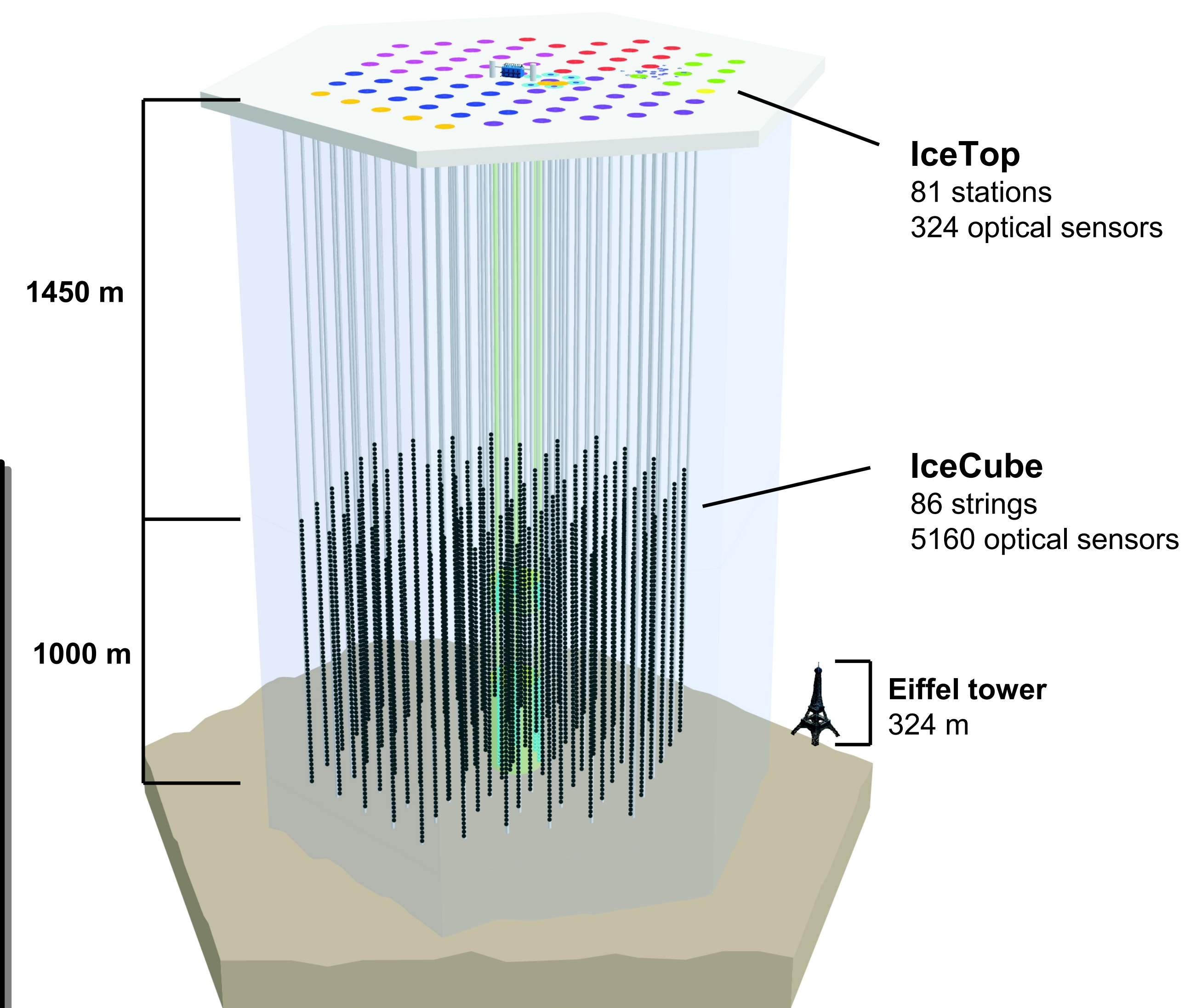
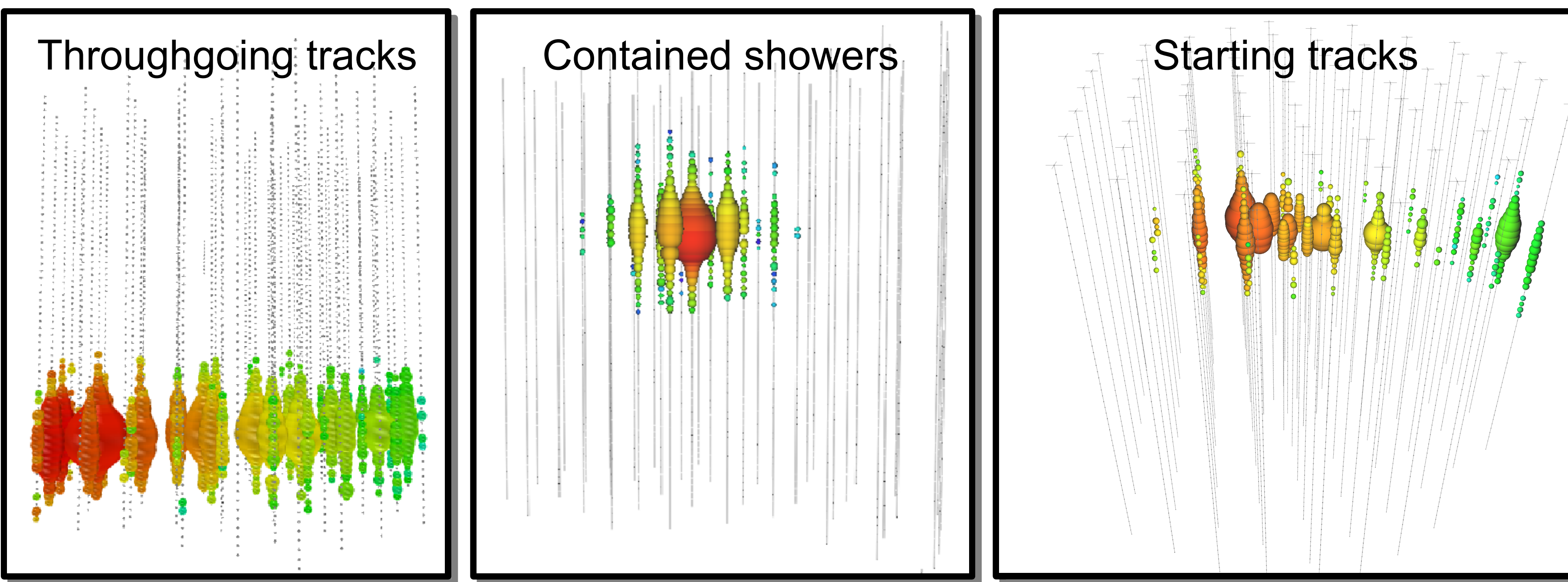


## Evidence for Extraterrestrial Neutrinos in IceCube

Lars Mohrmann – DESY, Platanenallee 6, 15738 Zeuthen

