Contribution ID: **89** Type: **not specified**

# Multi-PeV Signals from a New Astrophysical Neutrino Flux Beyond the Glashow Resonance

*Monday, 8 May 2017 16:30 (15 minutes)*

The IceCube neutrino discovery was punctuated by three showers with $E_\nu$ ~ 1-2 PeV. Interest is intense in possible fluxes at higher energies, though a marked lack of $E_\nu$ ~ 6 PeV Glashow resonance events implies a spectrum that is soft and/or cutoff below ~few PeV. However, IceCube recently reported a through-going track event depositing 2.6 $\pm$ 0.3 PeV. A muon depositing so much energy can imply $E_{\nu_\mu}$
$gtrsim$ 10 PeV. We show that extending the soft $E_\nu^{-2.6}$ spectral fit from TeV-PeV data is unlikely to yield such an event. Alternatively, a tau can deposit this much energy, though requiring $E_{\nu_\tau}$ ~10x higher. We find that either scenario hints at a new flux, with the hierarchy of $\nu_\mu$ and $\nu_\tau$ energies suggesting a window into astrophysical neutrinos at $E_\nu$ ~ 100 PeV if a tau. We address implications, including for ultrahigh-energy cosmic-ray and neutrino origins.

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**Session Classification:** Neutrino Astronomy

**Track Classification:** Neutrino Astronomy - Convenor: Gisela Anton, FAU / ECAP