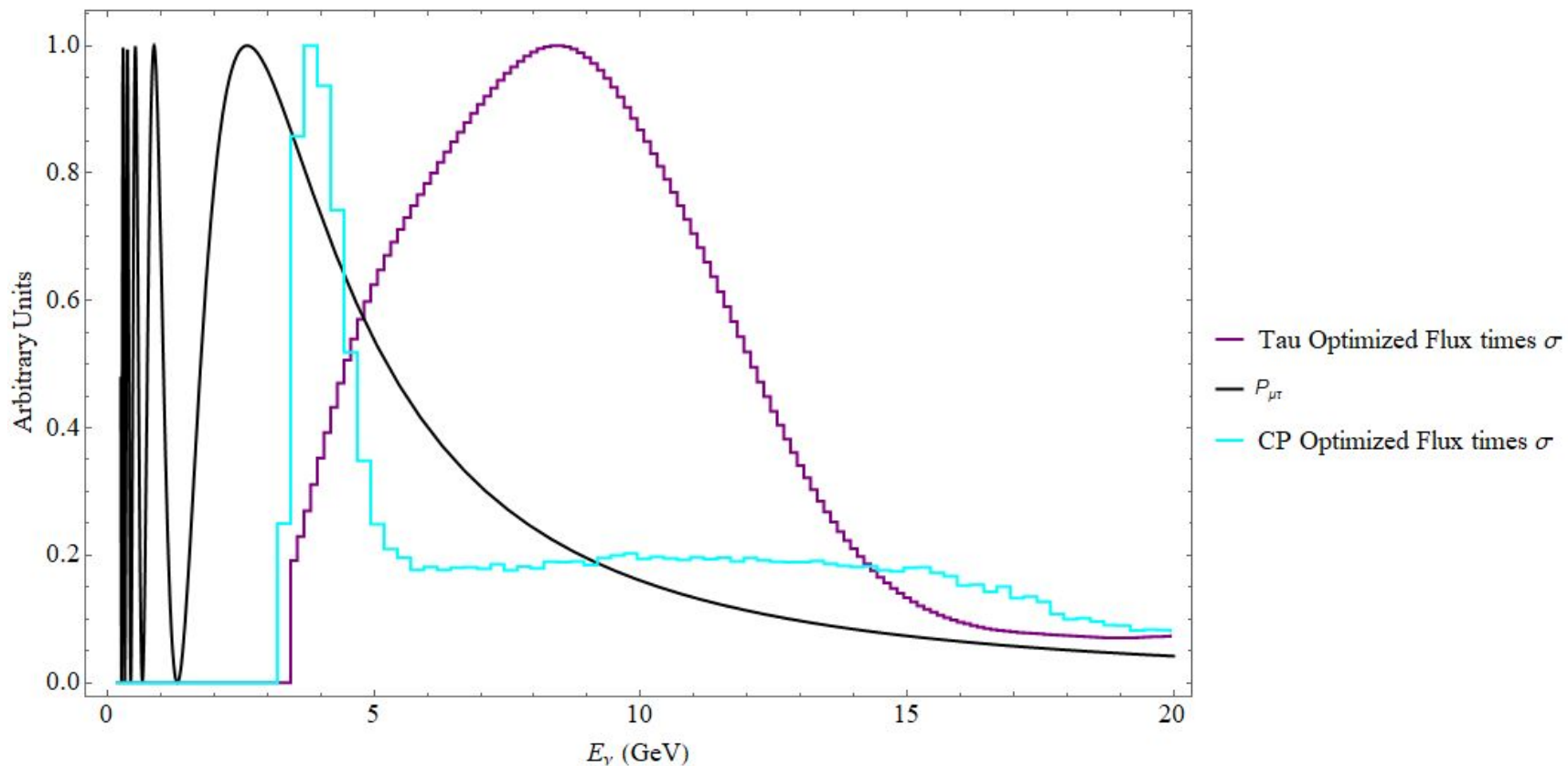


Atmospheric  $\nu_{\tau}$

Adam Aurisano  
University of Cincinnati  
1 November 2018

# Overview

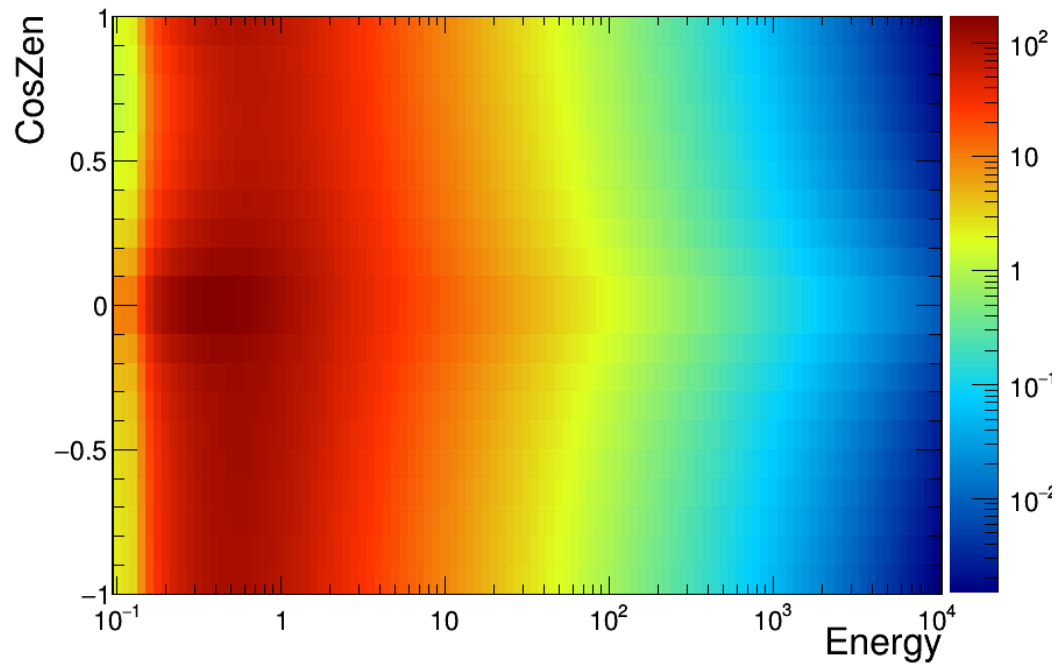
- Last week, Kevin noted that the high energy flux does not improve the measurement of three-flavor oscillations over the low energy flux
  - Due to cross-sections, we don't see events near the oscillation maximum
  - High energy flux has many more events, but they are even farther from the oscillation maximum
- Can atmospheric neutrinos help?



