GammaLib - Bug #2172

Pulsar event simulation does not correspond to model

07/28/2017 09:37 AM - Knödlseder Jürgen

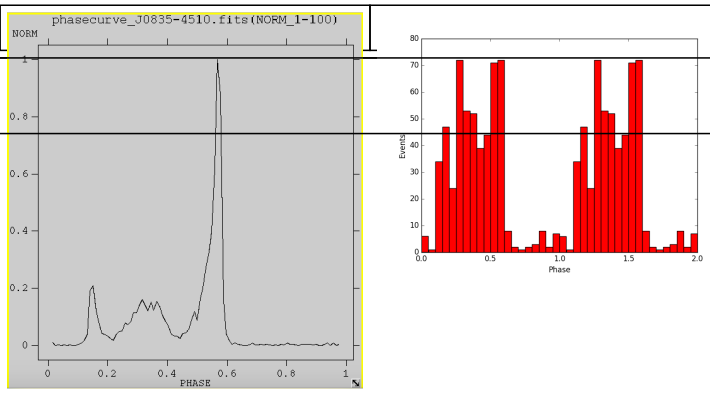
Status:	Closed	**Start date:**	07/28/2017
Priority:	Normal	**Due date:**	
Assigned To:	Knödlseder Jürgen	**% Done:**	100%
Category:		**Estimated time:**	0.00 hour
Target version:	1.4.0		

Description

Using the model

```
 <source name="J0835-4510" type="PointSource">
   <spectrum type="PowerLaw">
     <parameter name="Prefactor"   scale="1e-14" value="19.4" min="1e-07" max="1000.0" free="1"/>
     <parameter name="Index"       scale="-1"    value="4.45" min="0.0"   max="+10.0"  free="1"/>
     <parameter name="PivotEnergy" scale="1e3"   value="20.0" min="0.01"  max="1000.0" free="0"/>
   </spectrum>
   <spatialModel type="SkyDirFunction">
    <parameter free="0" max="360" min="-360" name="RA"  scale="1" value="128.838"  />
    <parameter free="0" max="90"  min="-90"  name="DEC" scale="1" value="-45.1783" />
   </spatialModel>
   <temporal type="PhaseCurve" file="phasecurve_J0835-4510.fits">
    <parameter name="Normalization" scale="1"        value="1.0"     min="0.0"   max="1000.0"   free="0"/>
    <parameter name="MJD"           scale="1"        value="54686.2" min="0.0"   max="100000.0" free="0"/>
    <parameter name="Phase"         scale="1"        value="0.0"     min="0.0"   max="1.0"      free="0"/>
    <parameter name="F0"            scale="1"        value="11.19"   min="0.0"   max="1000.0"   free="0"/>
    <parameter name="F1"            scale="1e-11"    value="-1.55"   min="-10.0" max="1000.0"   free="0"/>
    <parameter name="F2"            scale="1e-23"    value="6.46"    min="0.0"   max="1000.0"   free="0"/>
   </temporal>
 </source>
```

the simulated events do not correspond to the input light curve:



History

#1 - 07/28/2017 09:47 AM - Knödlseder Jürgen

- File vela_nonorm.png added

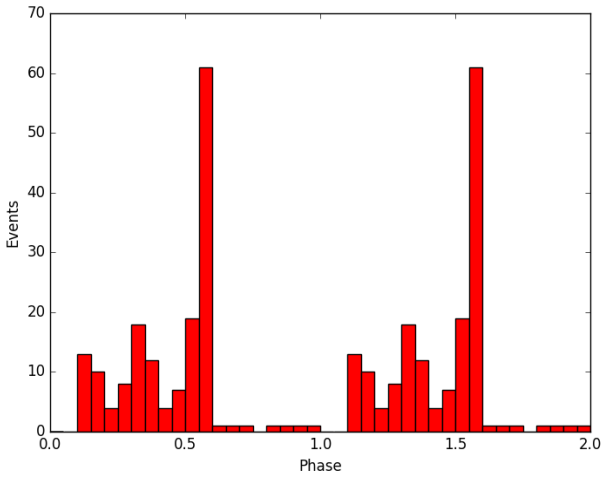
- File vela_reproduce.png added

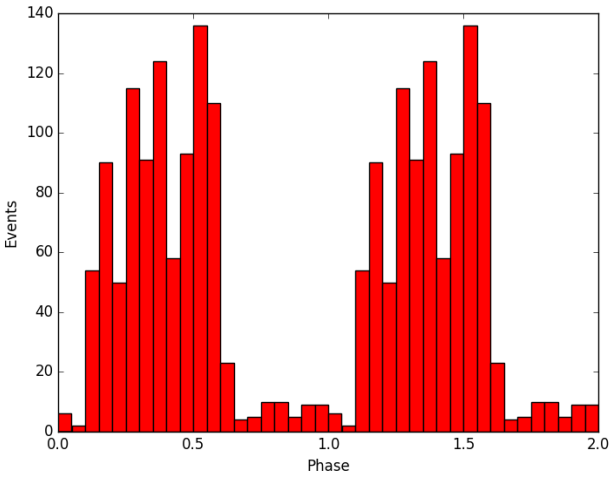
- Status changed from New to In Progress

- Assigned To set to Knödlseder Jürgen

- Target version set to 1.4.0

Below a comparison of the simulated events without (left) and with (right) normalization. Apparently something goes wrong with the normalization. The number of events simulated without normalization is 163, the number of events with normalization is 1004, the difference is about a factor of 6.


