IceDune Workshop

Flux and XSEC
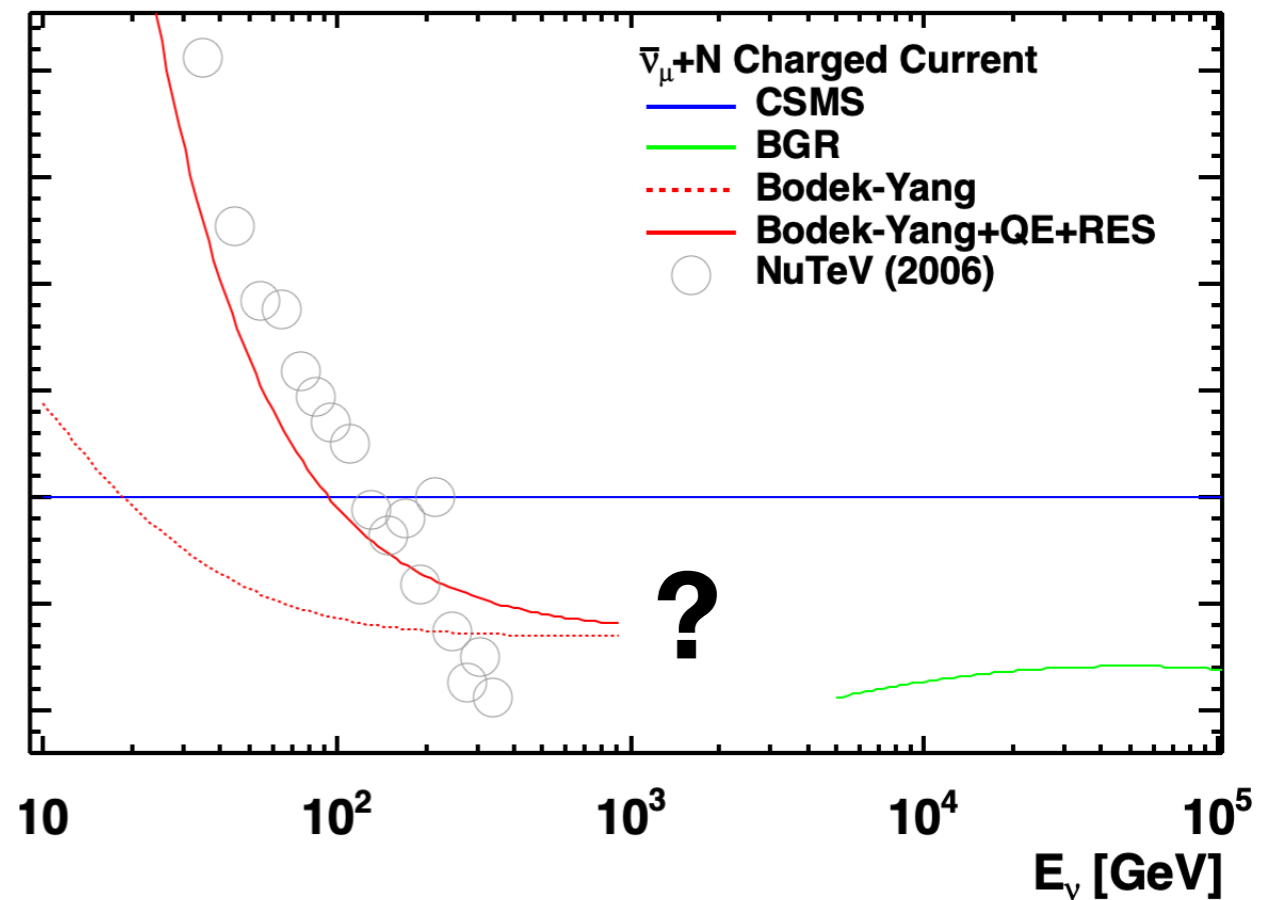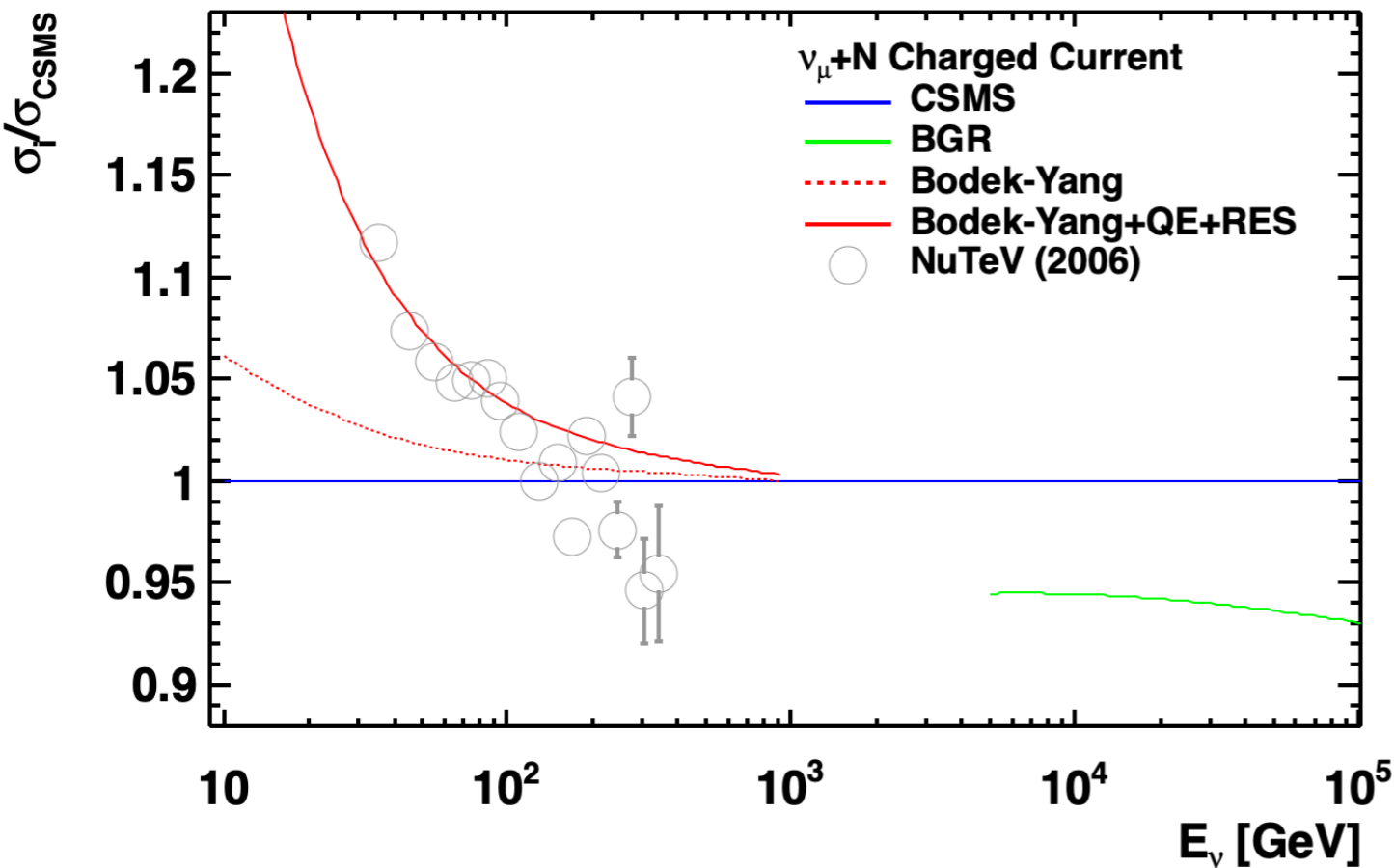Working group
Summary

