

Low-energy Neutrino Reconstruction with GRECO

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Low-energy

- Bad angular resolution:
 - The accuracy of directional reconstructions in IceCube depends heavily upon the number of light sensors that register photons from a given neutrino event.[1]
- Can provides an additional probe for possible neutrino sources in a lower energy regime
 - The flux of atmospheric neutrinos (irreducible backgrounds) is strongly energy dependent
 - Any soft-spectrum astrophysical source will be exceedingly difficult to parse out from background

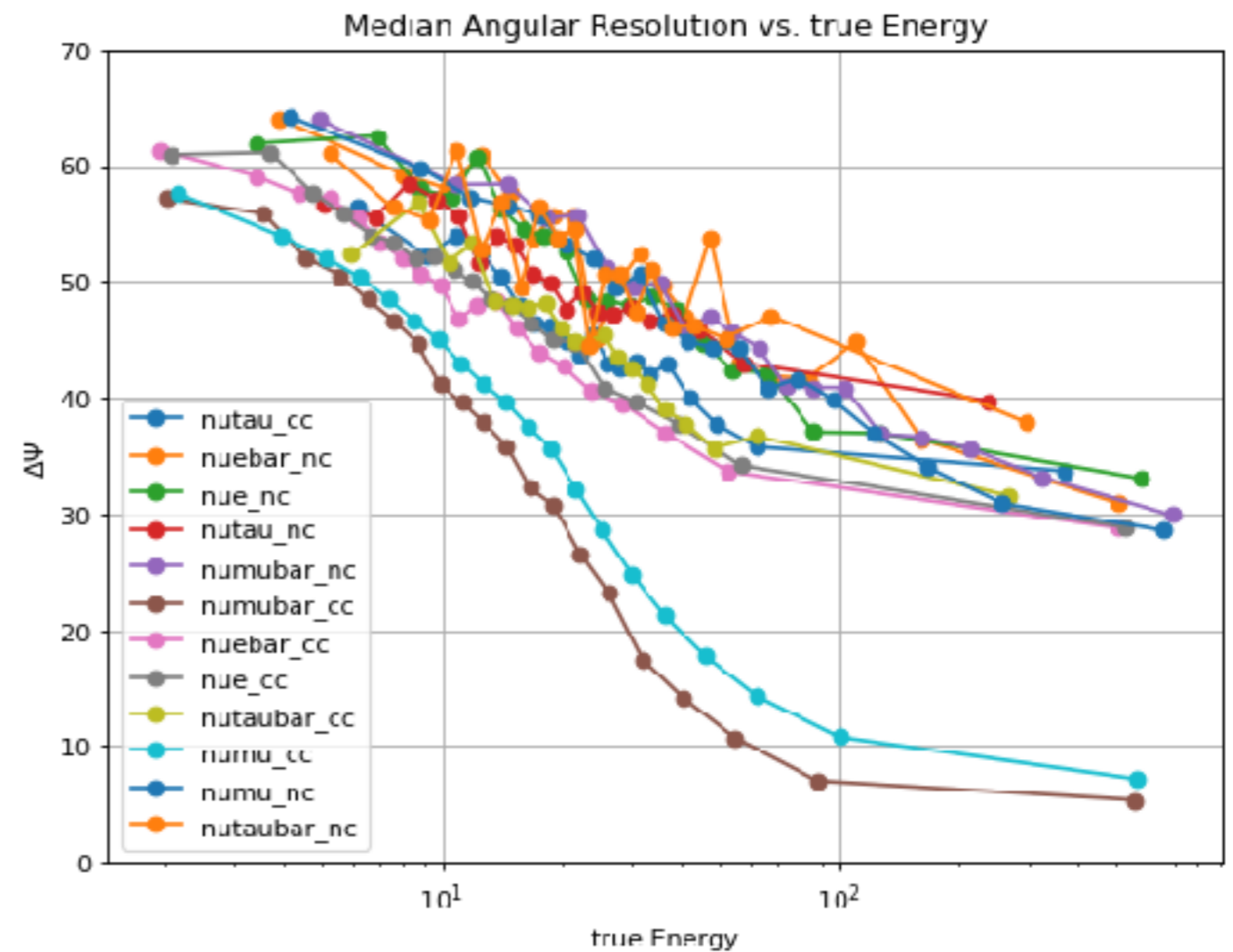
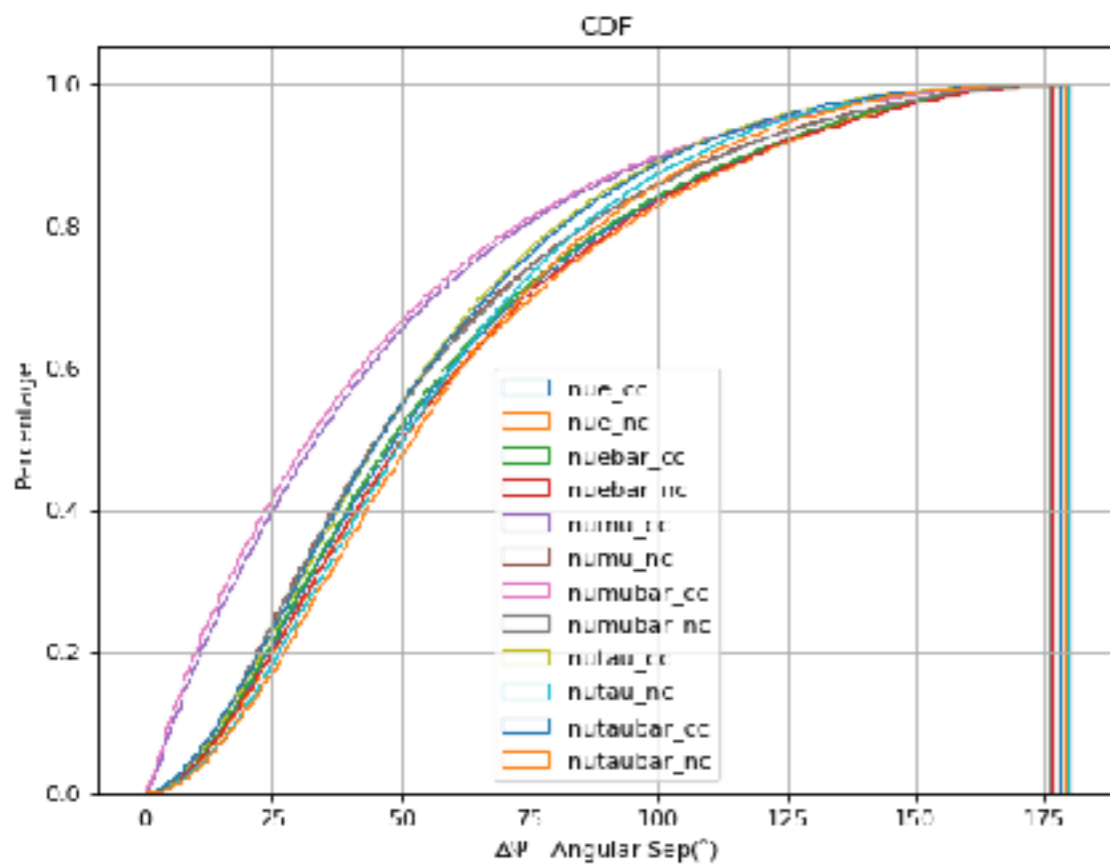
Pegleg Reconstruction

