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Detection of Small-Scale Components in Power Law Spectra via the Applicaton of Functional Data Analysis

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Spectra in astroparticle physics are commonly approximated by simple power laws. The steeply falling nature of these power laws, however, makes the detection of additional components rather challenging. This holds true especially, if the additional components are small compared to the established ones. Energy spectra of muon neutrinos are an interesting example of such a scenario, where the conventional and astrophysical components to the spectra have been established by the use of different analysis methods, such as likelihood fits or spectral deconvolution. The prompt component, although expected from theoretical models, has not yet been experimentally observed. This contribution presents a different approach to the analysis of power-law spectra, which is based on functional data analysis. The method itself and its implications are discussed using neutrino energy spectra as an example. Furthermore, the required resolution in future deconvolutions of energy spectra is estimated.

Keywords

power-law spectra, data analysis, prompt neutrinos, atmospheric neutrinos

Collaboration

other Collaboration

Subcategory

Experimental Methods & Instrumentation

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