Events
Phase
0.0
0.5
1.0
1.5
2.0
0
10
20
30
40
50
60
70

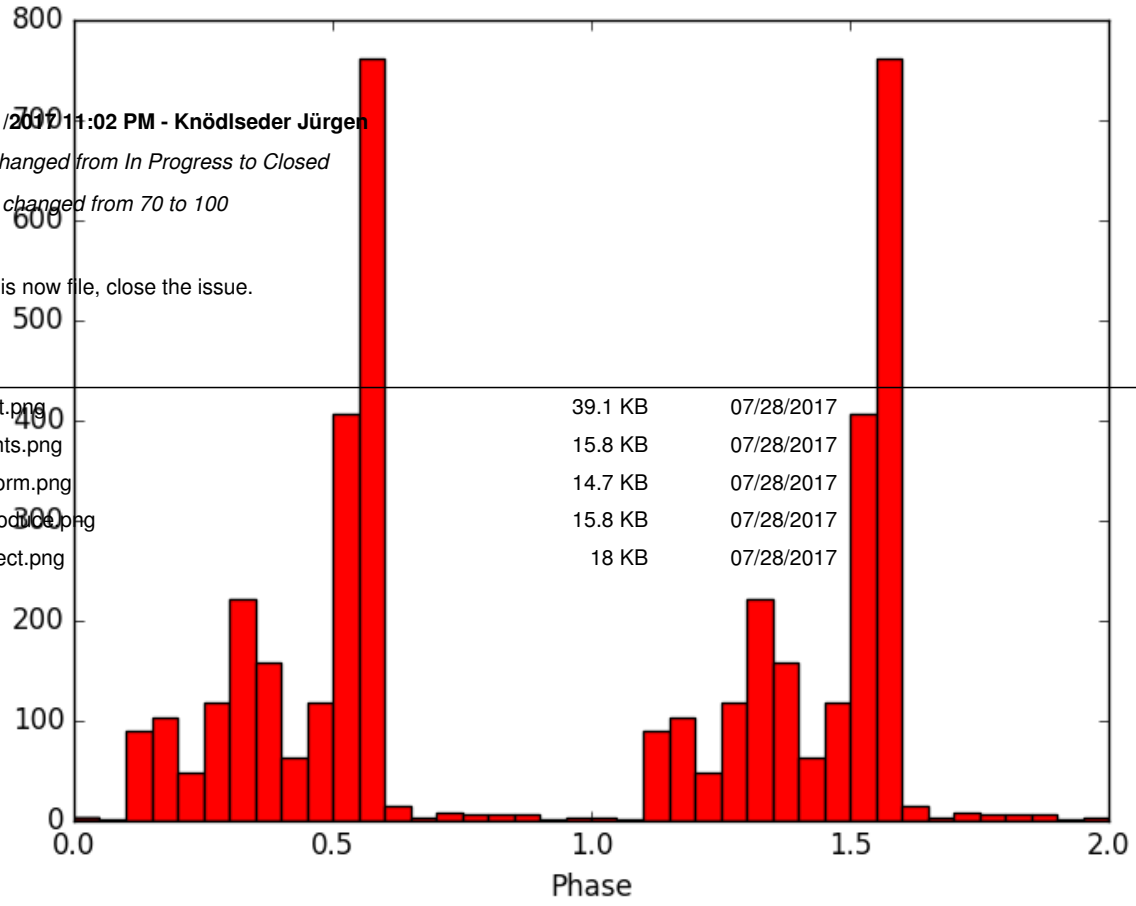

Events
Phase
0.0
0.5
1.0
1.5
2.0
0
20
40
60
80
100
120
140

#2 - 07/28/2017 10:04 AM - Knödlseder Jürgen

- File vela_correct.png added

- % Done changed from 0 to 70

There was a scale factor missing in the Monte Carlo simulations due to the normalization of the phase curve. Adding this scale factor the following phase curve is obtained. The number of simulated events is 2144, corresponding to a ratio of 13.15 with respect to the non-normalized phase curve. The scale factor from normalization is 13.41, hence pretty close to that.



#3 - 07/31/2017 11:02 PM - Knödlseder Jürgen

- Status changed from In Progress to Closed

- % Done changed from 70 to 100

The GPS is now file, close the issue.

Files

vela_input.png	39.1 KB	07/28/2017	Knödlseder Jürgen
vela_events.png	15.8 KB	07/28/2017	Knödlseder Jürgen
vela_nonorm.png	14.7 KB	07/28/2017	Knödlseder Jürgen
vela_reproduce.png	15.8 KB	07/28/2017	Knödlseder Jürgen
vela_correct.png	18 KB	07/28/2017	Knödlseder Jürgen