# FoM - diffuse / IceCube

MANTS 2014, CERN

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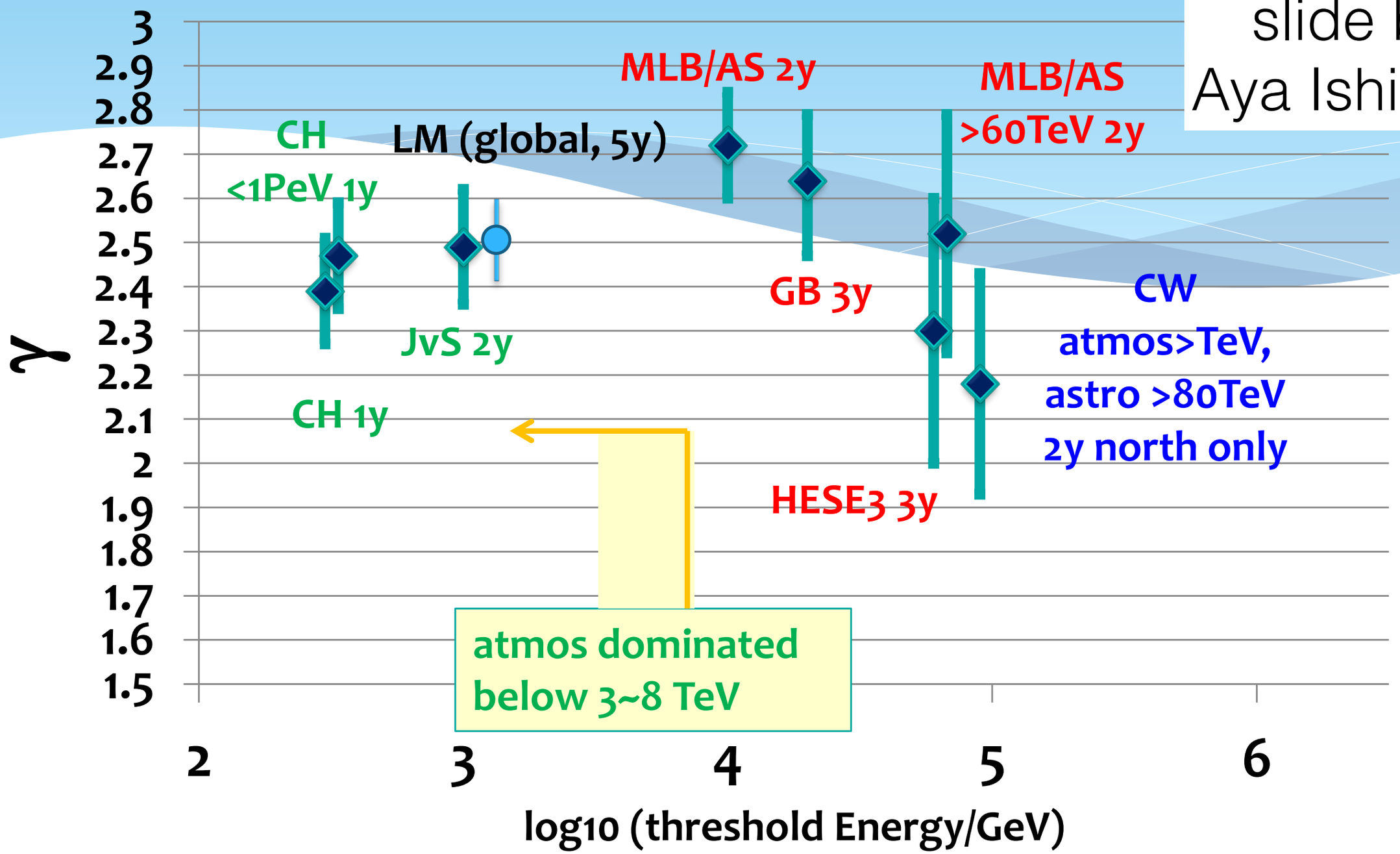
# What would be a good figure of merit for diffuse fluxes?

- IceCube has found a diffuse astrophysical neutrino flux (in several analyses now)

- We started by fitting for benchmark spectra, first $E^{-2}$, then $E^{-\gamma}$, but there are hints that the picture might be more complicated

# Floating astrophysical indices

slide by
Aya Ishihara




- Mariola/Joanna noted a possible threshold dependence of fitted indices
  - astro dominated region softening of indices with reduced threshold
- Also Lars' global fit indicate a South/North asymmetry
- Deviation from simple power-low hypothesis?

