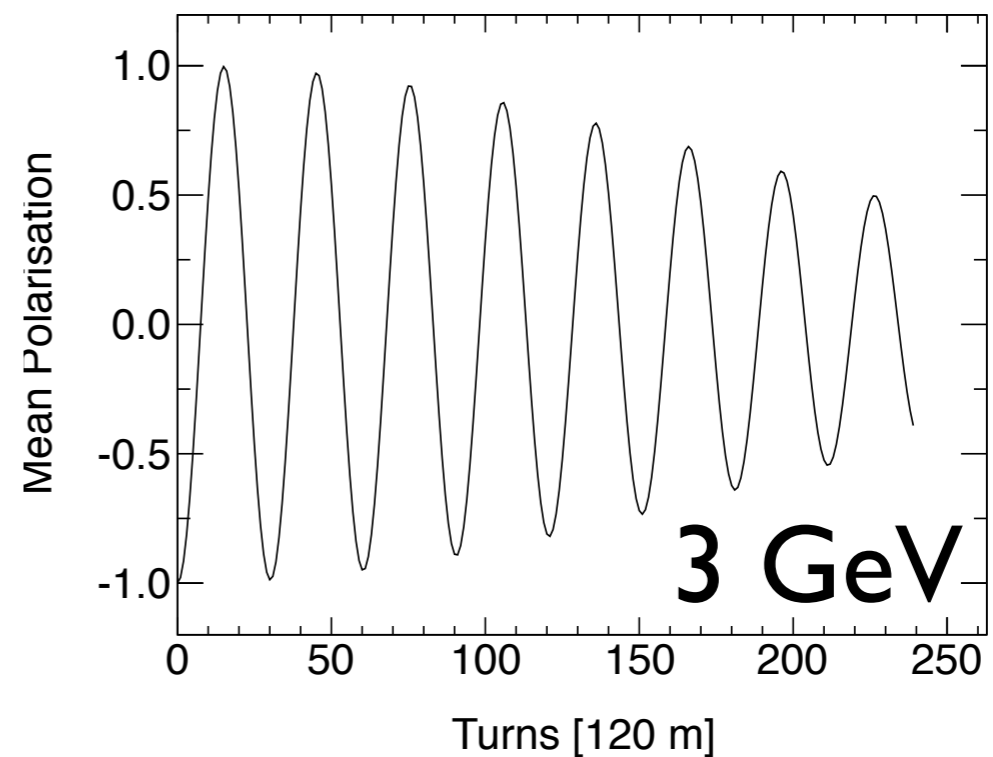
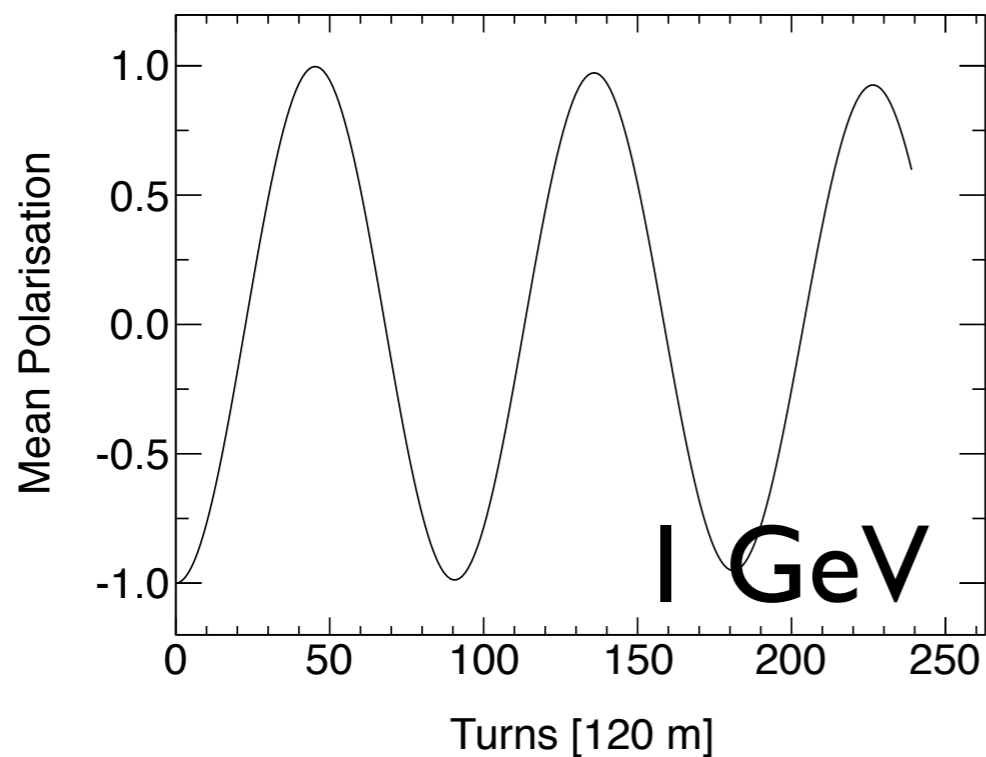