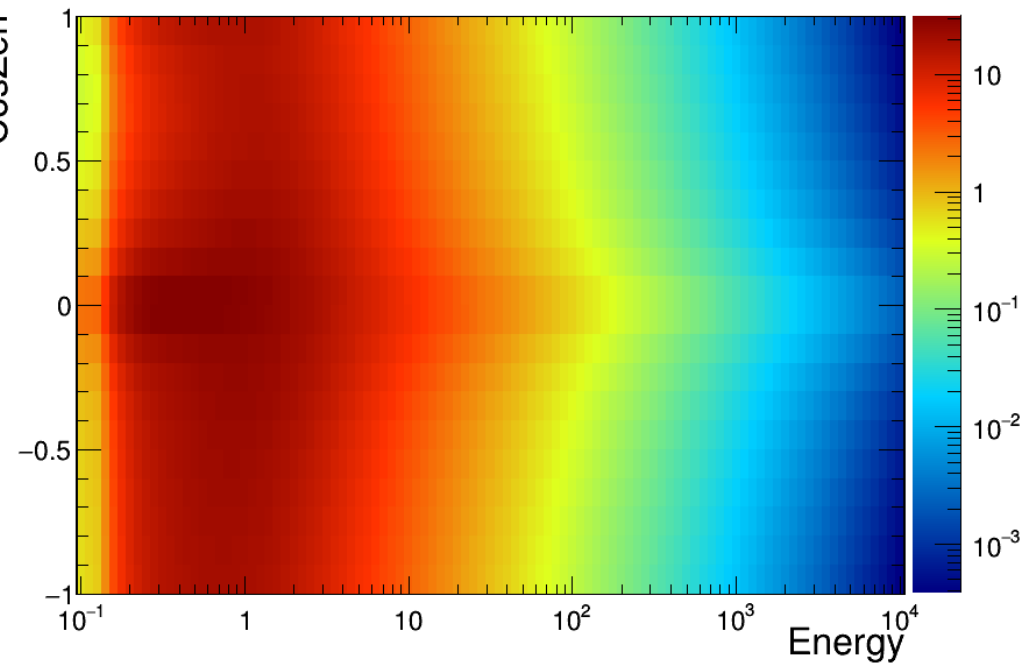
# Fluxes

Honda fluxes from <http://www.icrr.u-tokyo.ac.jp/~mhonda/nflx2014/index.html>

Muon Neutrino



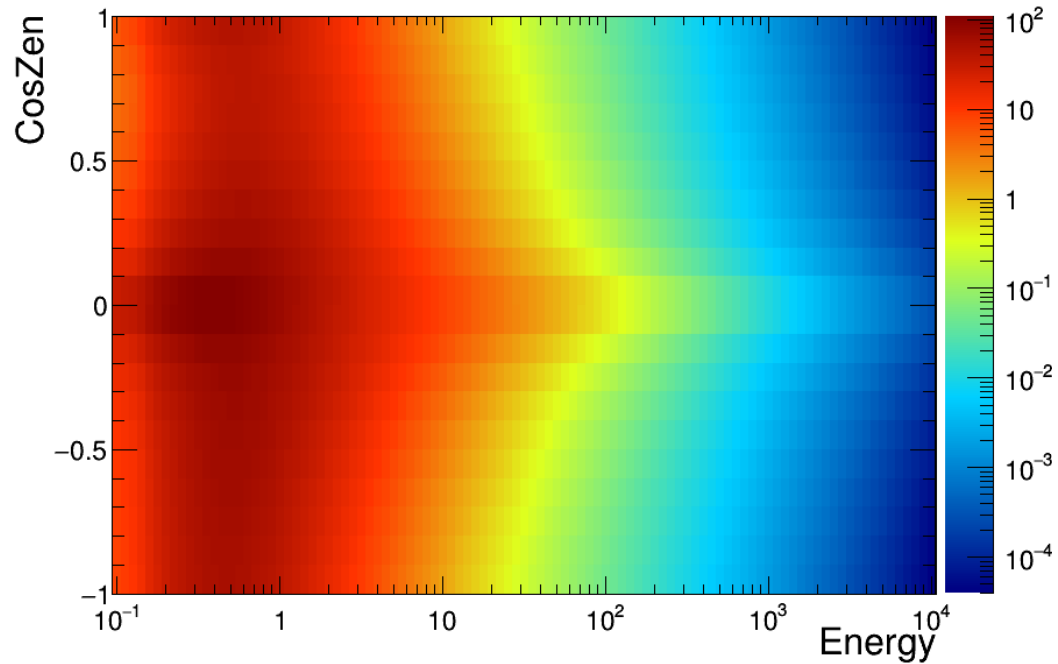
Muon Antineutrino



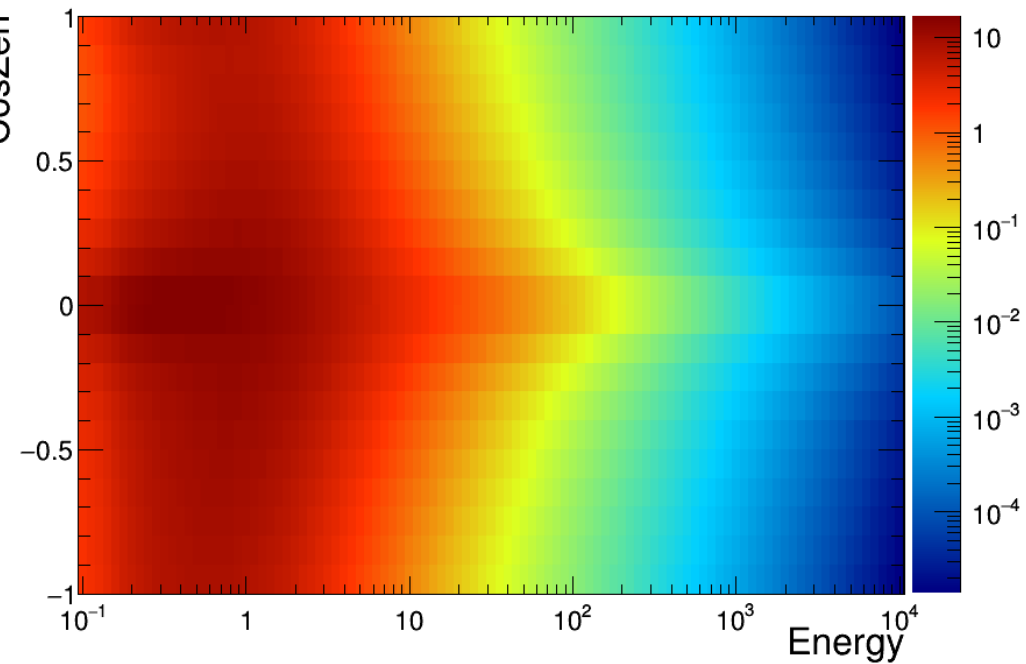
