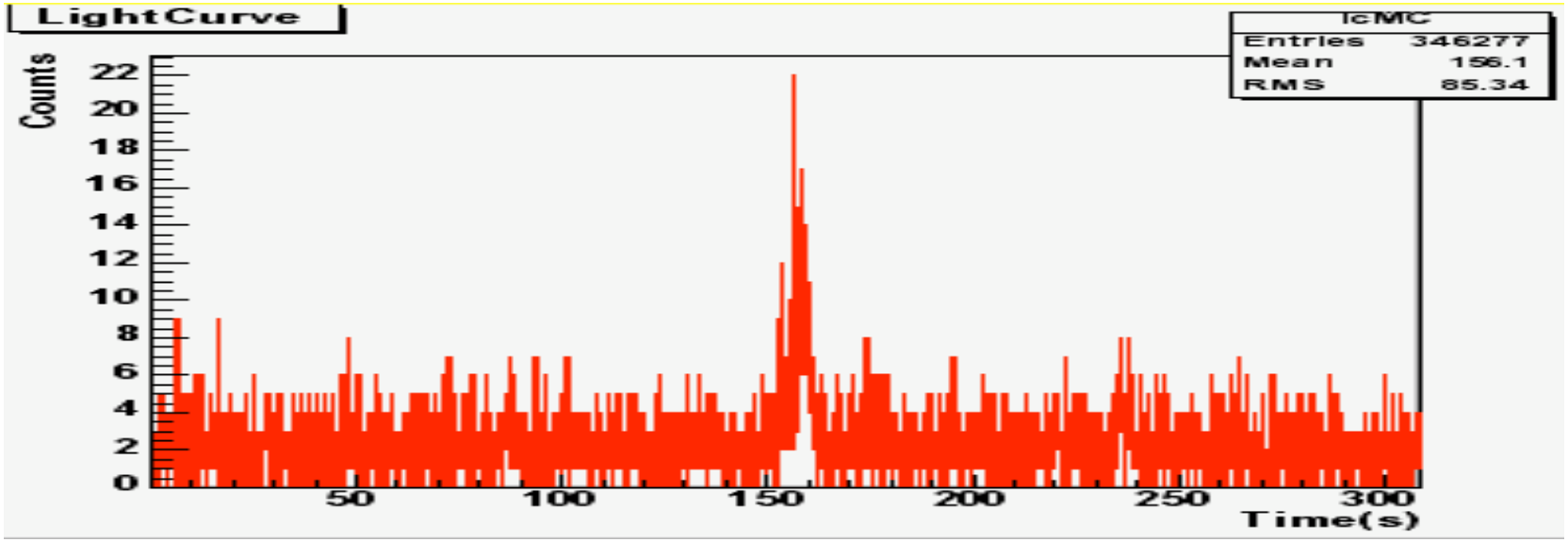
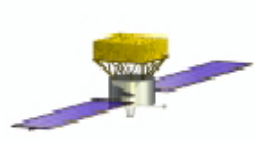
Generation of GRB for the DC1

Nicola Omodei, INFN Pisa
on behalf of the GRB Science Team

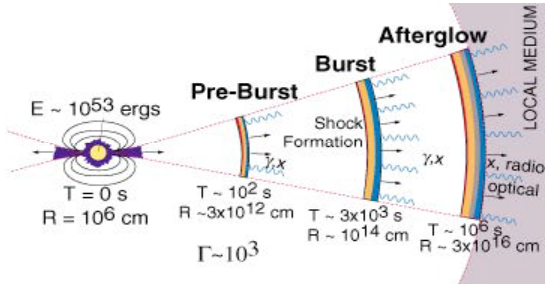




GRB and DC1

- The physical model for GRB (fireball model) has been included into the DC1 data.
- Phenomenological model will be introduced in the following DC1 days.
- The physical model concatenates several GRB, located at different time and different locations in the galactic sky.
- Increased Burst rate, to be sure (?) to detect at least one burst in the LAT Fov...
- GRB physical model is useful to connect GRB data (temporal and spectral) with physical parameters (dimensions of the shells, gamma factors.)
- Test GRB and transient science tools

Brief Physical Model Description



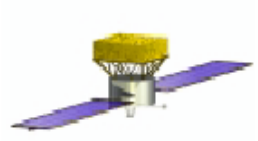
Panaitescu & Meszaros (astro-ph/9810258)
Piran, Phys.Rep. 99
...

The shells are emitted with different Lorentz factors chosen randomly from **gamma_min**, to **gamma_max**
their initial separation is **L** (~1e10 cm) and their thickness is **D** (~1e10 cm)
A shock is computed each time two shells collide.

