Q & A (Monday, June 21 2021)

Q. what does it mean that there is an upper limit to the flux if it is not significantly detected?

A. Although nothing is significantly detected, one can add a potential source at the expected location and study its profile log likelihood. We shall cover upper limits in future school activities.

Q.   does the binning affect the fit?

A. It can affect the fit. You can try different binning parameters to see the effect. As a general rule, the FSSC recommends 10 energy bins per decade of energy in the energy range.

Q. Could you recommend some papers or materials about maximum likelihood analysis good for beginners?

A. An excellent paper for likelihood analysis in gamma rays is Mattox et al. 1996
http://cdsads.u-strasbg.fr/pdf/1996ApJ...461..396M

Q. Is it possible to do unbinned analysis with Fermipy?

Unbinned analysis is not supported by Fermipy.

Q. Do we assume that our pdf follows Gaussian? is it reasonable assumption? I've heard of "Wilk's theorem", does it have anything to do with it?

A. For binned analysis, one usually assumes a Poisson probability function in any given bin. More details are included in the Cicerone.

https://fermi.gsfc.nasa.gov/ssc/data/analysis/documentation/Cicerone/Cicerone_Likelihood/

An excellent paper for likelihood analysis in gamma rays including Wilk's theorem is Mattox et al. 1996
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Q. How do we know what is the best binning possible for a particular data set?

A. You can try different binning to see the effect. As a rule of thumb, the FSSC recommends 10 bins per energy of decade in your energy range.

Q. what exactly is "likelihood"?

A. The likelihood describes the probability of observing the data we've measured
https://fermi.gsfc.nasa.gov/ssc/data/analysis/documentation/Cicerone/Cicerone_Likelihood/

Q. What does it mean to free source parameters during analysis? Is freezing the parameters also the same meaning?

A. We usually refer to freeze when parameters remain fixed, thaw is used to refer to free parameters.

Q. i was trying to use Fermipy for another source out of curiosity on my own and got a negative TS value. What does that mean?

A. This might indicate an issue with the fit, model or source setup.

Q. Dr. Hays, I'm sad and just picked a source. Is tonight too late to do the exercises

A. It is never too late to do LAT analysis.
A. its never too late to do science!