



**HEASARC**  
High Energy Astrophysics  
Science Archive Research Center

# XSPEC update

***Keith Arnaud***

Oct, 2007  
HEASARC Users Group

Keith Arnaud



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# Status

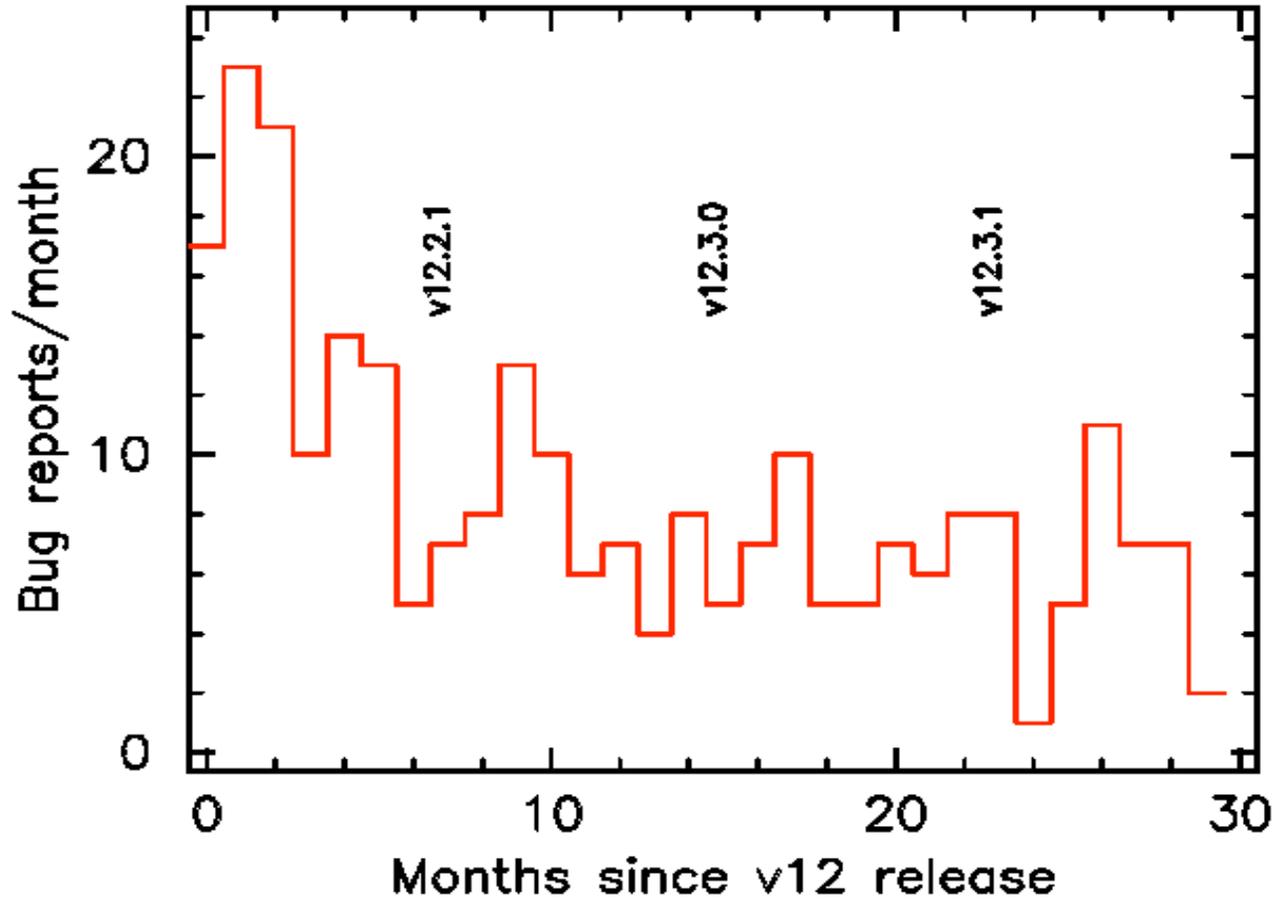
The current release is 12.3.1 and patch level is 12.3.1am. Our policy is to distribute the latest patched version with each HEASoft update and produce a new xspec release every 6-8 months.

We also continue to release and support v11.3.2. Our policy on v11 is we will continue to fix critical bugs but will not add new features. New models are only added to v12.

The standard XSPEC reference (Arnaud 1996) now has more than 1000 citations in ADS.