but V-A suppressed.

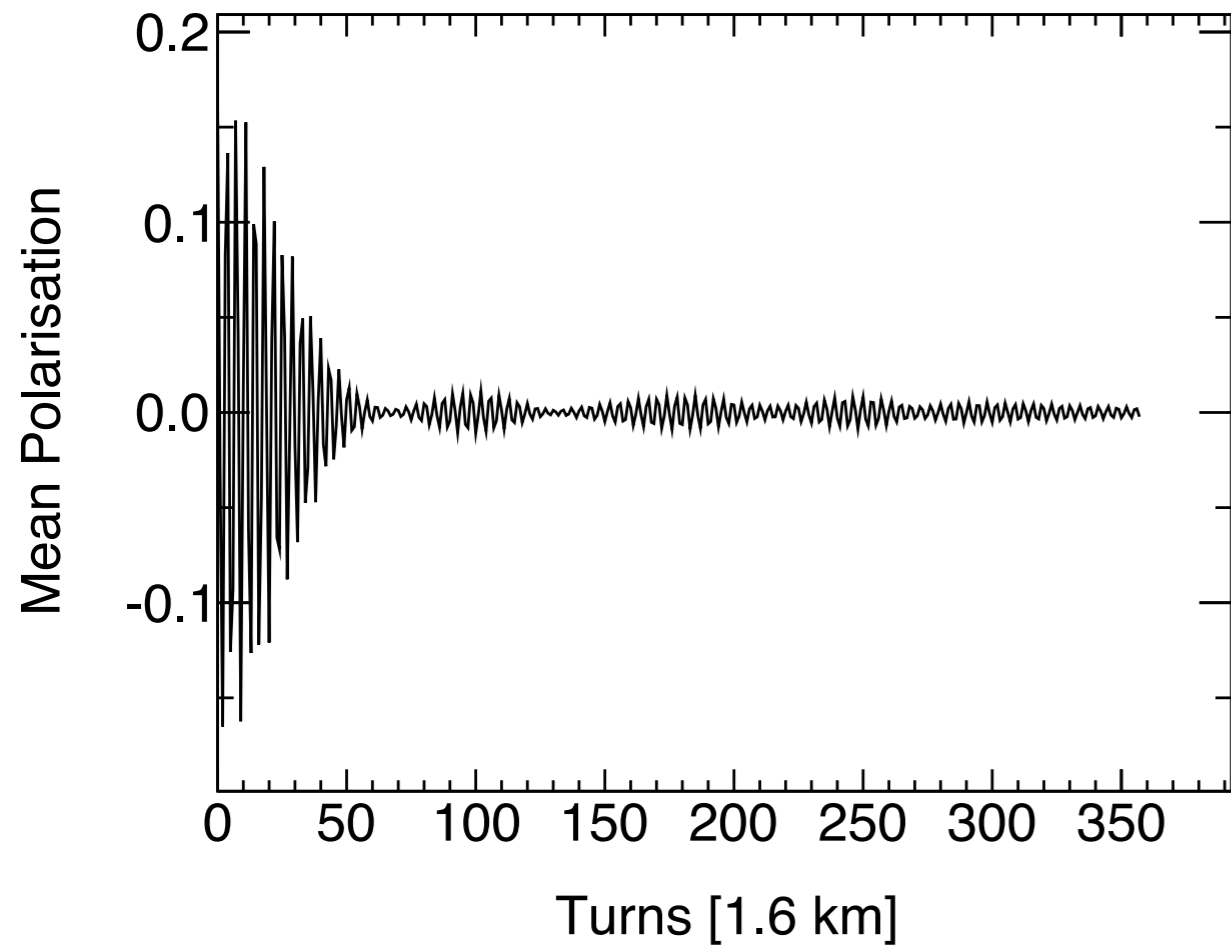
E	σE	$\langle P \rangle$
3	2.5%	0.28%
3	0	0.50%
1	0	6%
1	5%	6%