# More Caveats

- The global fit shows different spectra when fitting the northern and the southern sky
  - is this real? or background we did not explain?
  - assuming it is real is this a galactic component?
    - There is no fit/analysis/… for this, so this is just a crazy idea (and I take full responsibility)

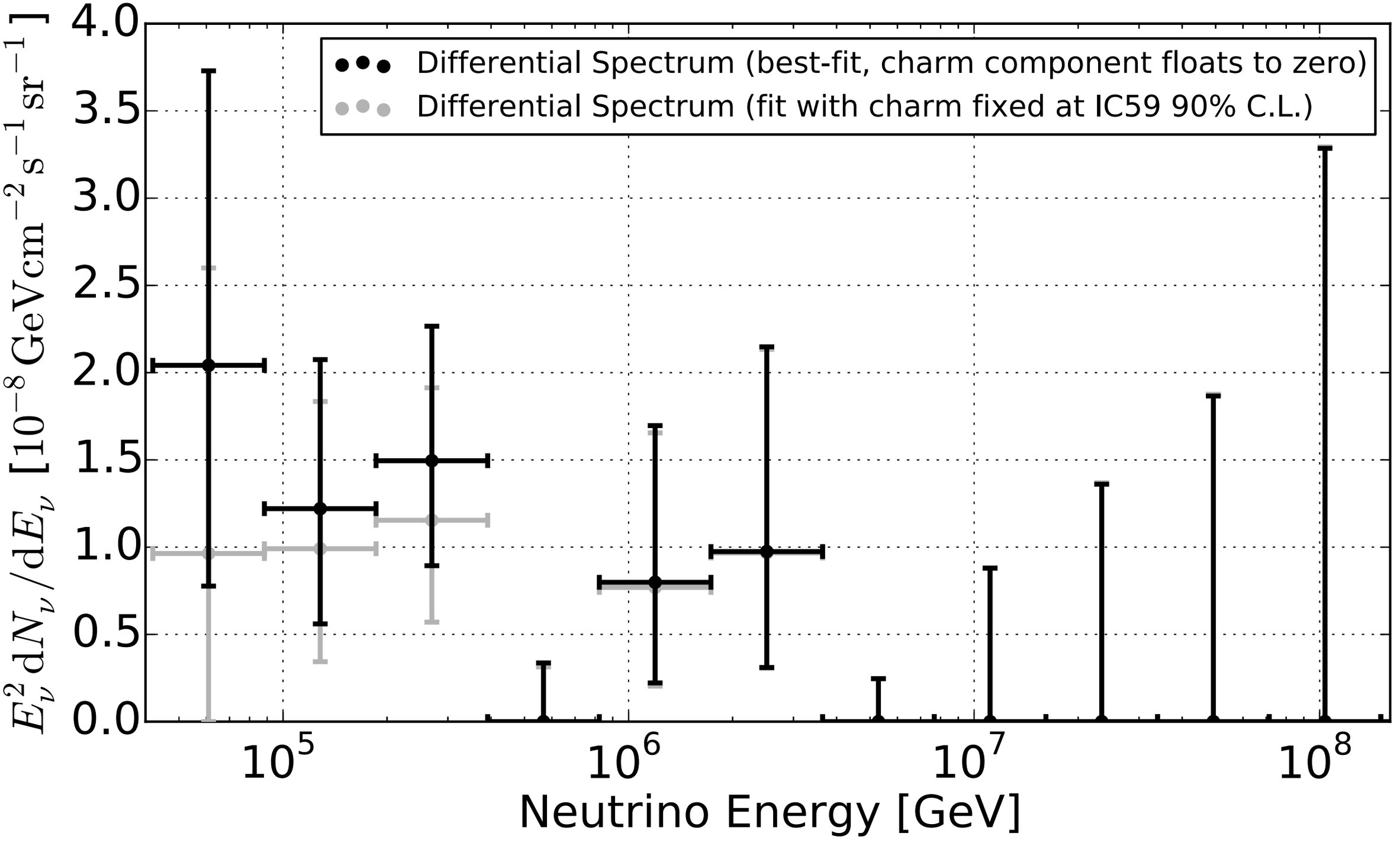
# How do we best describe the flux?