Alfonso Garcia

Overview

- Participants:
  - John Hardin.
  - Maria Liubarska.
  - Jaydip Singh.
  - Diego Gratieri.
  - Bei Zhou.

- Identify open questions in XSEC and FLUX topics.
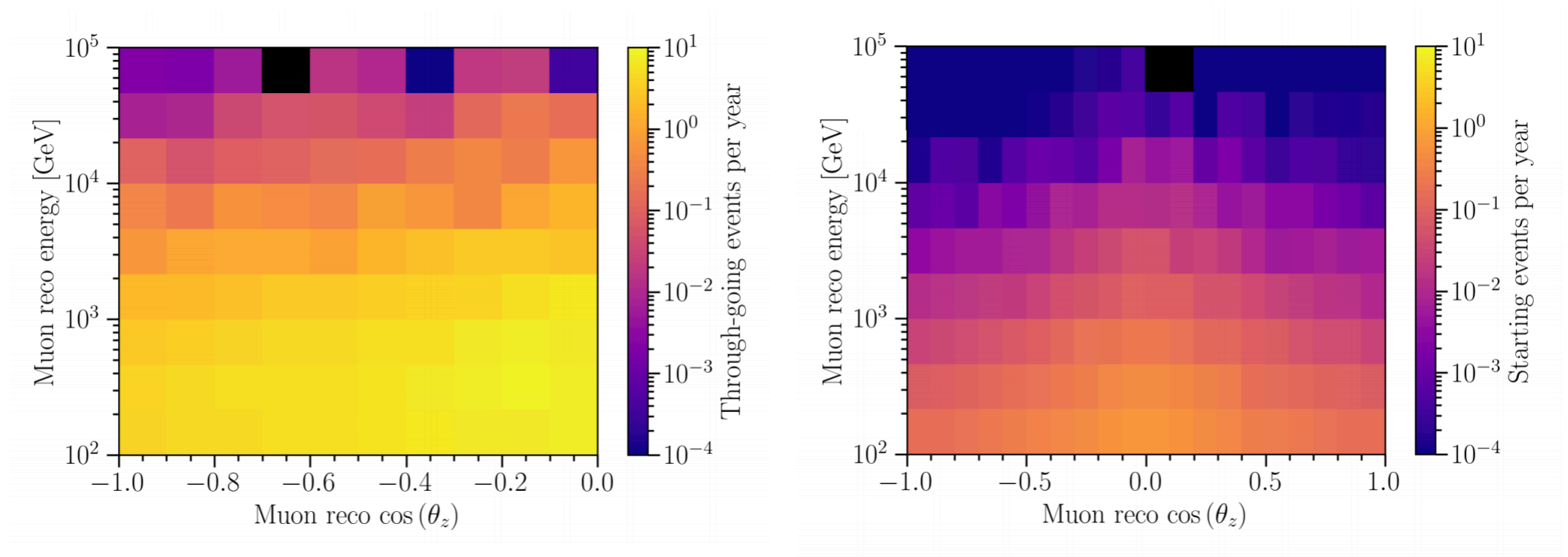
- Where IceCube and DUNE can play a role?