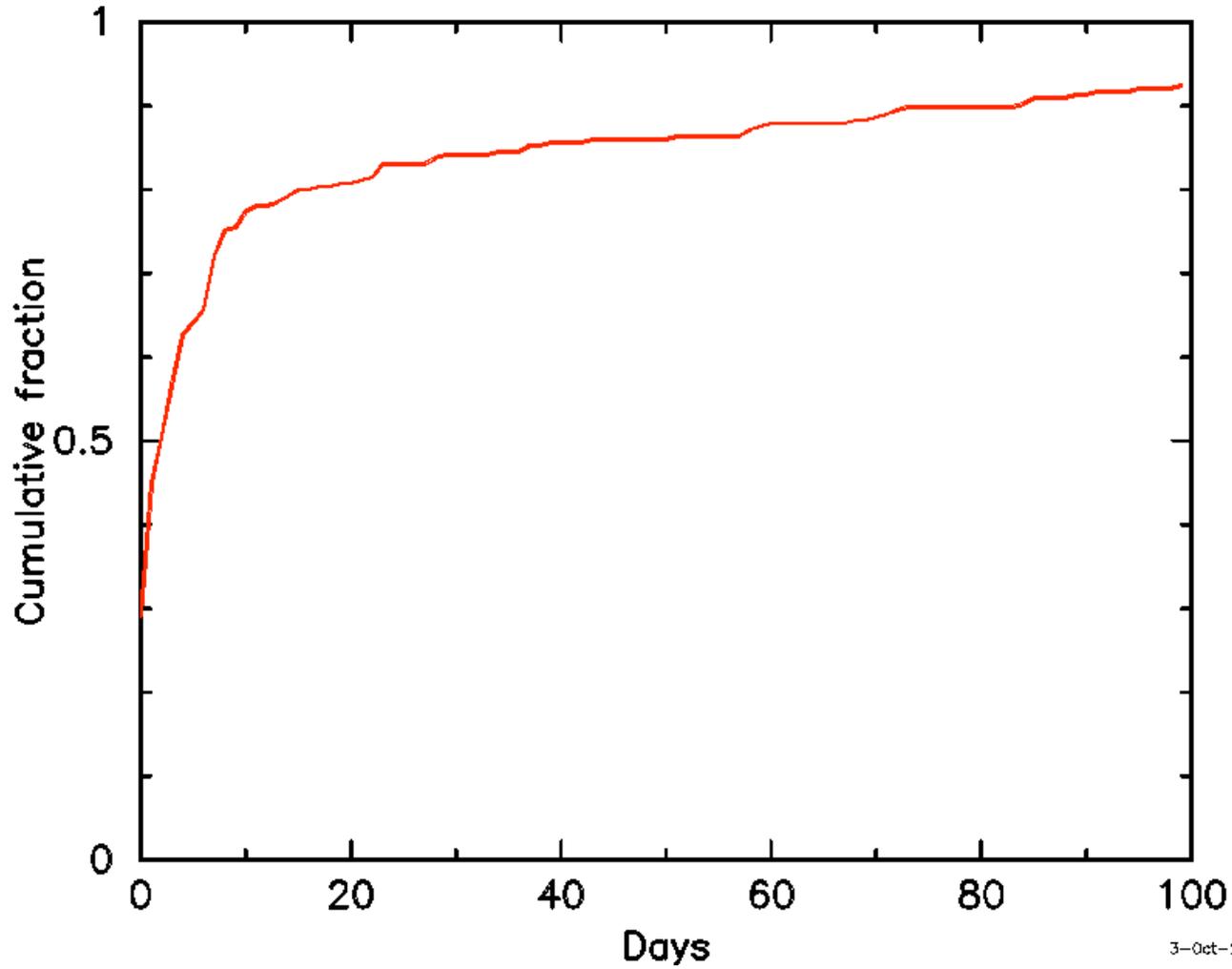


## XSPEC v12 bug reports





### Delay in fixing bugs



3-Oct-2007 11:09



## Coming in v12.4

Much improved Markov Chain Monte Carlo capabilities. MCMC is the preferred method in the computational statistics literature for complex models with many parameters.

Added flexibility in defining proposal distributions - a critical step in making the method efficient. Added tempering (a bit like simulated annealing).

MCMC is integrated into other xspec commands. If chains are loaded then these are used to generate confidence regions on parameters, fluxes and luminosities. This is more accurate than the current method to estimate errors on fluxes and luminosities.

Chains can be output either as ascii or FITS files.



## Other things coming in v12.4

A rewrite of the manual. Chapter 4 “Walks through xspec” is about 2 decades out-of-date. The release will have new, more relevant, examples. Chapter 6 “XSPEC V12 Models” will have better cross-referencing to make it easier to find the appropriate model for a problem.

The most popular FAQ is how to estimate error on the unabsorbed flux or the flux of a single component of the model. A general solution is difficult but we have a Tcl script which solves the easier cases and can be used as a template for complicated cases.

