Dear Jay,

The model we have developed is based on the well-known fireball model, and it converts energy using the internal shock mechanism. We have chosen this model because it is a very good candidate for simulating the rapid variability observed in the GRB signals. The model generates a series of shells with different Lorentz factor, randomly chosen. The number of shells, their initial separation, their thickness, and the total energy available can be modified from the user to simulate different behaviors. The shells evolve with time, and when a shock occurs the code calculates the main parameters that are needed for describing the spectra. In particular, using the equipartition of the energy between electron accelerated, protons (the minority) and the magnetic field, one can obtain the peak of the synchrotron spectrum, and the principal quantities that determine the shape of the flux and its temporal evolution.

For each shock the rise time of the flux depend on the size of the resulting shell, while the decay time depends on the cooling time (that it can be expressed as function of the energy of the out coming photon - roughly it goes as 1/sqrt(observed energy) - The emission mechanisms that we consider are the synchrotron emission and the Inverse Compton Scattering (SSC). With this simple assumption we are able to reproduce light curves and spectrum typical of GRBs.

The next step we have done is to insert the GRB simulation in the GLAST simulation software (the Montecarlo based code that simulates the response of the detector).

For doing this we wrote an algorithm that extract photons in agreement with the GRB flux (at a certain time): in this way we feed the detector simulation with the photons produced by an astrophysical source that varies with the time.

The code that simulates the GRB is entirely written in C++, and it is part of the GLAST simulation software, still under development.

The main goal is to have a simulation of a rapid variable astrophysical source, and to use it as source input for the detector simulation. The idea is that the user is able to choose "GRB" under the list of sources and to have a distribution of photon that reach the detector similar to the one expected from a GRB event (under the assumption that GRBs are fireballs!). In this way we will be able to analyze the GLAST performance in the study of GRBs and in the study of transient sources.

Moreover, the fact that we have developed our model using an object oriented language, allow us to define some common "classes" that will help in the description of different GRB scenarios, or, also, different celestial

objects. For example the concept of "shocks" or "shell" could be used to obtain the description of GRB in the external shock phase during the interaction with the ISM, or in the simulation of AGNs.

To have an idea of the work done, see the power point presentation at:
http://glastserver.pi.infn.it/glast/presentations/omodei180202.ppt
or, in general, the other documents in the "presentation=" area at:
http://glastserver.pi.infn.it/glast/

I'll send you any other presentation/ report/ draft concerning the GRB simulation model and our activity in Pisa about the study of GRB &transient phenomena.

We are also interested in the cooperation of the preparation of the mailing list and in helping the group activity starting up.

cheers,
Nicola Omodei