ctools - Bug #1548

ctobssim fails for non-nomalized sky maps

10/13/2015 02:34 PM - Knödlseder Jürgen

Status:	Closed	**Start date:**	10/13/2015
Priority:	High	**Due date:**	
Assigned To:	Knödlseder Jürgen	**% Done:**	100%
Category:		**Estimated time:**	0.00 hour
Target version:	1.0.0		

Description

Using the following model

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<source_library title="source library">
  <source name="Pion decay" type="DiffuseSource">
    <spectrum type="PowerLaw">
      <parameter name="Prefactor" value="1" error="0" scale="1" min="1e-07" max="1000" free="1" />
      <parameter name="Index" value="2.7" error="0" scale="-1" min="0" max="5" free="1" />
      <parameter name="Scale" value="0.868" scale="1e+06" min="0.01" max="1000" free="0" />
    </spectrum>
    <spatialModel type="SpatialMap" file="map_ics.fits" normalize="0">
      <parameter name="Prefactor" value="1" scale="1" min="0.001" max="1000" free="0" />
    </spatialModel>
  </source>
</source_library>
```

ctobssim complains about a too high photon rate:

```
*** ERROR encounterted in the execution of ctobssim. Run aborted ...
*** ERROR in ctobssim::simulate_source(GCTAObservation*, GModels&, GRan&, GLog*): Invalid value. Photon rate 7.87792e+16
 photons/sec for model "Pion decay" exceeds maximum allowed photon rate of 1e+06 photons/sec. Please check the model
 parameters for model "Pion decay" or increase the value of the hidden "maxrate" parameter.
```

It turned out that this comes from the fact that ctobssim assumes that the flux in the spatial model is unity (method ctobssim::get_model_flux. In other words, ctobssim only works for normalized sky maps.

This should be corrected.

History

#1 - 10/13/2015 09:09 PM - Knödlseder Jürgen

- Status changed from New to In Progress

- % Done changed from 0 to 80

I changed gammalib and ctools so that non-normalized diffuse maps are handled correctly.

I introduced a GModelSpatialDiffuseMap::set_mc_cone method that pre-computes the Monte Carlo cache for a given simulation cone. The GModelSpatialDiffuseMap::set_mc_cone method is called from GModelSpatialDiffuseMap::mc_norm which returns the normalization of the spatial component (I renamed the norm() method to mc_norm() to make explicit that this method is for the MC normalization). The mc_norm() is used in GModelSky::mc to determine the normalization of the expected count rate.

The mc_norm() is now also used in ctobssim::get_model_flux so that the flux is correctly computed in ctobssim.

A quick test has been done to make sure that ctobssim now runs as expected.

#2 - 10/14/2015 07:25 AM - Knödlseder Jürgen

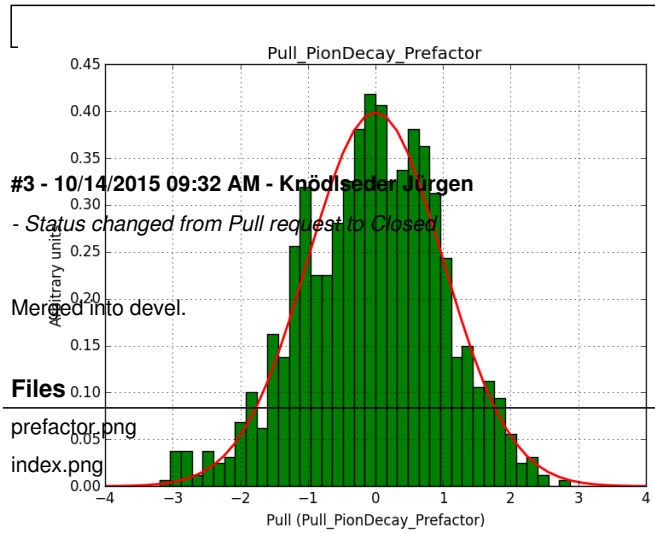
- File prefactor.png added

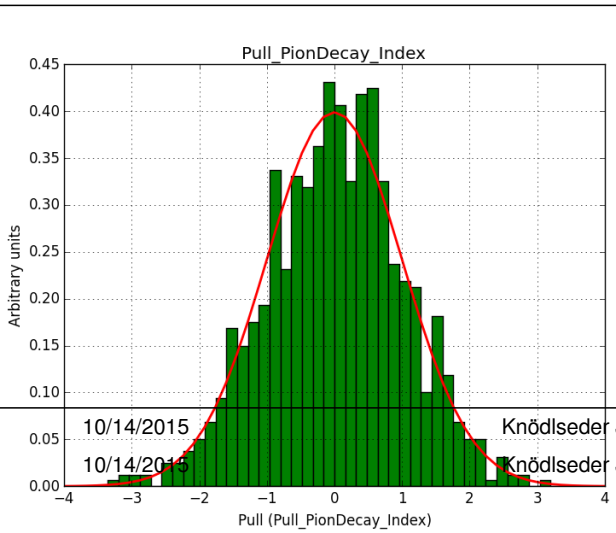
- File index.png added

- Status changed from In Progress to Pull request

- % Done changed from 80 to 100

Here are pull distributions for the corrected code. Everything looks ok.





#3 - 10/14/2015 09:32 AM - Knödlseder Jürgen

- Status changed from Pull request to Closed

Merged into devel.

Files

prefactor.png	51 KB	10/14/2015	Knödlseder Jürgen
index.png	49.4 KB	10/14/2015	Knödlseder Jürgen