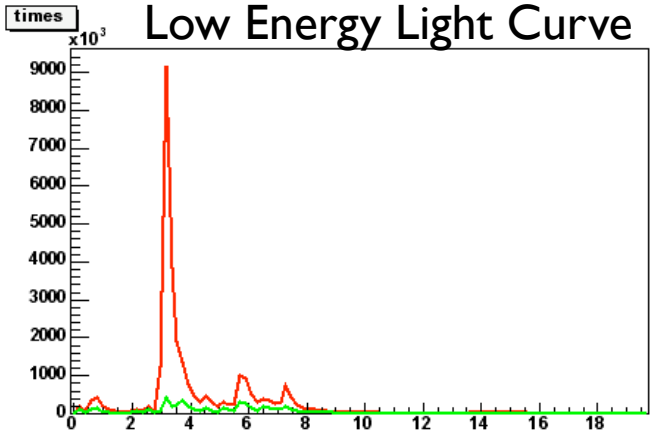
The dissipated energy is converted into magnetic field (B) and into accelerated electrons.
Synchrotron Emission: power law approximation + Inverse Compton scattering

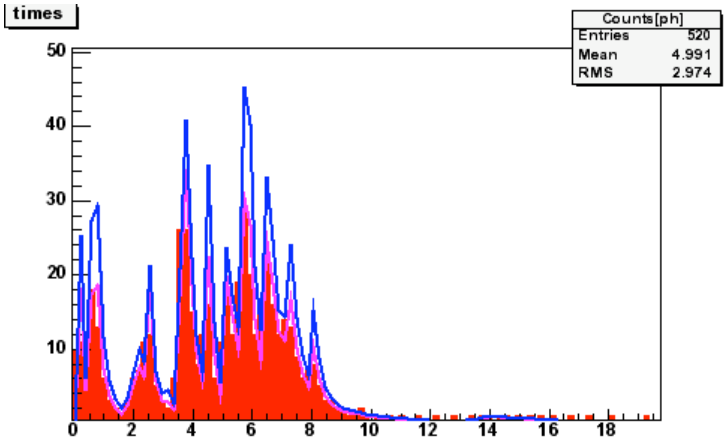
Each shock generates a peak profile, with a duration determined by the angular spreading, the crossing time, and the cooling time.

Photons are extracted from the computed flux.
The temporal interval between photons changes with the time, the temporal structure (peaks) is reproduced.
These photons feed the Montecarlo simulator (Gleam) and are processed by all the chain of algorithms (digitization, reconstruction...)