XSEC measurements VS models

- Some tensions in the nubar channel.

XSEC measurements VS models

- Can DUNE/IceCube measure XSEC in the 100GeV-10TeV range?
  - IceCube is trying to make a new measurement in this regime -> very correlated with flux.
  - DUNE has a non-negligible amount of through-going muons and starting events from numu interactions above 100GeV -> IceCube flux measurement can help constraining flux systematics?
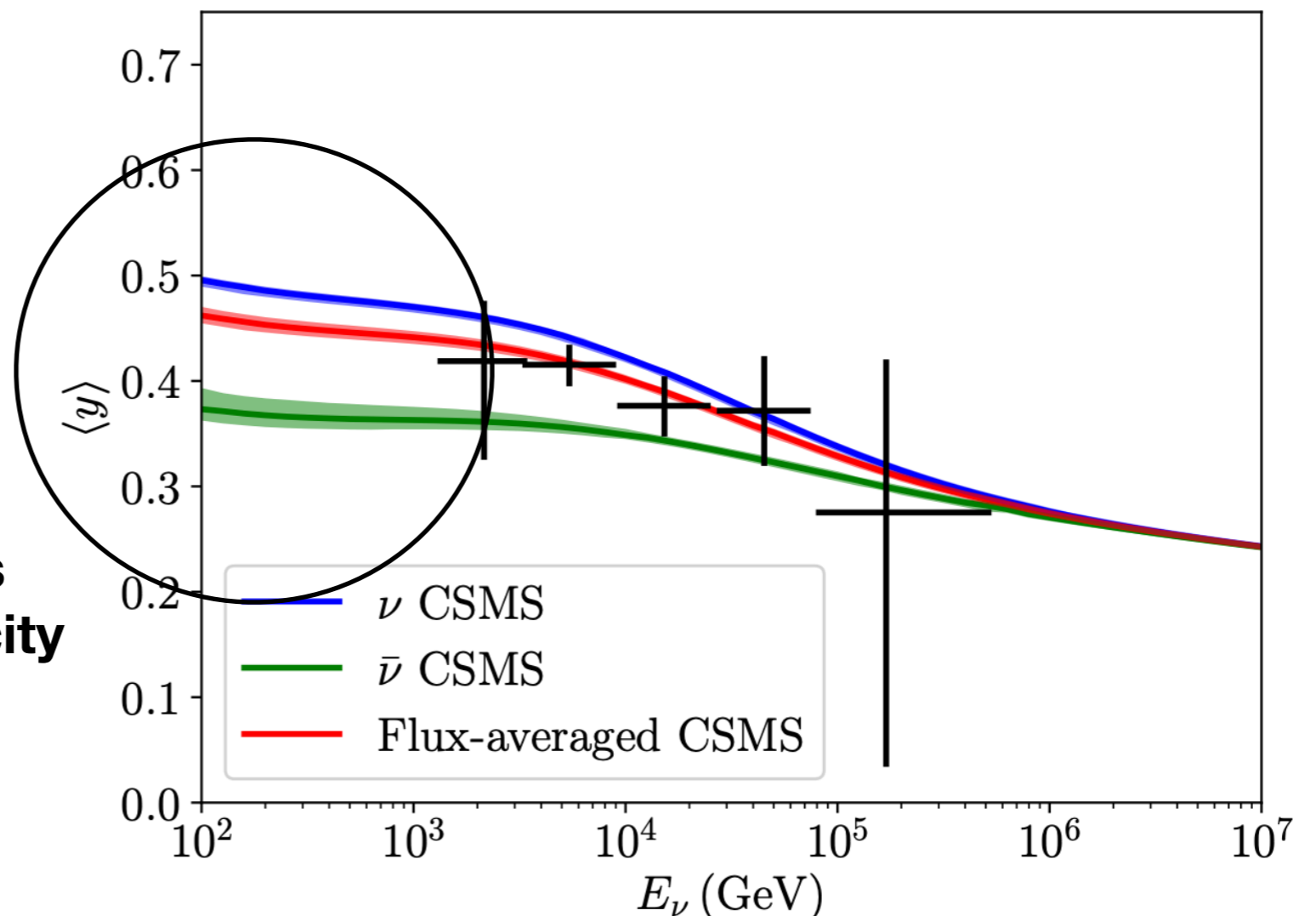
Inelasticity