- Be careful when you model cutoffs by adding an exponential
    - The normalization will not stay the same, if you re-fitted the flux with exp(-E/x PeV) you will get a different normalization (although they are not too different)
- $0.95\ 10^{-8}\ (E/GeV)^{-2}\ \exp(-E/(3PeV))$ [$GeV^{-1}\ cm^{-2}\ sr^{-1}\ s^{-1}$] is **not** a best fit (the normalization is different - although not too different)
    - Unfortunately haven't done the fit yet - should be back up to a bit above 1.1 or so - so not really a big deal

# How do we best describe the flux?

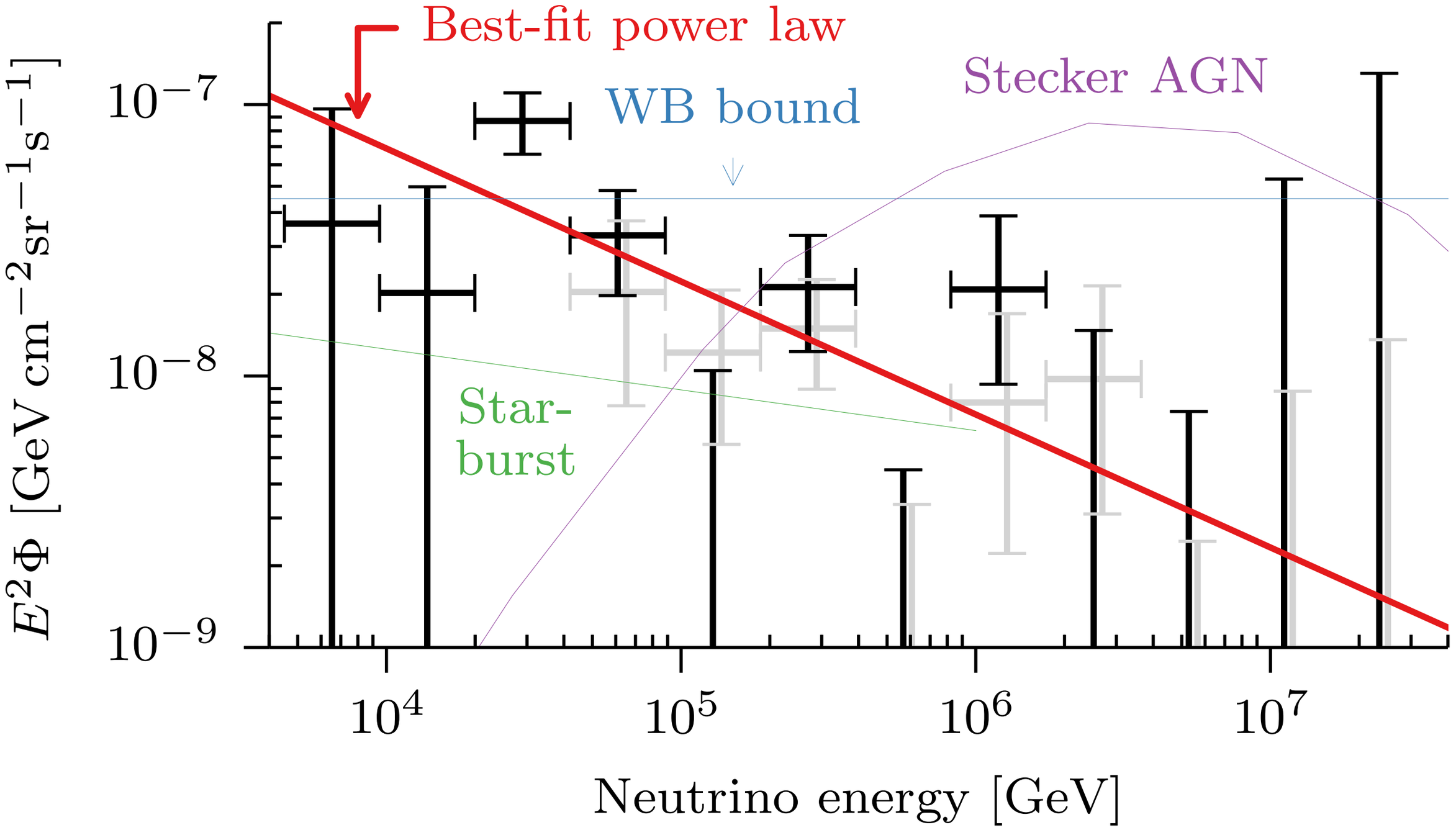
- Our current best description is a fit using backgrounds and several pieces of $E^{-2}$ (effectively an unfolding accounting for backgrounds)