Thomas Precession Frequency:

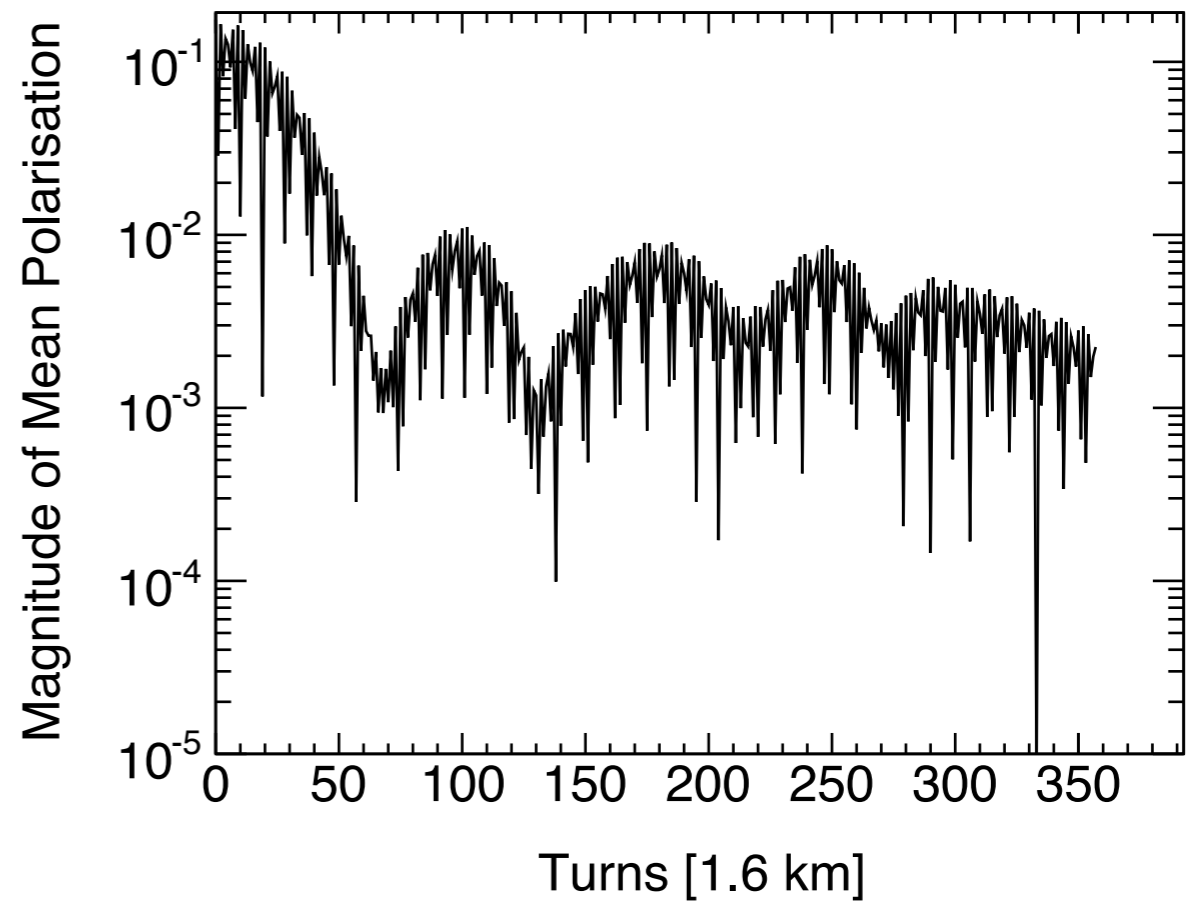
$$\nu = \frac{g_\mu - 2}{2} \frac{E_\mu}{m_\mu}$$