# Fluxes

Honda fluxes from <http://www.icrr.u-tokyo.ac.jp/~mhonda/nflx2014/index.html>

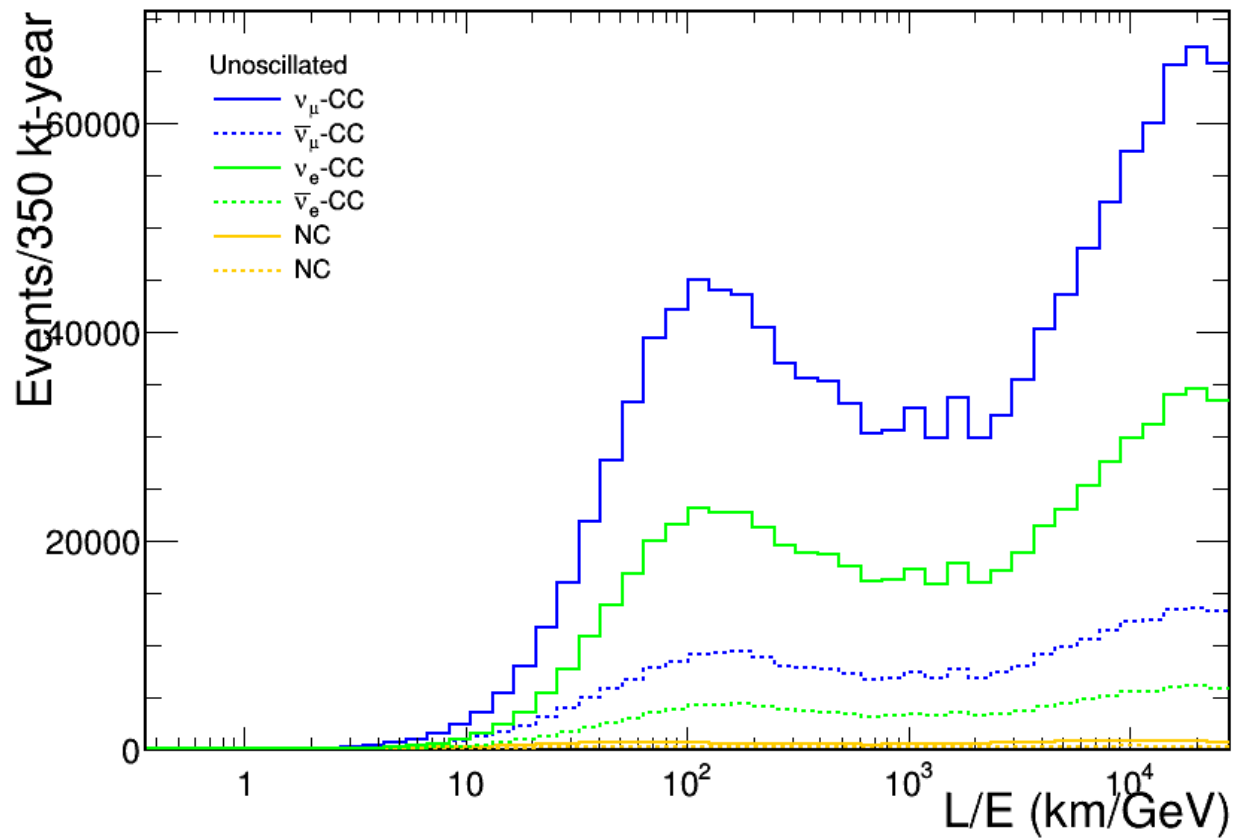
Electron Neutrino



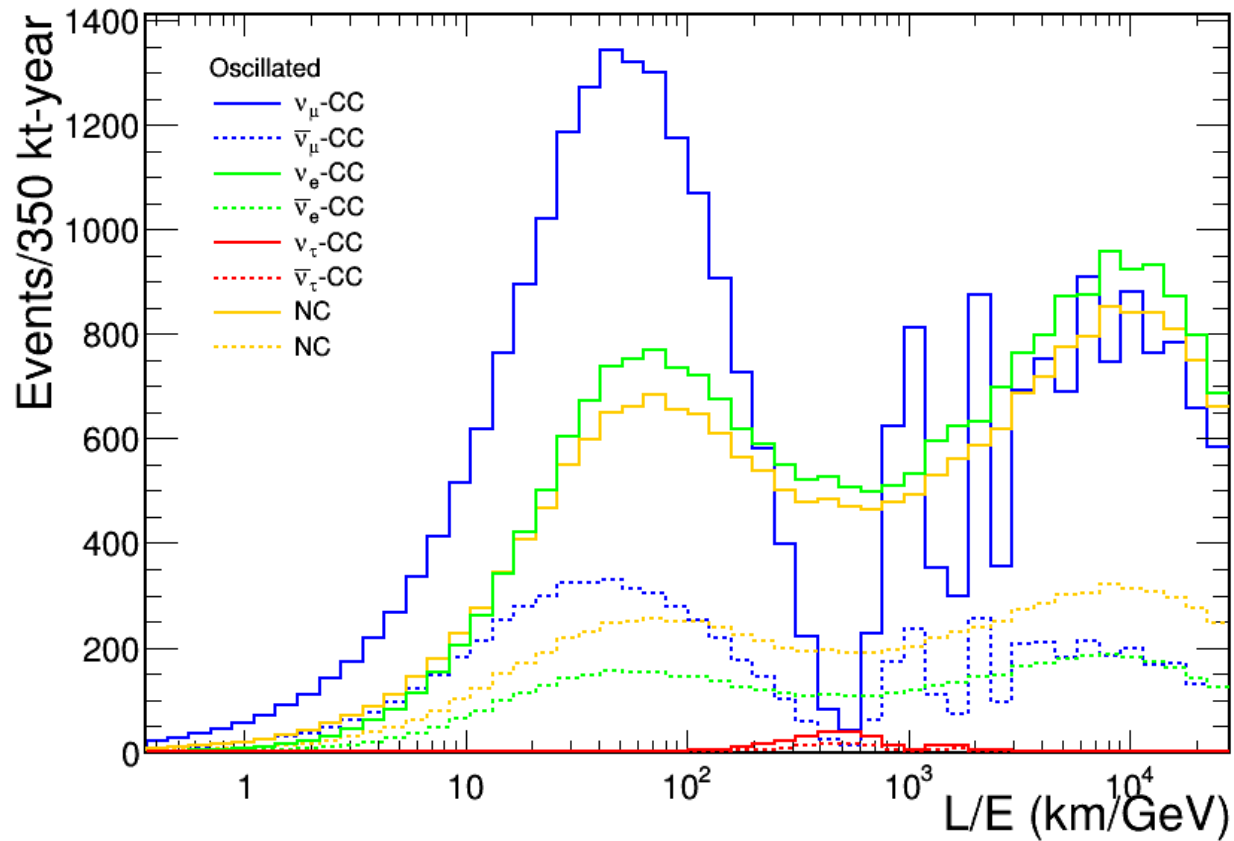
Electron Antineutrino