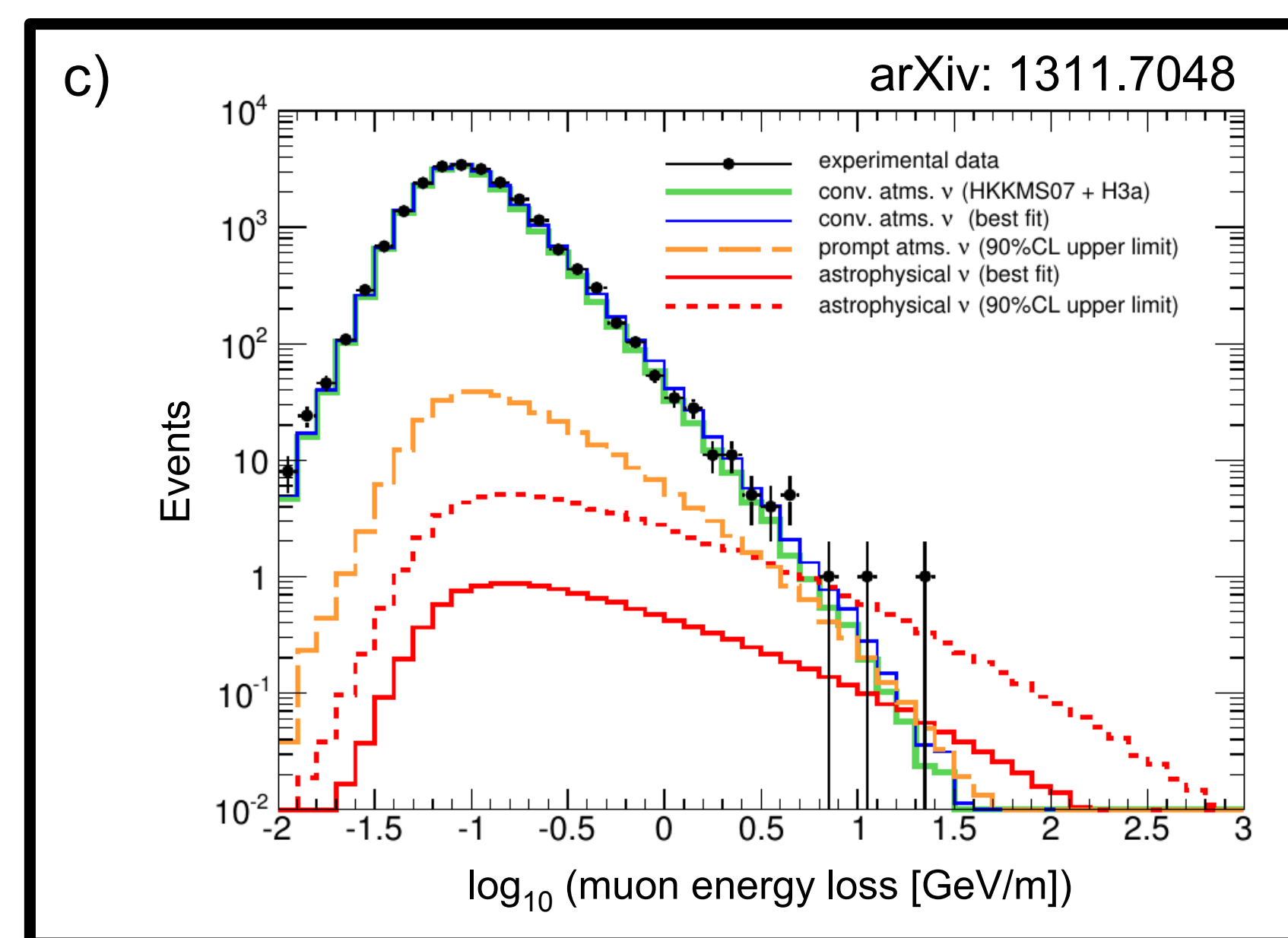
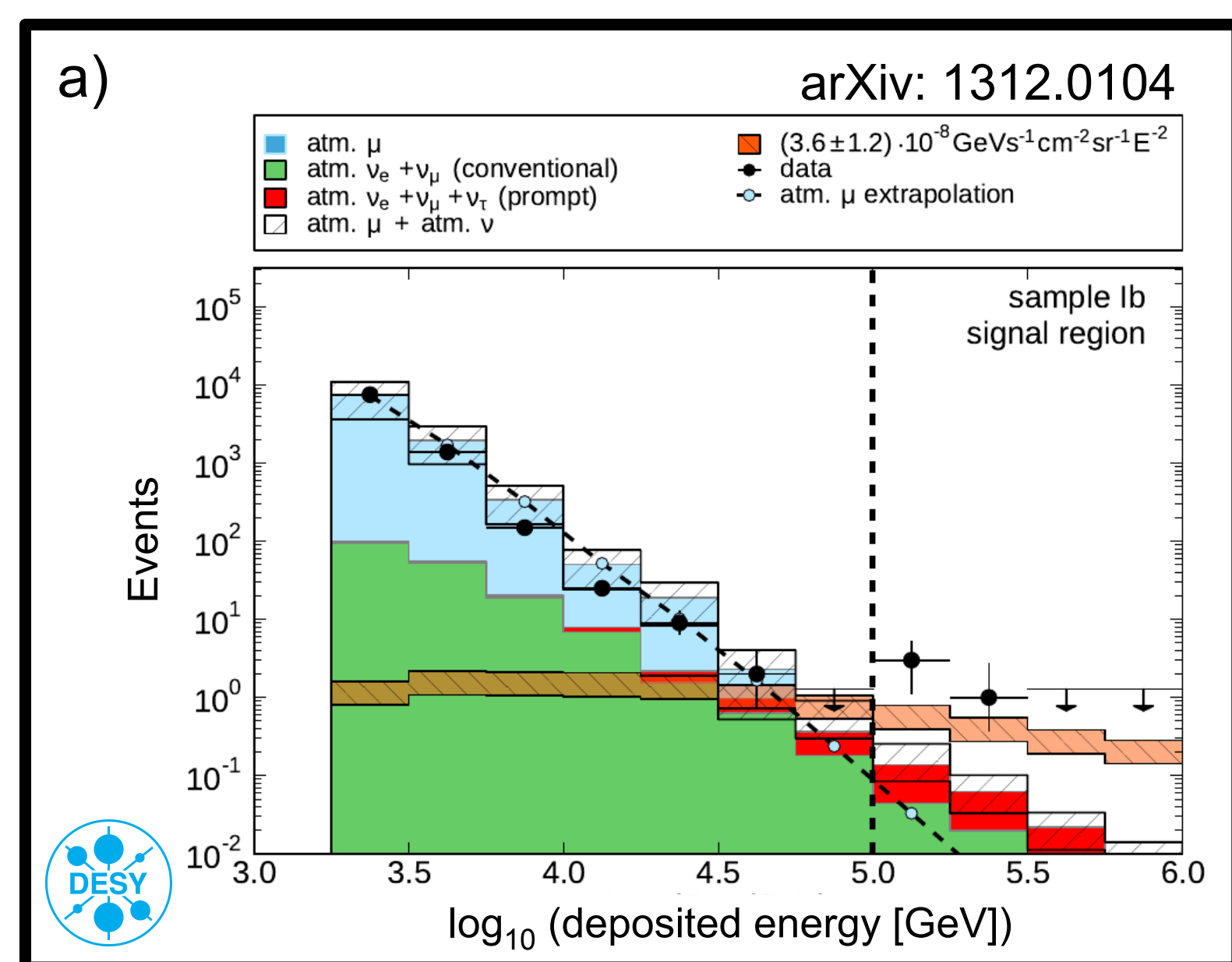
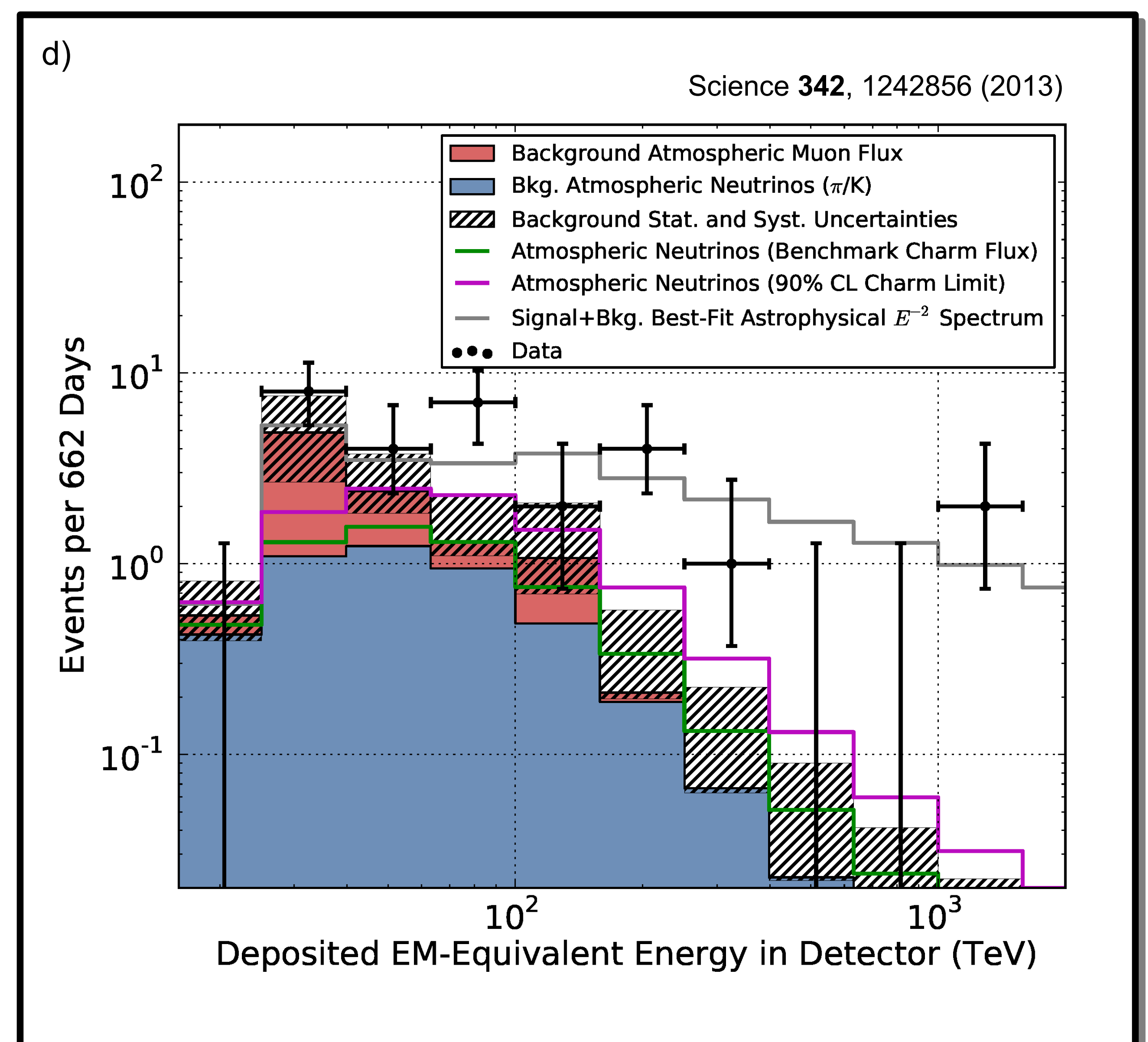
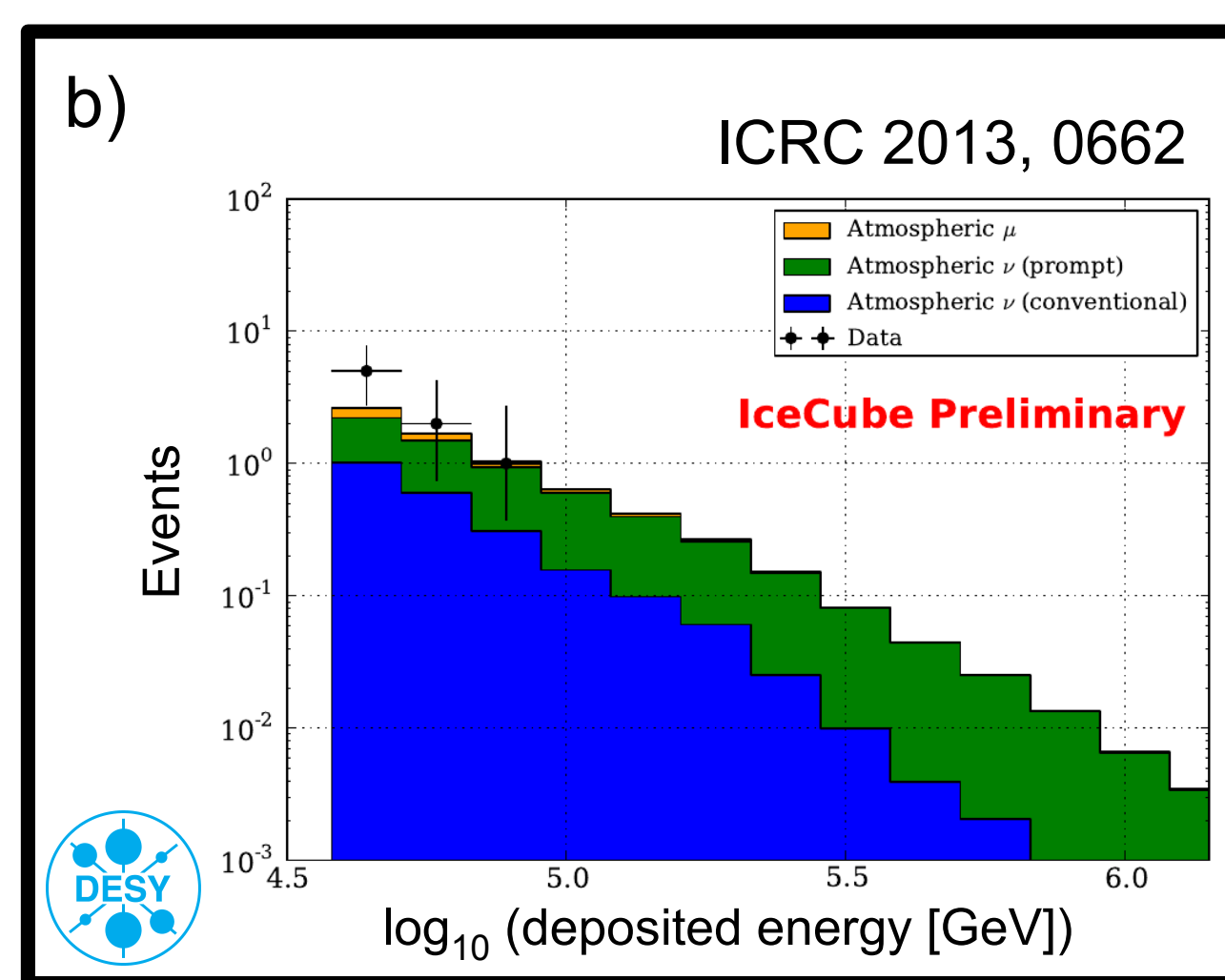
## The IceCube Neutrino Observatory

- Largest operating