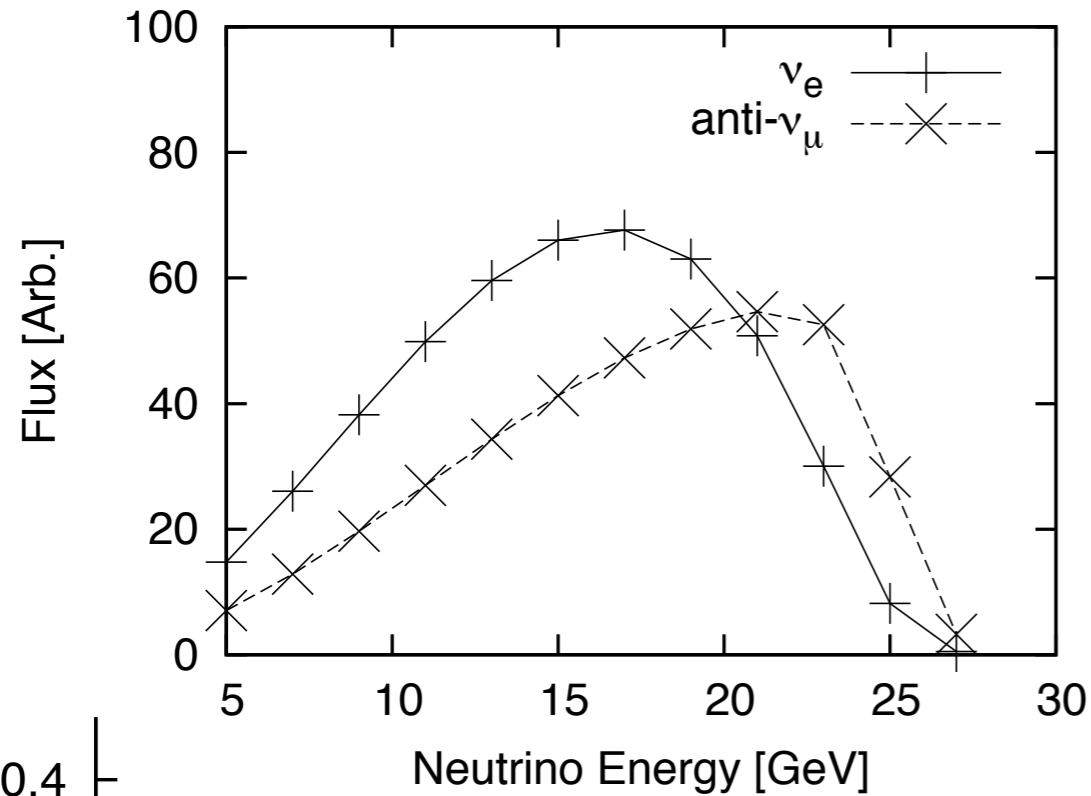
Polarization @ 25 GeV