# How do we best describe the flux?



# How do we best describe the flux?

plot by
Jakob van Santen



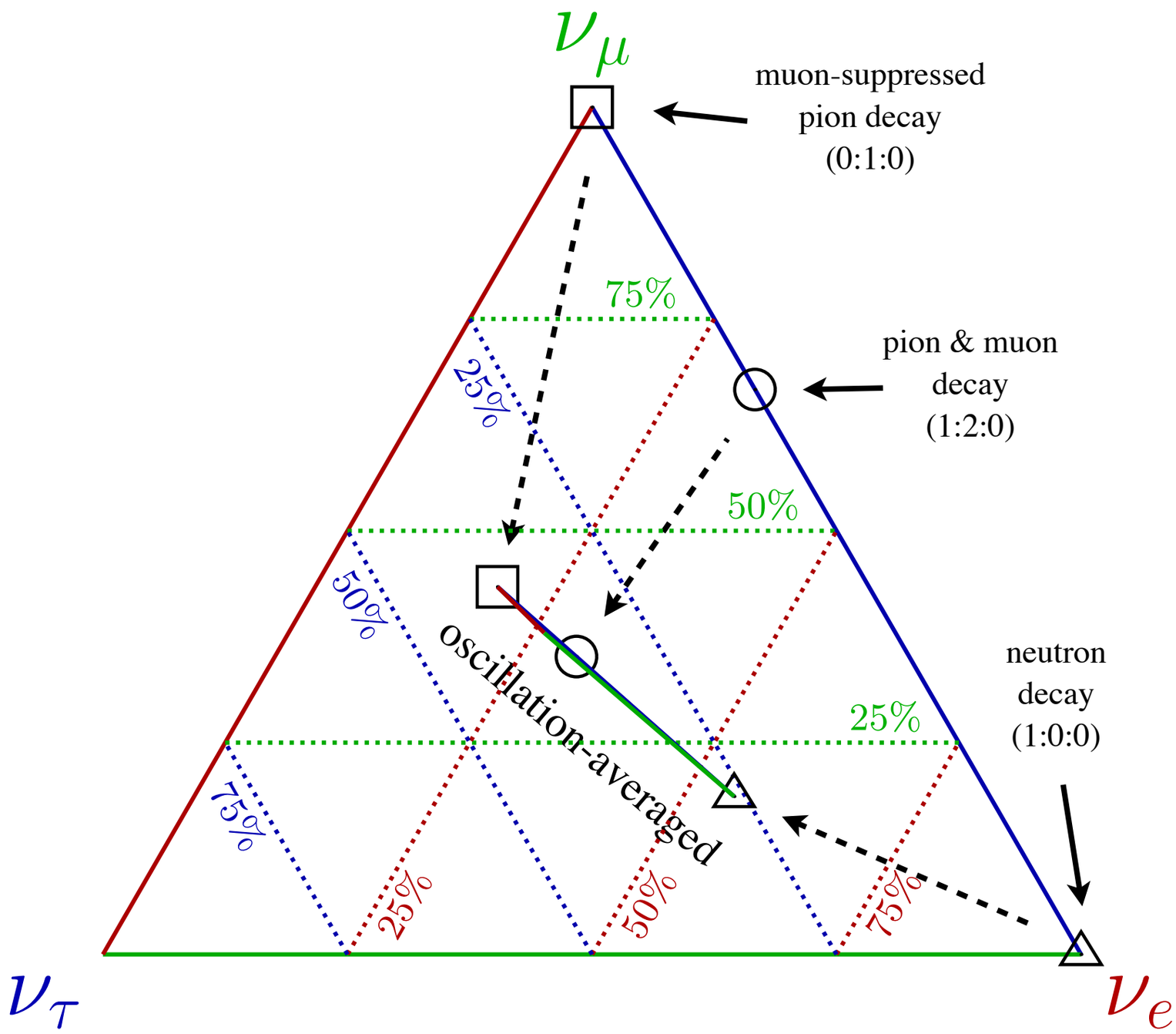
# More Questions / Figures

- How well can we measure flavor ratio?
  - All previous plots were made with the assumption of 1:1:1 : 1:1:1 - which is allowed by all analyses

- We measure it mostly by distinguishing tracks from cascades - maybe also taus in the future, but those are hard to see

# Oscillation-Averaged Neutrino Flavors

slide by
Markus Ahlers




"NuFit 1.3 ($\theta_{23} > 45°$)": $\sin^2\theta_{12} = 0.304$ / $\sin^2\theta_{23} = 0.577$ / $\sin^2\theta_{13} = 0.0219$ / $\delta = 251°$

# Summary

- There are several flux fits, mostly harder if you go to higher energies, somewhat softer if you go to lowers
    - (if you fit one spectral component)
- Some of them might be systematics, but it looks like the answer is not as simple as a single power-law flux
    - keep the energy rang in mind when you study a flux for KM3NeT!