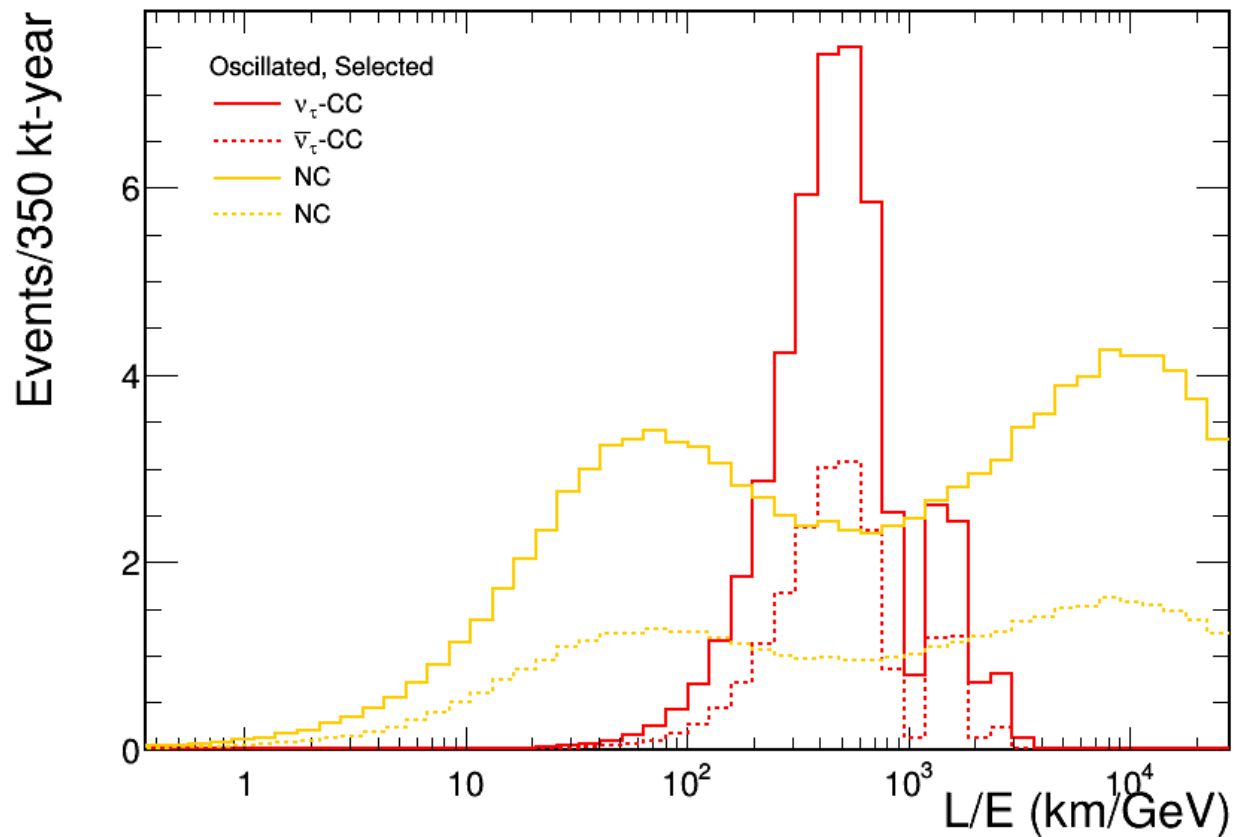
# Unoscillated Spectrum



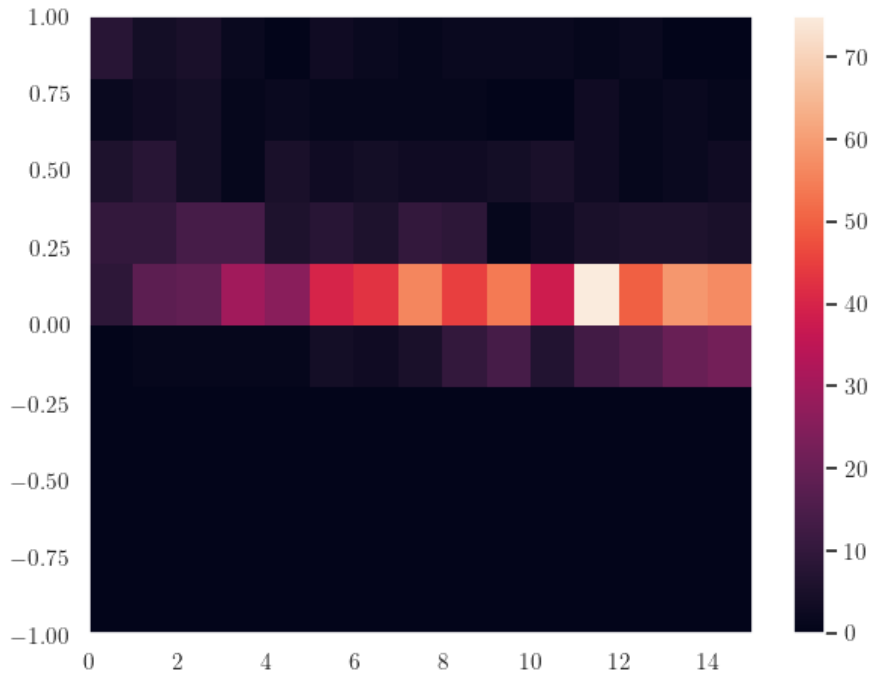
# Oscillated Spectrum



# Oscillated Spectrum, Optimistic Selection



# L/E Resolution?



- First attempt at understanding angular resolution for atmospheric tau neutinos
- Compared true angle of incoming neutrino to momentum weighted average angle of visible reconstructed objects



# Conclusions

- Statistics are low in atmospherics, but the first oscillation maximum is clearly visible
- Containment may be an issue
  - Jeremy's studies are on-going
- Unclear how well L/E can be reconstructed
  - First stab looks OK
- Could be a good complement to beam samples
  - Different samples constrain different parameters