- Shape -> Way to constrain single differential dsigmady
- Flux-averaged inelasticity -> proxy to measure nu/nubar ratio.
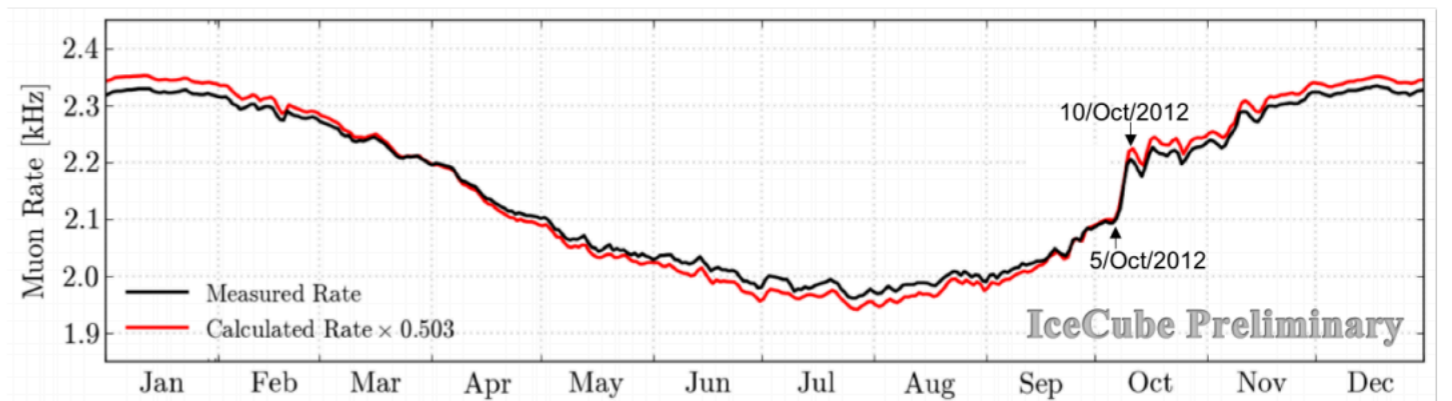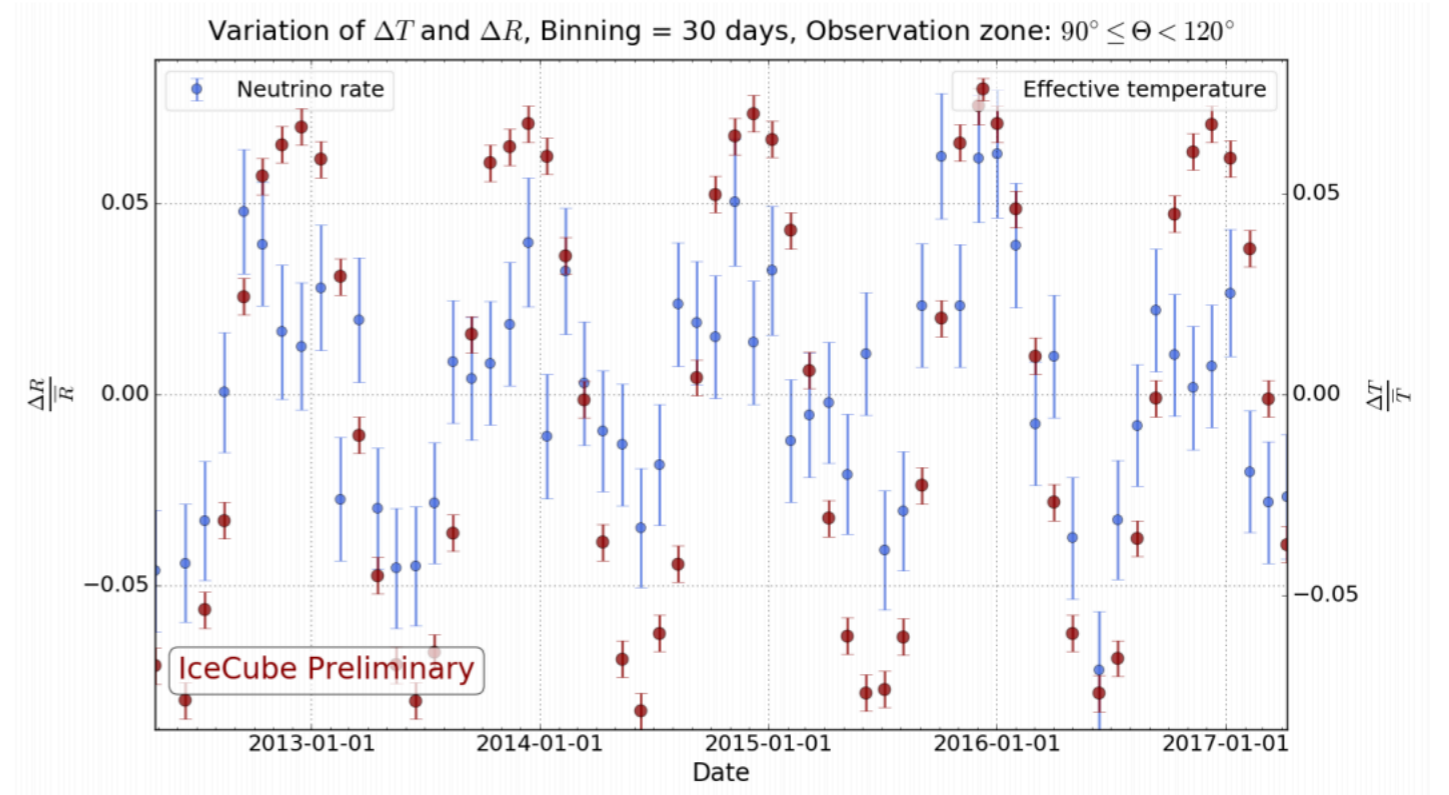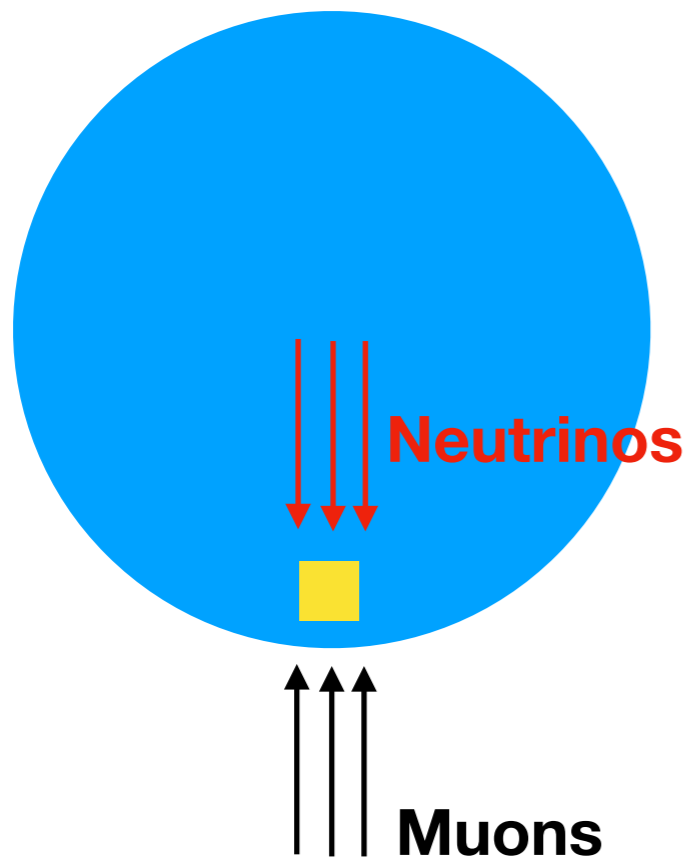
IceCube already working on that