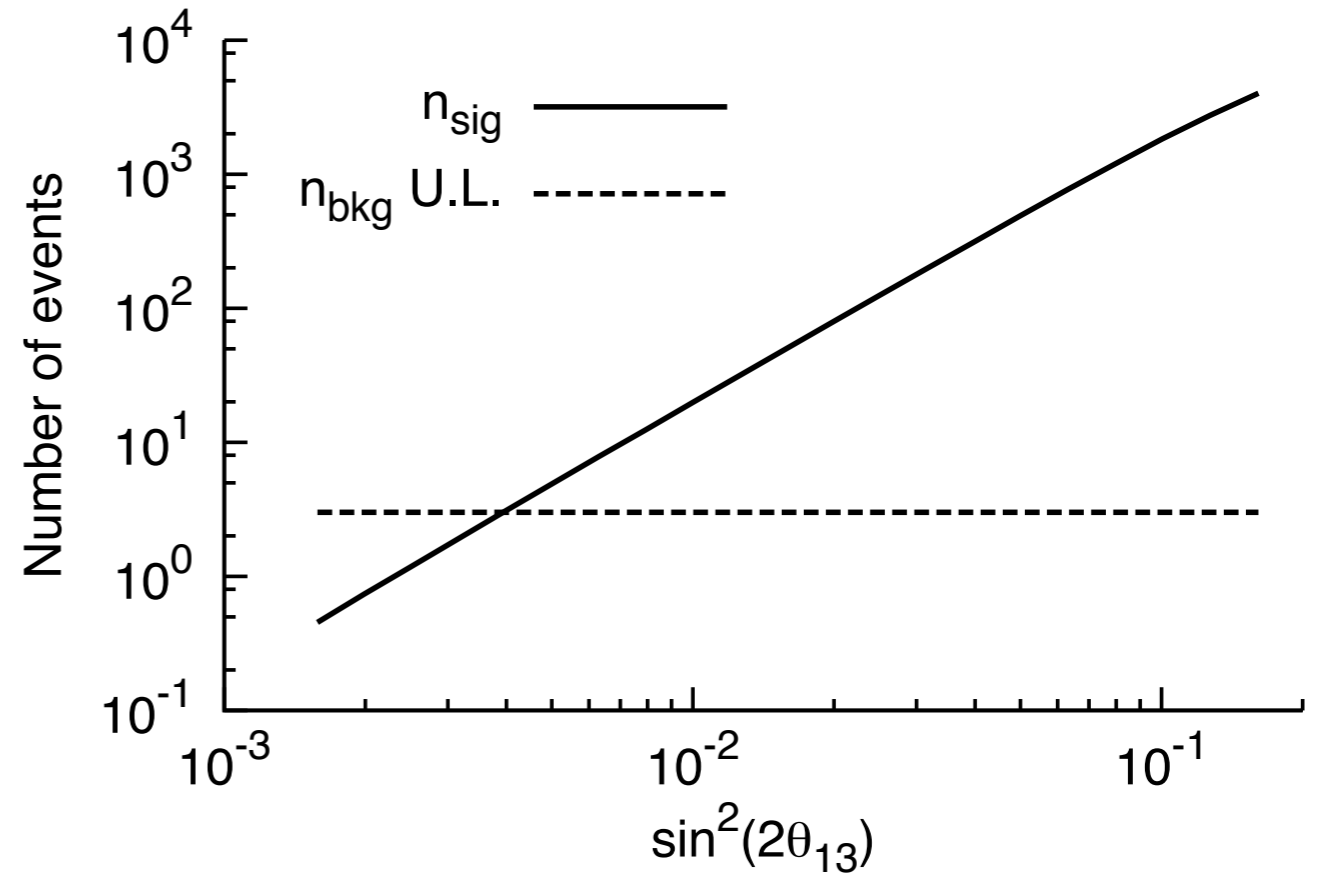
