

## GammaLib - Action #3062

### Add method that returns number of events in a model component

11/08/2019 10:53 AM - Knödlseider Jürgen

<b>Status:</b>	Closed	<b>Start date:</b>	11/08/2019
<b>Priority:</b>	Normal	<b>Due date:</b>	
<b>Assigned To:</b>	Knödlseider Jürgen	<b>% Done:</b>	100%
<b>Category:</b>		<b>Estimated time:</b>	0.00 hour
<b>Target version:</b>	1.7.0		

**Description**

A method should be added to GObservations that returns the number of events in a given model component. A possible implementation would be a method

```
GObservations::npred(const std::string& name, const std::string& instrument = "")
```

that returns the number of predicted events for a model name, and optionally, for a given instrument (if the instrument name is blank the number of events should be returned for all instruments).

In addition, a method could also be added that returns the predicted number of events for any kind of model, i.e.

```
GObservations::npred(const GModel& model, const std::string& instrument = "")
```

This method would simply loop over the GObservation::npred(const GModel& model) method.

#### History

##### #1 - 11/08/2019 04:33 PM - Knödlseider Jürgen

- Status changed from New to In Progress
- Assigned To set to Knödlseider Jürgen
- Target version set to 1.7.0
- % Done changed from 0 to 50

Both methods were now implemented. Note that the methods invoke the GObservation::npred() method, meaning that the predicted number of events are actually recomputed. This may eventually take some time, in particular for complex models. It should be checked whether the actual number of events for each model component can be stored in the GObservation class so that it could be simple read back after model fitting.

##### #2 - 11/08/2019 05:09 PM - Knödlseider Jürgen

Here a demonstration of the new methods:

```
>>> import gammalib
>>> import ctools
>>> sim=ctools.ctobssim()
>>> sim.run()
RA of pointing (degrees) (0-360) [83.63]
Dec of pointing (degrees) (-90-90) [22.51]
Radius of FOV (degrees) (0-180) [5.0]
Start time (UTC string, JD, MJD or MET in seconds) [2020-01-01T00:00:00]
Stop time (UTC string, JD, MJD or MET in seconds) [2020-01-01T00:30:00]
Lower energy limit (TeV) [0.1]
Upper energy limit (TeV) [100.0]
Calibration database [prod2]
Instrument response function [South_0.5h]
Input model definition XML file [SCTOOLS/share/models/crab.xml]
>>> print(sim.obs().npred())
```

```
0.0
>>> print(sim.obs().npred('Crab'))
3610.34095249
>>> print(sim.obs().npred('Crab','LAT'))
0.0
>>> print(sim.obs().npred('CTABackgroundModel'))
20275.5905275
>>> print(sim.obs().npred('CTABackgroundModel','LAT'))
0.0
>>> like=ctools.ctlike(sim.obs())
>>> like.run()
>>> print(like.obs().npred())
24046.9982827
>>> print(like.obs().npred('Crab'))
3696.37179287
>>> print(like.obs().npred('Crab','LAT'))
0.0
>>> print(like.obs().npred('CTABackgroundModel'))
20350.6264898
>>> print(like.obs().npred('CTABackgroundModel','LAT'))
0.0
>>> print(like.obs().npred('CTABackgroundModel','CTA'))
20350.6264898
>>>
```

### #3 - 11/08/2019 05:14 PM - Knödlseher Jürgen

- Status changed from *In Progress* to *Closed*

- % Done changed from 50 to 100

Code merged into devel.