- GRECO files
 - GeV Reconstructed Events with Containment for Oscillations
 - Reconstructed using the combined track+cascade millipede fit known as Pegleg [2]
- Pegleg
 - Track + cascade hypothesis
 - For < 100 Gev
- Angular Separation
 - θ : zenith
 - ϕ : azimuth

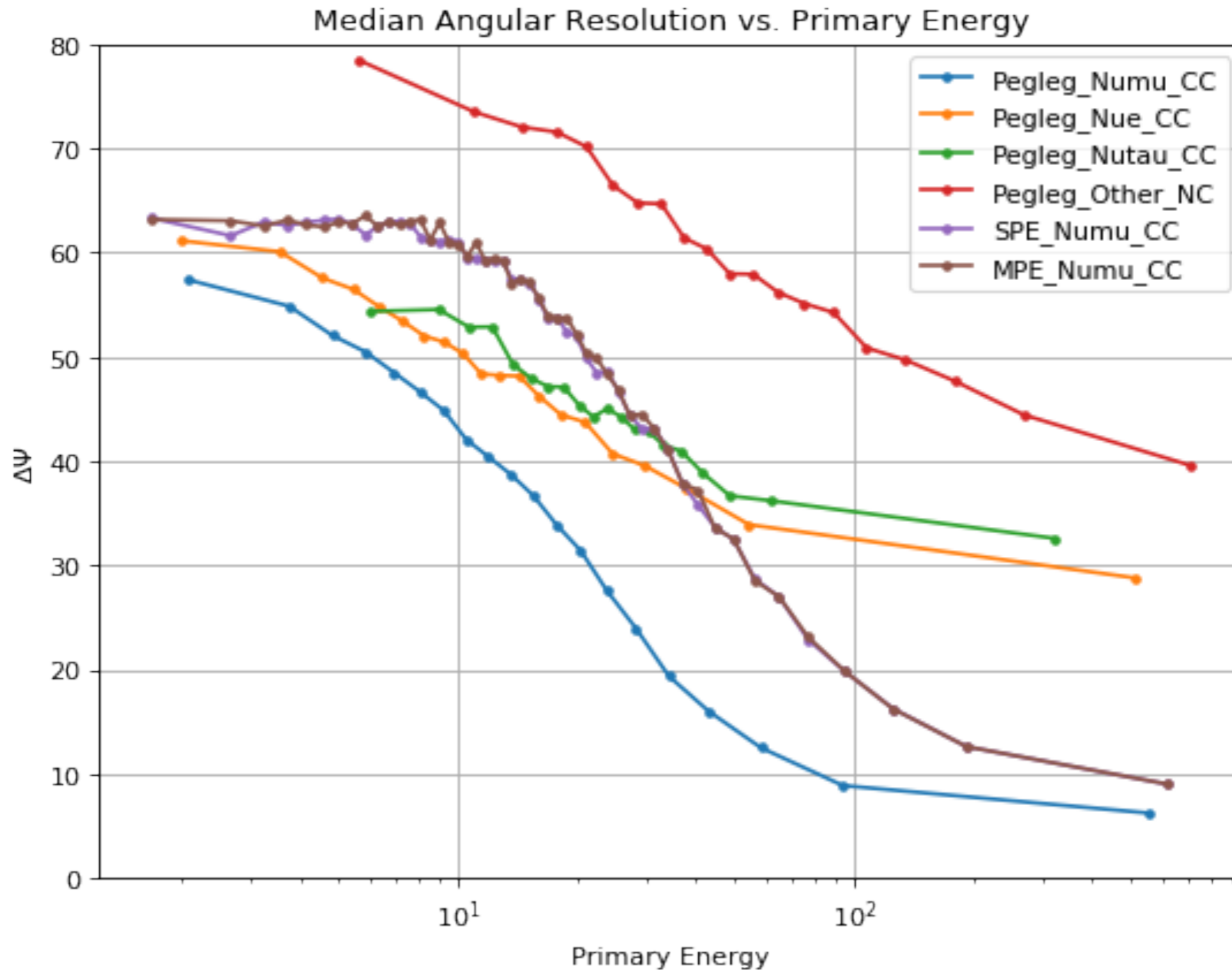
$$\Delta\Psi = \cos^{-1}(\cos\theta_1\cos\theta_2 + \sin\theta_1\sin\theta_2\cos(\phi_1 - \phi_2))$$

Median Angular Resolution

- Probability Density Function \rightarrow Cumulative Distribution Function \rightarrow Median Angular Resolution



Pegleg vs. SPE / MPE



Thank you!

- [1] Daughhete, J. D. (2015). *Search for neutrino transients using IceCube and DeepCore* (Doctoral dissertation, Georgia Institute of Technology).
- [2] Larson, M. (n.d.). IC86 Tau Appearance Analysis. Retrieved from https://wiki.icecube.wisc.edu/index.php/IC86_Tau_Appearance_Analysis#Event_Samples