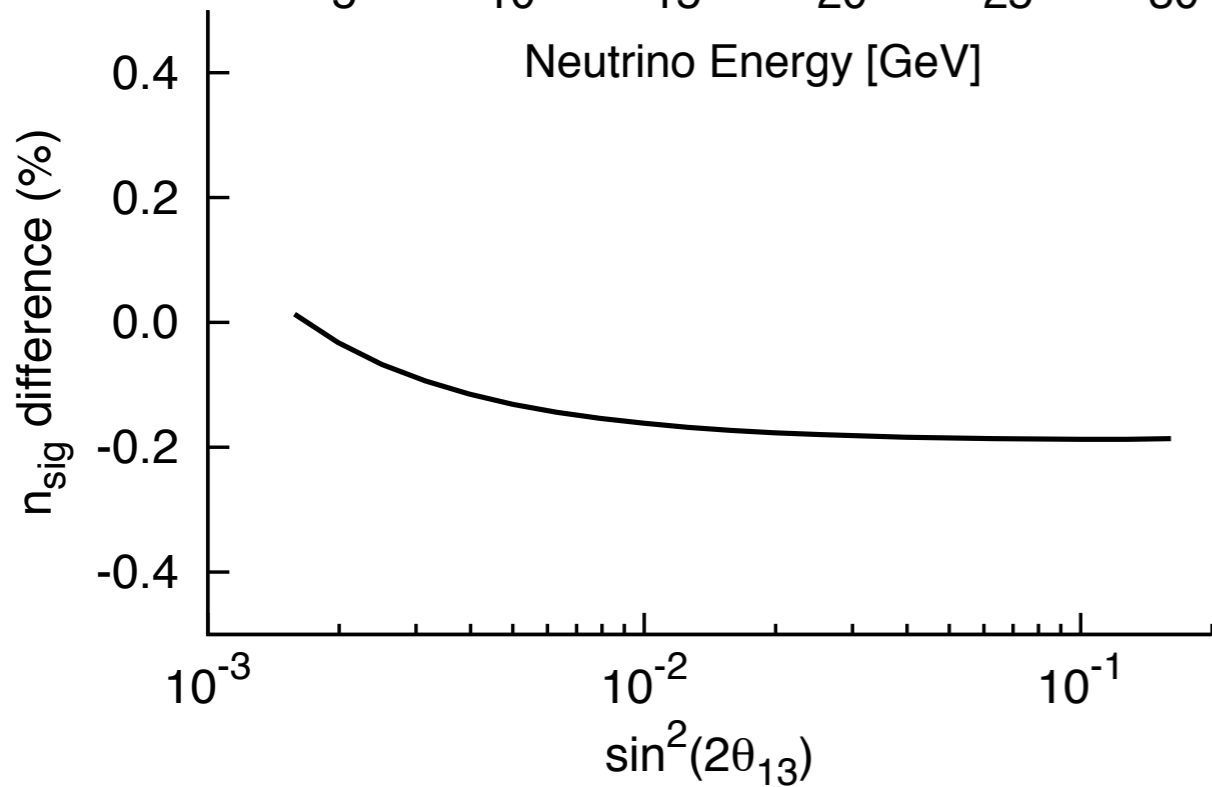
$\langle P \rangle$ less than 0.1%