IceCube-Upgrade

DUNE great tracking properties could potentially recover inelasticity with a very high precision. They can probably measure double diff. Xsec
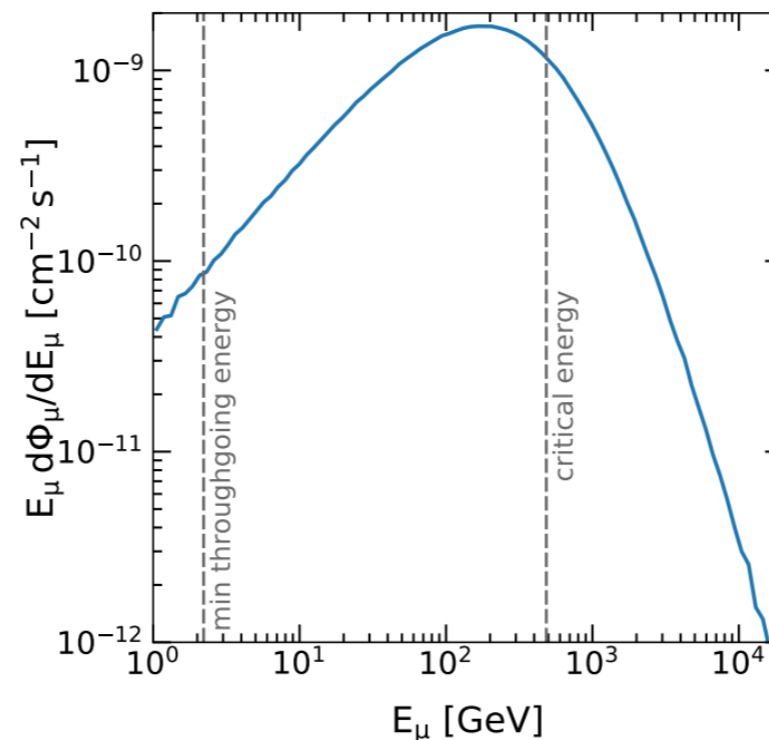