Here's some feedback, from a Science Tools perspective, on today's (Oct 11, 2004) discussion of the work that needs to be done for the DC2 IRFs. For reference, here is Steve's Checklist: http://www-glast.slac.stanford.edu/software/AnaGroup/GettingToIRF-SR.pdf

* IRF representation:

  * By far, the most difficult aspect of the DC1 parameterizations was dealing with the partitioning of the data into bins covering rather broad ranges of energy and inclination angle. This representation resulted in discrete jumps in psf shape as one crossed the bin boundaries either in the energy or inclination directions and so caused all sorts of problems for the evaluation of the psf and the likelihood fitting.

    I realize that we have to do some sort of partitioning like this when dealing with the AllGamma data sets in order to have sufficient numbers of events in the psf distributions for fitting, but we should choose a functional form for the psf that allows the fit parameters themselves to be represented as smoothly varying functions of energy and inclination (and any other dimensions over which we perform this sort of binning).

  * From the GR v4r2 AllGamma runs done in Spring 2004 (http://www-glast.slac.stanford.edu/software/batchjobs/spring2004.htm), I've seen substantial differences for the psf width for events converting in layer 0, say, versus layer 11 events for incident energies > 5GeV or so. This is understandable since layer 11 is the last one before the back part of the LAT. Perhaps we should consider layer-by-layer IRFs, or at least something more finely grained than just "front" vs "back".

  * Will the background rejection cuts depend on the background rate? If so, will we have separate IRFs for various ranges of those rates? This is essential information for designing/refactoring the Science Tools interface to the IRFs, so the sooner we can know something about this, the better.

* IRF validation:

  * Science performance tests and comparing Gleam output with observation simulator output (using the IRFs) I think are great ideas. However, since there are several layers between the Gleam data and use of the IRFs by tools such as likelihood, I would advocate doing the validation on at least one more level:

    * The IRFs themselves should be tested against independent Gleam runs that are tightly controlled, e.g., mono-energetic pencil beams (with 6 m^2 cross-sections) fired at the LAT for a grid of inclinations, azimuths, and energies. The resulting data can then be compared to what is predicted by the IRFs. Since using a grid of incident energies and angles contrasts with the AllGamma approach, these comparisons should provide a more stringent test of the IRFs than simply comparing to another AllGamma run.

I have a package that runs Gleam (GR v4r2) for just such a grid of energies and angles:

http://glast.stanford.edu/cgi-bin/cvsweb/users/jchiang/irfTests/?hideattic=1&cvsroot=CVS_SLAC

and makes such comparisons:

http://www.slac.stanford.edu/~jchiang/dc1psf_tests.pdf

The red curves in these plots are the DC1 IRF psfs and the histograms are distributions from the various runs where the name of the merit file in the title of each plot gives the incident photon energy and inclination:
merit_<log10(energy/MeV)>_<inclination/degrees>.root

Clearly, the number of events for each comparison needs to be controlled better, but the basic infrastructure is there. The package is tuned to my environment, but it should be straight-forward to modify it (to plot, for example, using ROOT, JAS, or whatever) for incorporation into a set of system tests.

If there are problems with the observationSim comparisons with Gleam, this extra level of tests will help determine if the problems are in the IRFs themselves or elsewhere.

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