Energy spread?



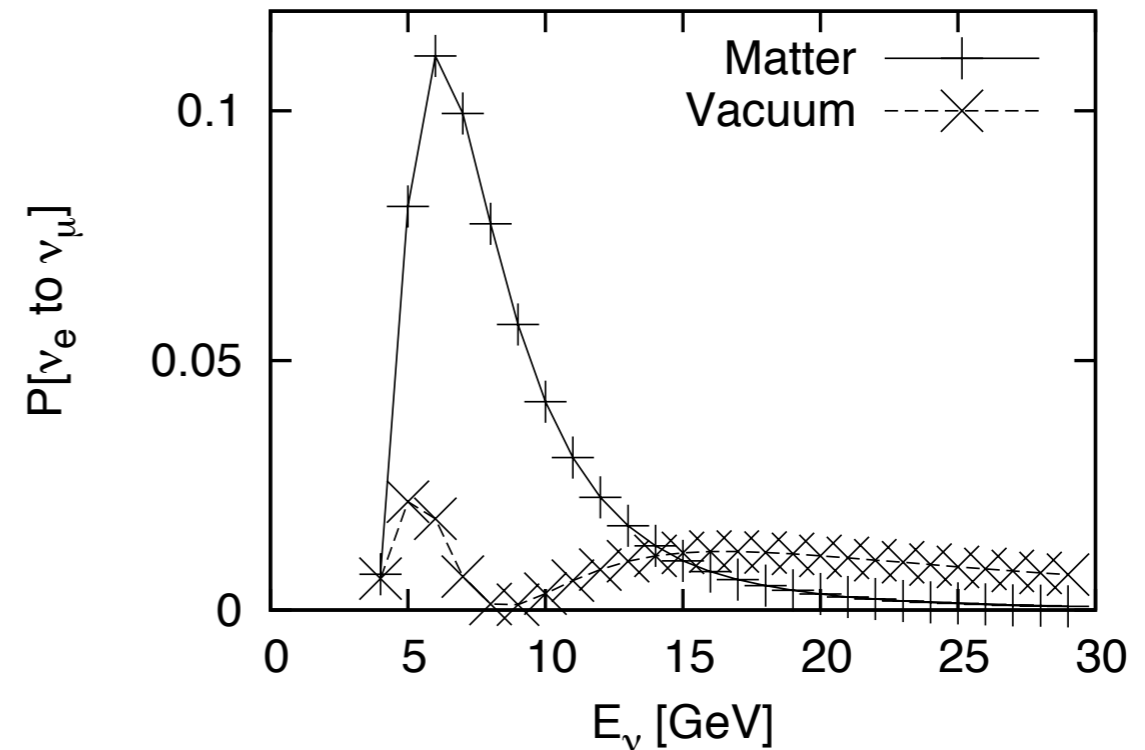
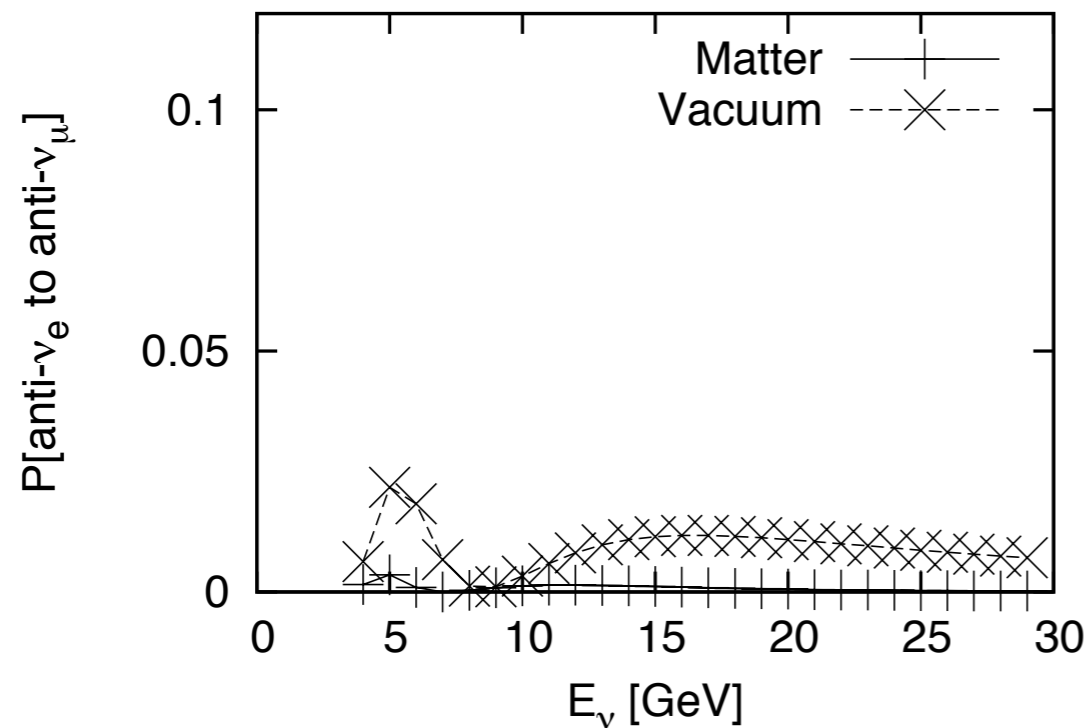
Assuming overzealous 5%
energy spread in
longitudinal phase space
For magic baseline!



pseudo-GLoBES

Oscillation Probabilities

Energy spread and oscillation probability commute.
Swamped by detector response.