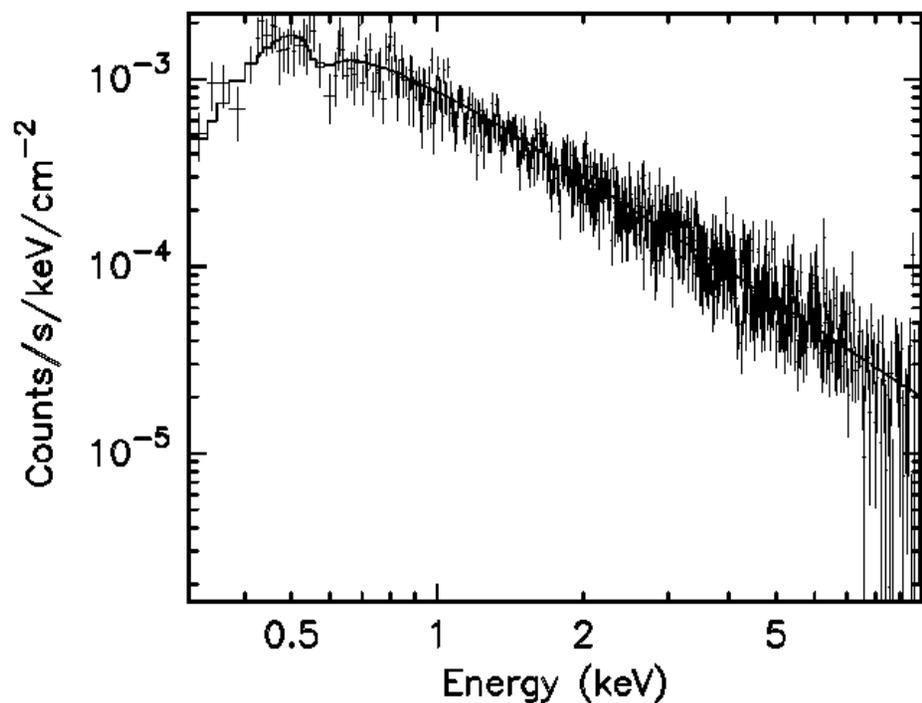
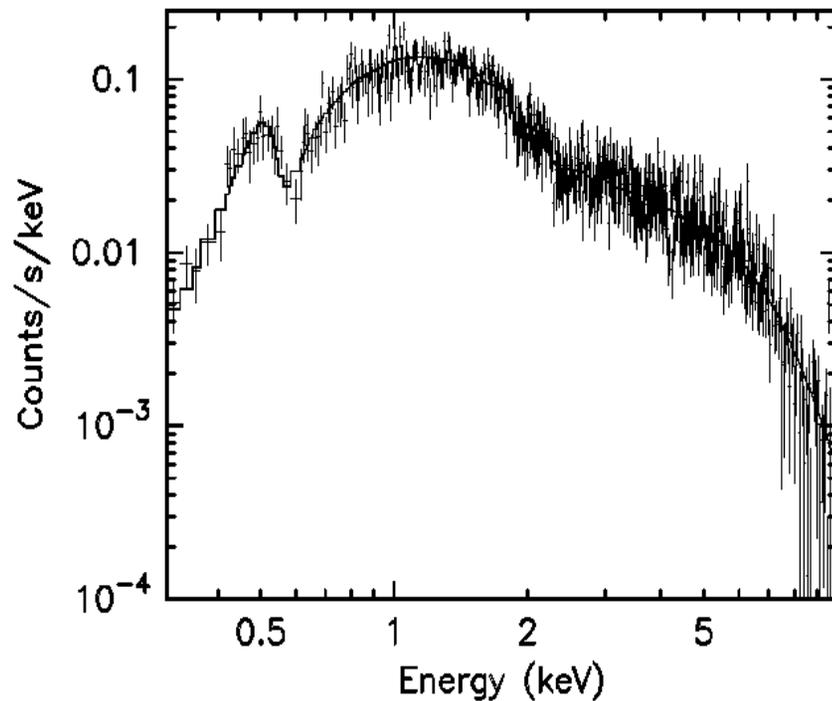
Support of GLAST file types.

`xset delta <fraction>` sets delta for numerical derivatives to the specified fraction of the current parameter value.



## A handy tip : setplot area

Not many people seem to be aware of the `setplot area` command. This modifies data plots by dividing by a flat spectrum multiplied by the response.





## Web 2.0 ?

I have been keeping a blog ([xspector.blogspot.com](http://xspector.blogspot.com)) since December 2004. This is mainly for my own use but I do note xspec issues and fixes. As with all Google blogs an RSS feed is available.