neutrino telescope (1 km<sup>3</sup> instrumented volume)
- Embedded in glacial ice at geographic South Pole
- Construction time: 6 years (2004-2010)
- Detected > 100,000 atmospheric neutrinos by now
- Main purpose: Detection of extraterrestrial neutrinos
- Three detection channels currently employed:



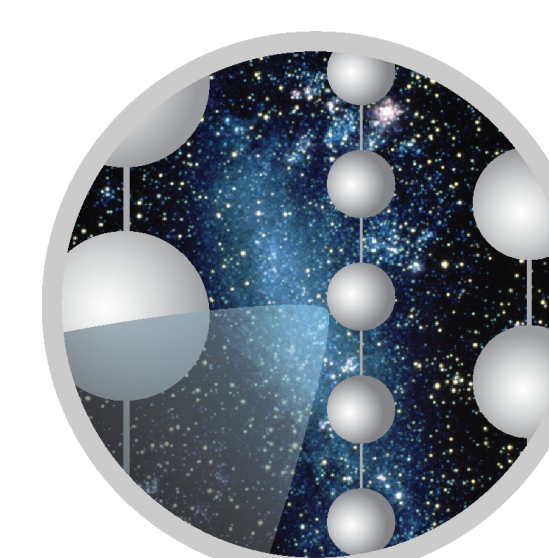
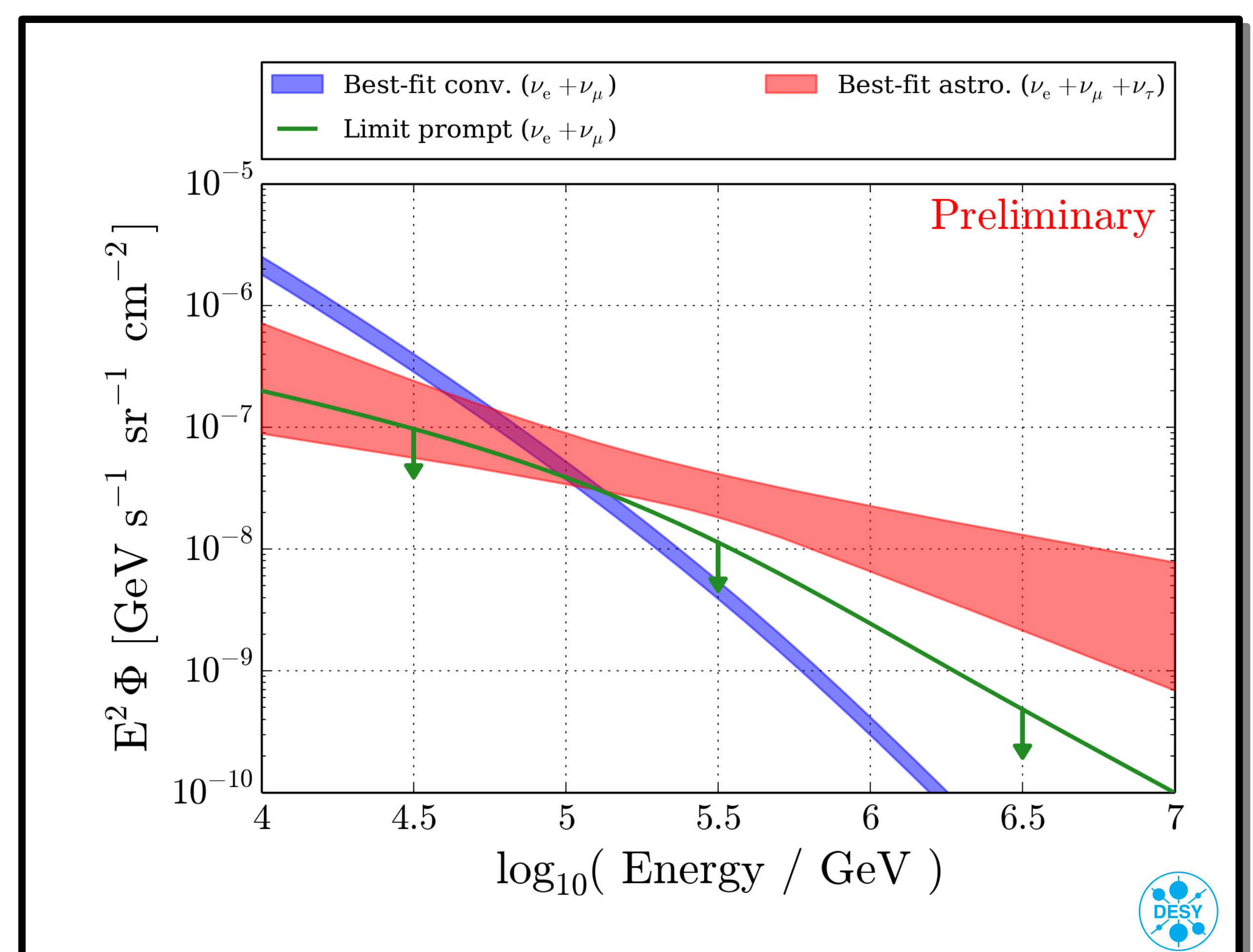
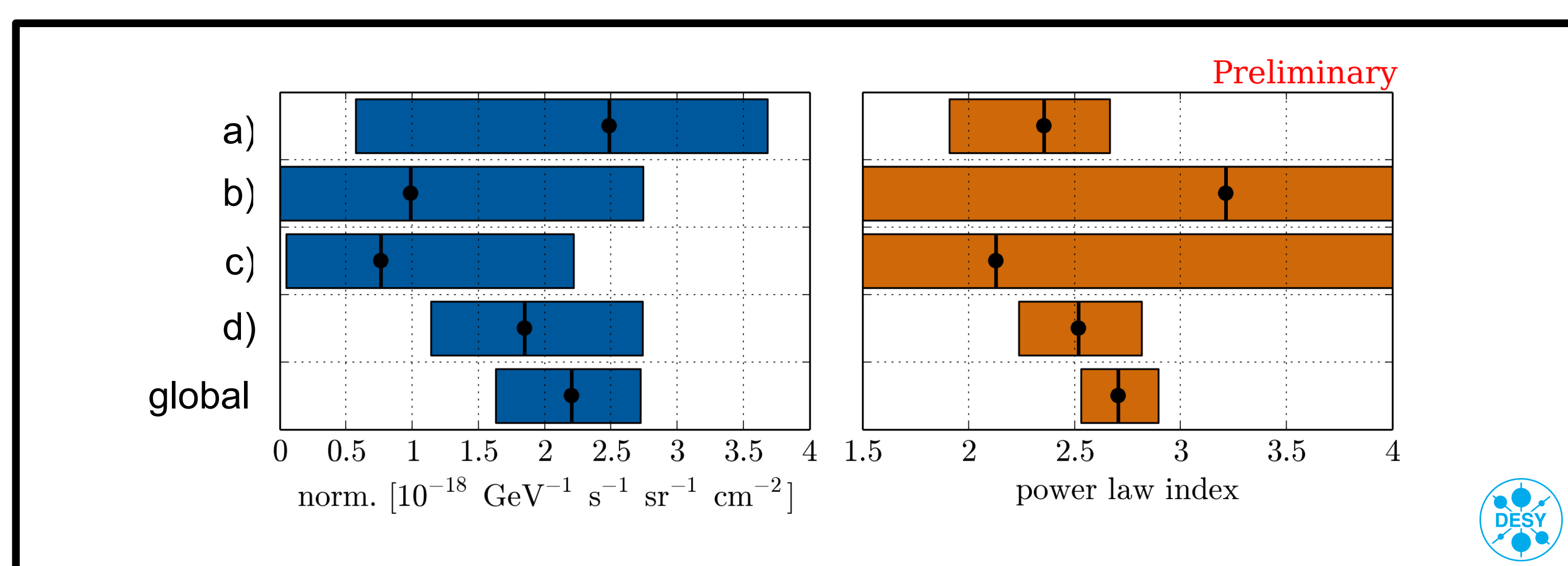
## Evidence for Extraterrestrial Neutrinos

- High-energy excess in multiple data sets / channels:
  - a) Contained showers (40 strings, 2.7 $\sigma$ )
  - b) Contained showers (59 strings, no excess)
  - c) Throughgoing tracks (59 strings, 1.8 $\sigma$ )
  - d) Contained showers+starting tracks (79/86 strings, 4.1 $\sigma$ )
- No evidence for a point source yet...



## Forming a global picture

- **Aim:** Combine the results of individual data sets / channels to achieve
  - Better sensitivity to extraterrestrial flux
  - Improved constraints on parameters of extraterrestrial flux
- **Method:** Simultaneous likelihood fit of energy distributions
- **Results:**
  - Best fit is a power law with index  $(-2.7^{+0.2}_{-0.2})$
  - Incompatible with background-only hypothesis at 4.8 $\sigma$



ICECUBE