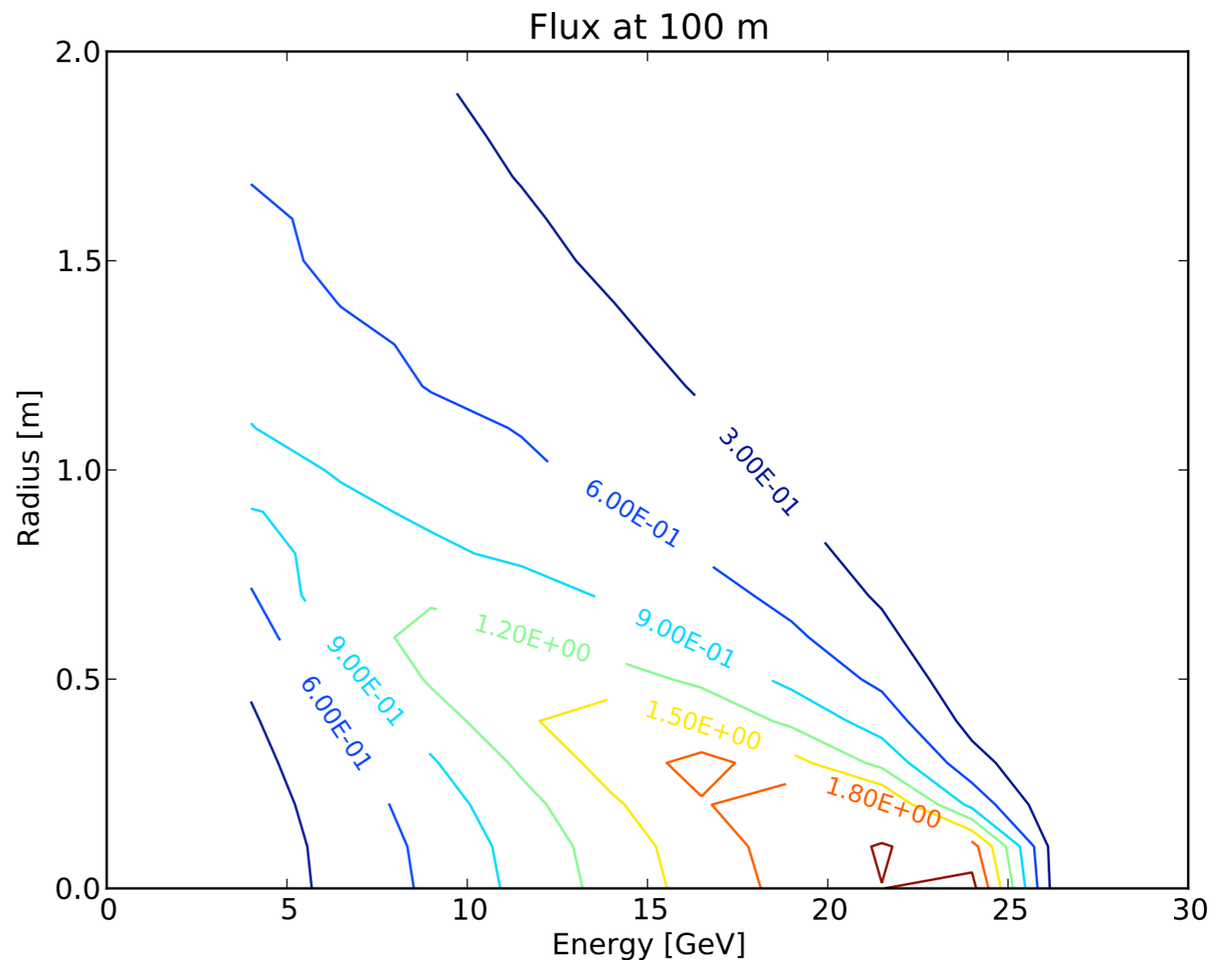
My Ring Simulation

1. Randomly sample points in 6D phase space where polarized muon decays (energy spread, divergence, etc.)
2. Compute baseline and angle for some point at the ND
3. Determine COM angle
4. Compute flux

ND Can measure Divergence

$$\sigma_{\text{div.}}^2 = \sigma_{\text{div. lattice}}^2 + \sigma_{\text{div. muon decay}}^2$$

Lattice divergence will
add 4 cm to this...
definitely measurable



Can you measure current on axis?

- During chat with Alain, we thought about using on-axis gamma detector
- $(\text{straight length})/(\text{gamma})$ means you don't see all the photons...
- But event rate should go as $(\text{gamma})^2$ on axis from relativity
- Will think about more after previous work completes

Summary and Future

- Now that I have a 'fancy' flux, I'm starting to do some analyses with it
- Will try to determine beam diagnostic and ND uncertainties to put into GLoBES
- Anybody want my flux? Done before?
Suggestions on directions?