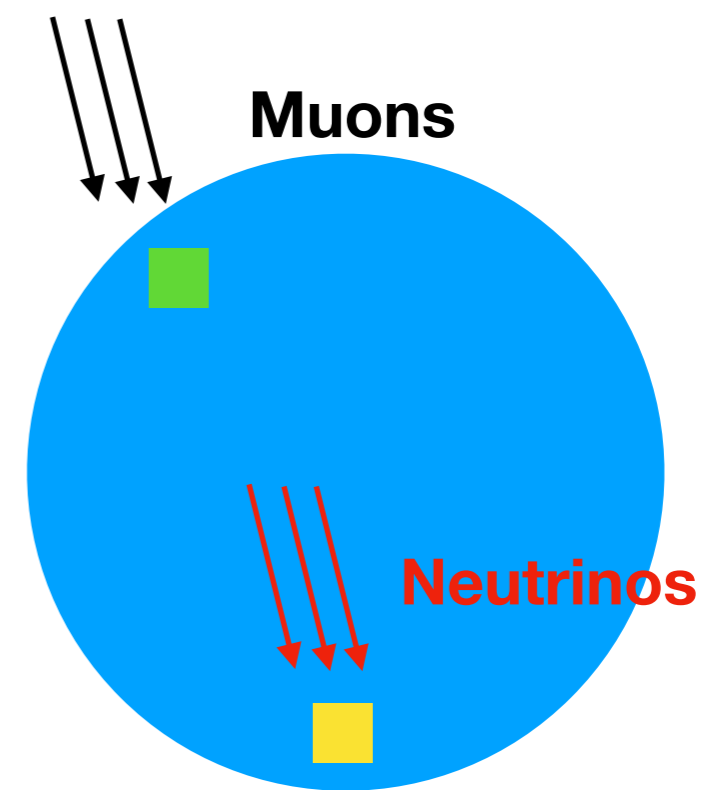
Seasonal effects

- IceCube has measure seasonal effects:
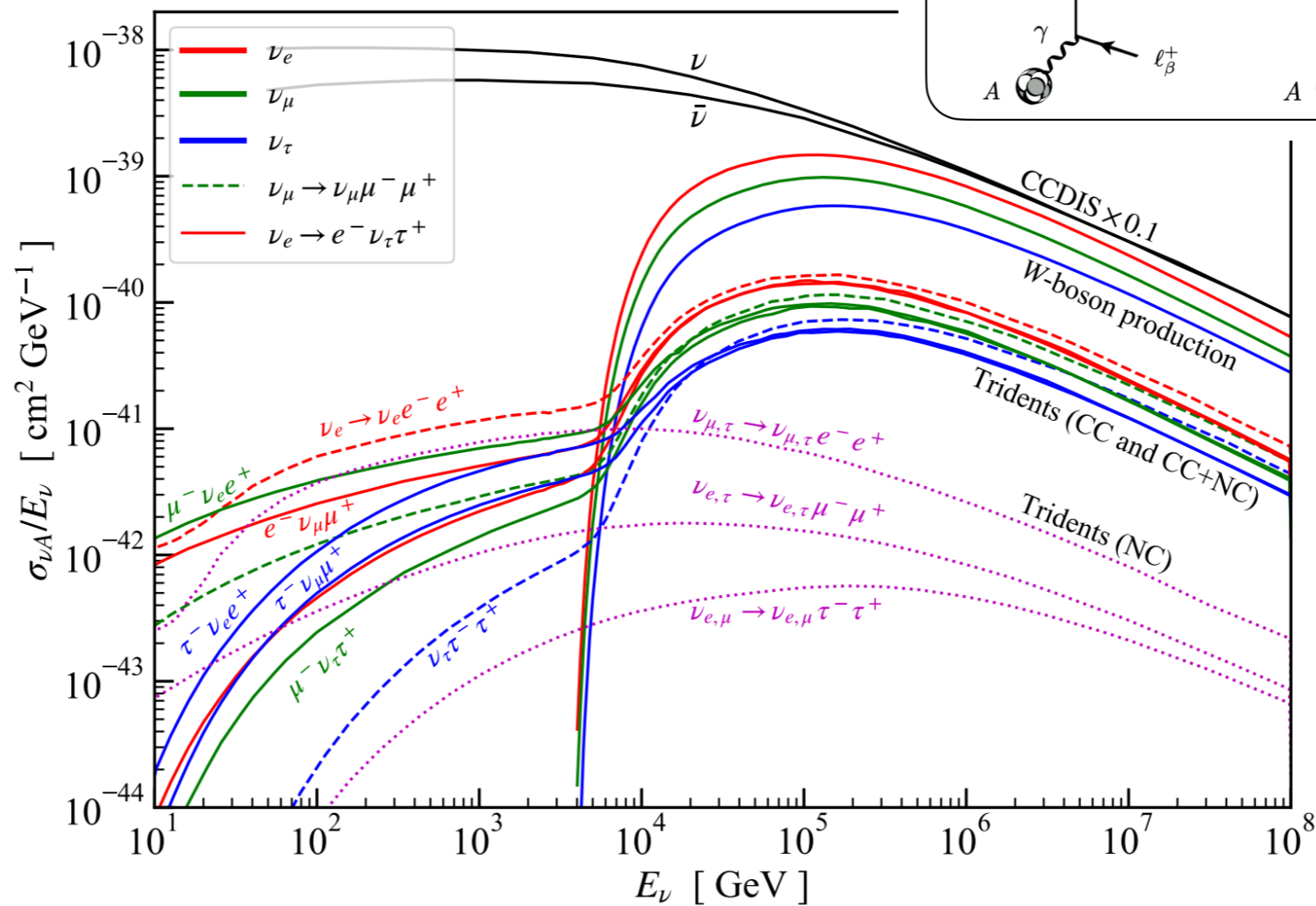 - Down-going muons.
  - Up-going neutrinos.

