# Outline for nuSTORM Flux Calculations

## Preparations for NuINT Workshop

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11 April, 2014

# Overall Outline

1. Introduction
2. Full Simulation for FODO Ring
3. Partial simulation of FODO Ring
4. Ramifications for cross-section measurements

# Introduction

## nuSTORM Facility Description

- target station
- FODO storage ring
- FFAG storage ring(?)

## Benefits of Muon Storage ring for Neutrino Physics

- $\nu_e(\bar{\nu}_e)$ and $\bar{\nu}_\mu(\nu_\mu)$ available in precisely known quantities
- systematic clarity i.e. energy distribution well known and predictable
- $\pi$ beam $\nu$ flux available for the same instrumentation.

## Principles of neutrino flux definition

- zeroth order description of the flux from $\mu$ decay

# Full Simulation of FODO Ring

## Target Station

- pion production/horn capture rates

## Pion transport and injection

- Efficiency of transport and injection
- What is the injection scheme?
- dynamic aperture of ring
- momentum acceptance of ring

## Muon retention

- how many muons are stored per turn?
- how many muon decays per turn?
  - better question how many lifetimes per turn?

# Partial simulation of FODO Ring

- reduction in simulation time
- fidelity wrt full simulation
- systematic investigation - exaggerated dispersion
  - suggests a less that 1% bin to bin energy uncertainty.

# Ramifications for cross-section measurements

- How do bin-to-bin rate uncertainties translate to cross-section uncertainties?

## Detector requirements

- $\nu_e/\nu_\mu$ resolution (easy?)
- charge ID (magnetic field)
- vertex resolution (what resolution?)
- particle identification capabilities