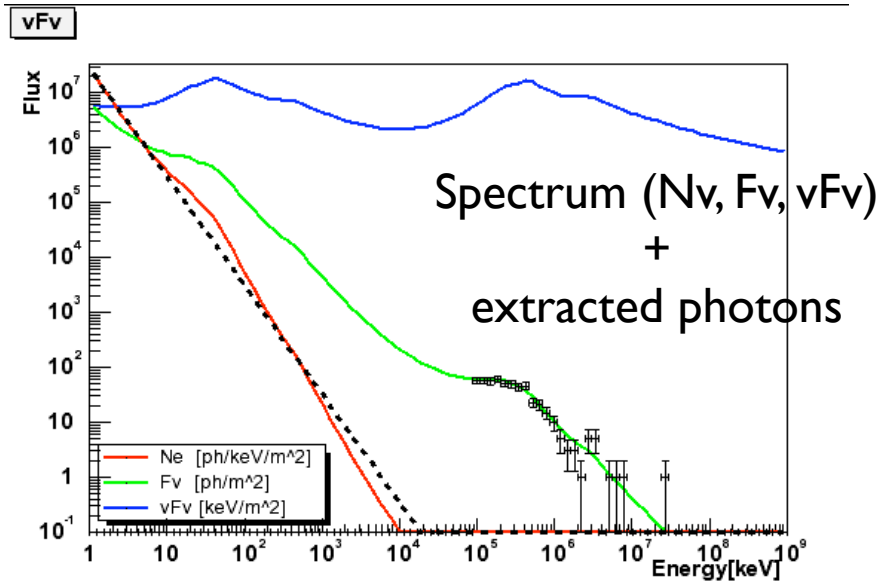


Example of synthetic GRB

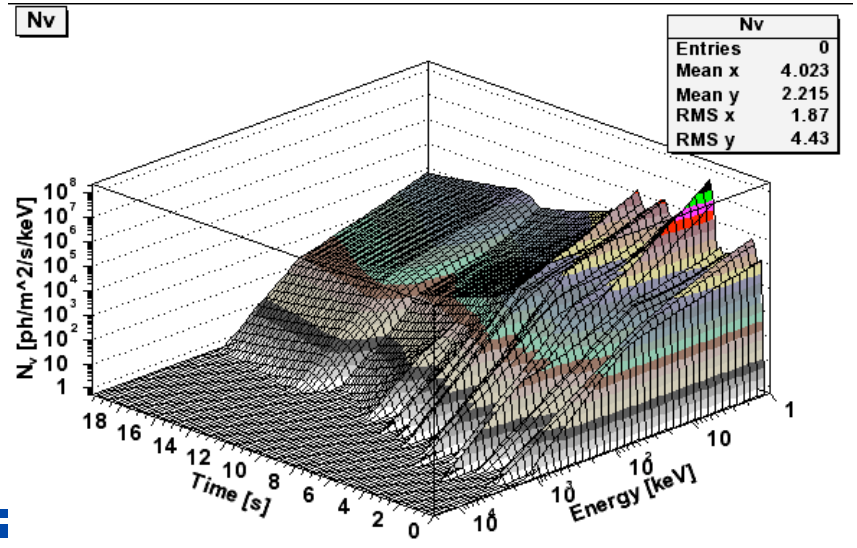




High Energy light curve
+
extracted photons

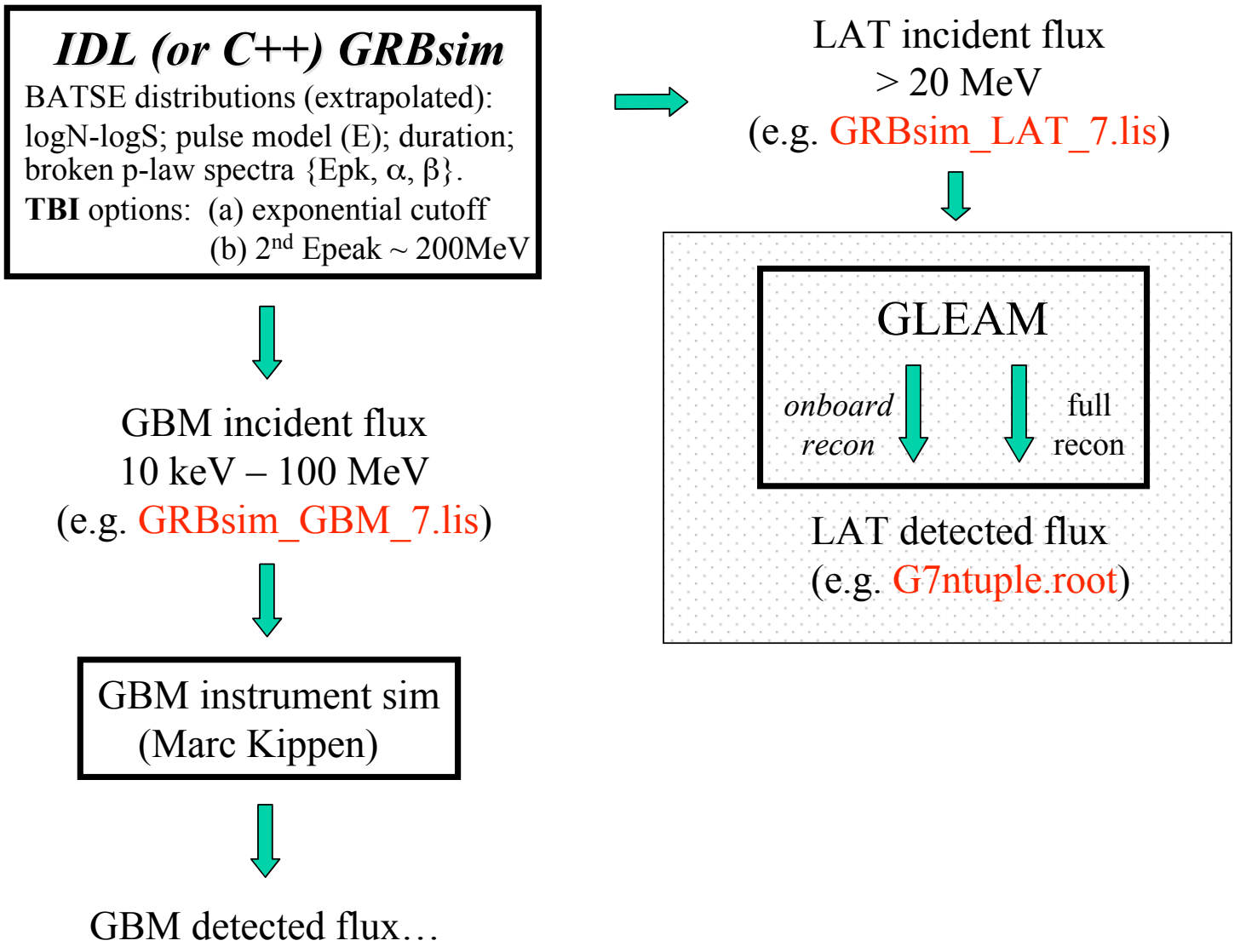


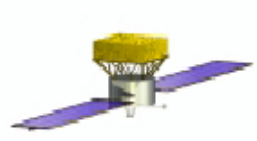
Spectrum (Nv, Fv, vFv)
+
extracted photons