Neutrinos

Muons

Seasonal effects

Muons

Neutrinos

- IceCube has measure seasonal effects:
  - Down-going muons.
  - Up-going neutrinos.

- Can we correlate with measurements from DUNE?
  - Reduce field of view IceCube neutrinos -> few events per 1deg.
  - Rate of muons in DUNE is reasonable for this study -> muon rate in four modules of DUNE will be ~0.2 Hz.
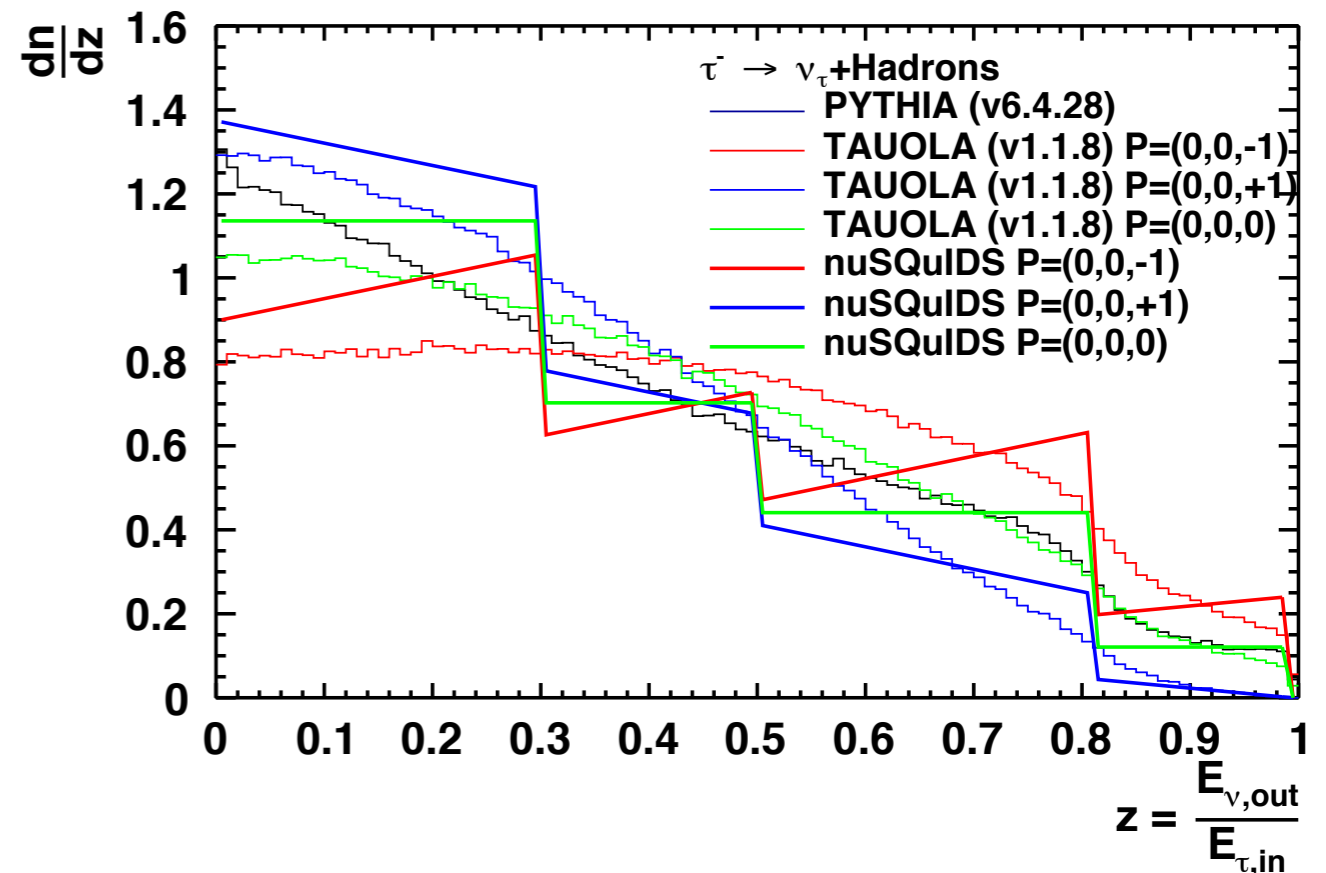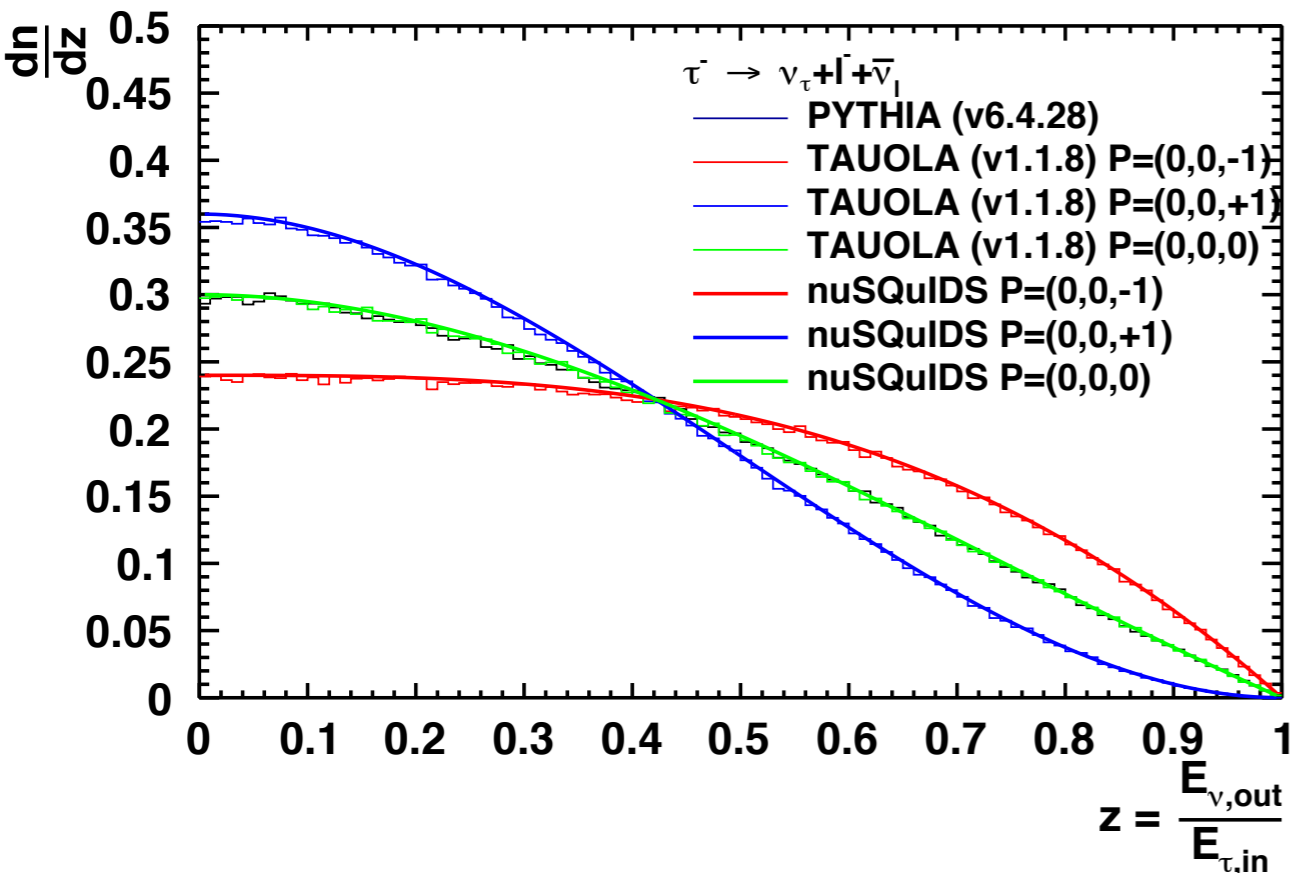
New channels

- Trident production:
  - DUNE-ND can observe many.
  - IceCube -> can we distinguish pair of muons?
  - Details of hadronic showers must be model -> charm decays?
- W-boson:
  - Relevant for IceCube -> earth absorption.

Very good to constrain Z' model

Tau polarisation

- Do we need to account for this effect in nutau measurements?
  - PYTHIA6 does not account for spin effects in tau decay.
  - Recent studies showed highly polarised taus at E>10TeV.

Self veto

- Can DUNE help?
  - Important systematics for IceCube southern-sky searches.