GRBsim (Empirical Representation) Gamma-Ray Burst Data Generation, Data Challenge One

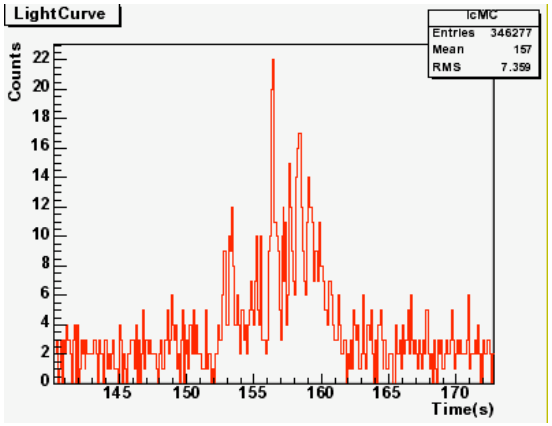
Jerry Bonnell, Sandhia Bansal, Jay Norris

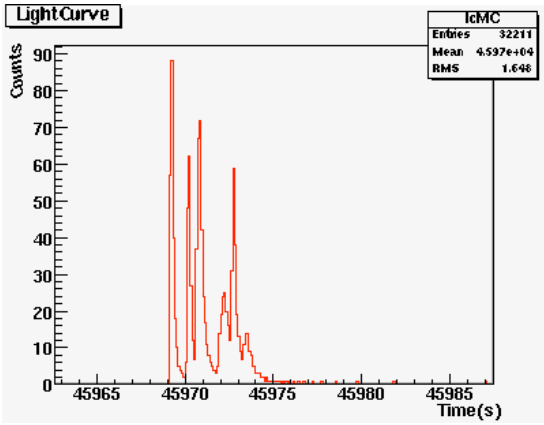

IDL (or C++) GRBsim
BATSE distributions (extrapolated):
logN-logS; pulse model (E); duration;
broken p-law spectra {Epk, α, β}.
TBI options: (a) exponential cutoff
(b) 2nd Epeak ~ 200MeV
GBM incident flux
10 keV – 100 MeV
(e.g. GRBsim_GBM_7.lis)
GBM instrument sim
(Marc Kippen)
GBM detected flux…
LAT incident flux
> 20 MeV
(e.g. GRBsim_LAT_7.lis)
GLEAM
onboard recon
full recon
LAT detected flux
(e.g. G7ntuple.root)

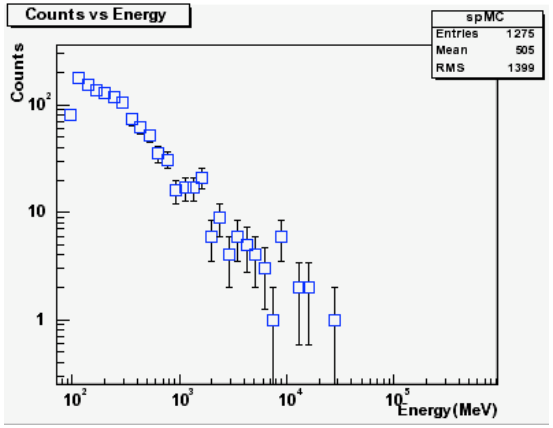


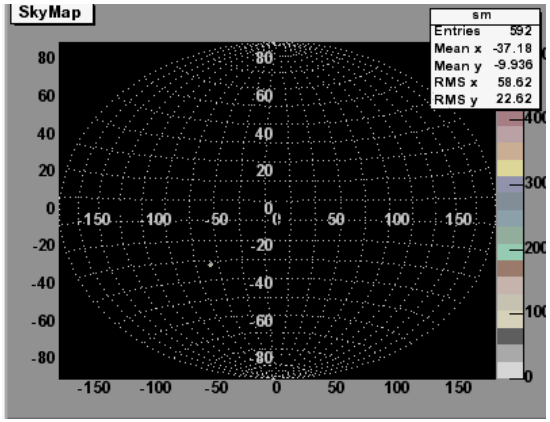
GRB in DC1

- **Some GRB** have been generated during the DC1.
- The bursts have different fluxes, compatible with the BATSE catalog
- They are at different positions !!
- I'm sorry I can not tell you more...









Now we are ready to analyze the data !!
(Binning, rebinning, spectral fitting, trigger algorithms, temporal analysis,plotting)
Finding GRB is a challenge in the data challenge !!

GLAST