I would like to find ways of involving the xspec community more.

One possibility would be to wikify the manual and allow it to be edited by any xspec user.

What other ideas are there ? google groups...



# XSPECtor blog



## XSPECtor

WEDNESDAY, SEPTEMBER 26, 2007

### [xselect and directory paths with spaces](#)

Eric Miller points out that xselect runs into problems on the Mac if the directory path has a space in it even if a soft link is used to produce a path without a space. This occurs because xselect calls getcwd to return the current working directory and getcwd resolves any links to give the absolute path. This then runs into the customary problems with directory paths containing spaces.

The best workaround seems to be to change xsel\_utils.f and replace

```
call XPICWD(wrkdir)
```

with

```
wrkdir = "/"  
call XSL_EXPAND_DIR(wrkdir,status)
```

since the xsl\_expand\_dir routine in xsel\_unix\_c.c spawns a shell and runs pwd to get the current directory path. This method does preserve links.

Note that having an explicit directory path with a space (ie no links) fails in all sorts of ways and will be very hard to work around.

POSTED BY KEITH ARNAUD AT 8:36 PM 0 COMMENTS

THURSDAY, SEPTEMBER 20, 2007

### [Linking parameters in xspec](#)

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KEITH ARNAUD

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# Future directions

improved scripting options (Python/S-lang)

better multi-wavelength support (note that some groups analyzing Spitzer spectra are starting to do global fitting)

improvements in handling spectra with small number of counts (there is a formally correct way to do this but it is tedious and most people would prefer a faster method)

optimizing use of multi-core machines

more Bayesian options



# Astrogravs

**Astrophysical Gravitational-Wave Sources Archive**

**AstroGravs**

- [Waveform Catalog](#)
- [Literature Catalog](#)
- [Mock LISA Data Challenge](#)
- [Other LISA Resources](#)
- [Ground-Based Detectors](#)
- [Meetings & Presentations](#)
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**WHAT'S NEW:**

- [Meetings of Interest](#) updated March 6, 2007
- [Mock LISA Data Challenge begins!](#) (June 30, 2006)
- Press release: [NASA Achieves Breakthrough In Black Hole Simulation](#)  
Web feature: [Breakthrough Reached In Visualizing Black Hole Collisions](#) (April 18, 2006)
- [Finding the Holy Grail - Goddard Scientists Discover What Happens When Black Holes Merge](#) March 17, 2006

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AstroGravS is a service of the [Astrophysics Science Division \(ASD\)](#) at NASA's [GSFC](#).

A prototype gravitational wave astronomy archive.

The important things to archive for GW astronomy are the models. The actual LISA data will fit on your cellphone.

Data analysis will consist largely of searching the data for matches with templates.



# The Mock LISA Data Challenge

**Mock LISA Data Challenge**

In support of the Laser Interferometer Space Antenna (LISA) gravitational wave observatory, we are conducting several rounds of mock data challenges. The LISA Mock Data Challenges were proposed and discussed at meetings organized by the US and European LISA Project that were attended by a broad cross section of the international gravitational-wave community. These challenges are meant to be blind tests, but not really a contest. These serve the dual purposes of fostering the development of LISA data analysis tools and capabilities, and of demonstrating the technical readiness already achieved by the gravitational-wave community in distilling a rich science payoff from the LISA data output.

The Mock LISA Data Challenge (MLDC) Taskforce has been working since the beginning of this year to formulate challenge problems of maximum efficacy, to establish criteria for the evaluation of the analyses, to develop standard models of the LISA mission (orbit, noises) and of the LISA sources (waveforms, parameterization), to provide computing tools such as LISA response simulators, source waveform generators, and a Mock Data Challenge file format, and more generally to provide any technical support necessary to the challengers, including moderated discussion forums and a software repository.

The first set of challenge datasets were released following the [Sixth International LISA Symposium](#) (June 19-23, 2006, at Goddard Space Flight Center, Greenbelt, Maryland) With the results returned in Dec 2006 and preliminary analysis presented at the [11th](#)

**WHAT'S NEW:**

- **Round 1B released.** Datasets available. (August 18, 2007).
- **Round 2 finishes.** Key files on datasets page. (June 16, 2007).
- **Round 2 corrections.** Metadata files corrected; challenge data unaffected. (May 4, 2007).
- **Round 2 revised.** The blind challenge data sets were revised. (Mar 2, 2007).
- **EMRIs rereleased.** New Ch 1.3 sata sets now available (Mar 2, 2007)..
- **Round 2 released.** Round 2 data sets are now available.. (Jan 31, 2007).
- **Round 1 Analysis Submitted.** [Round 1 Analysis](#) submitted

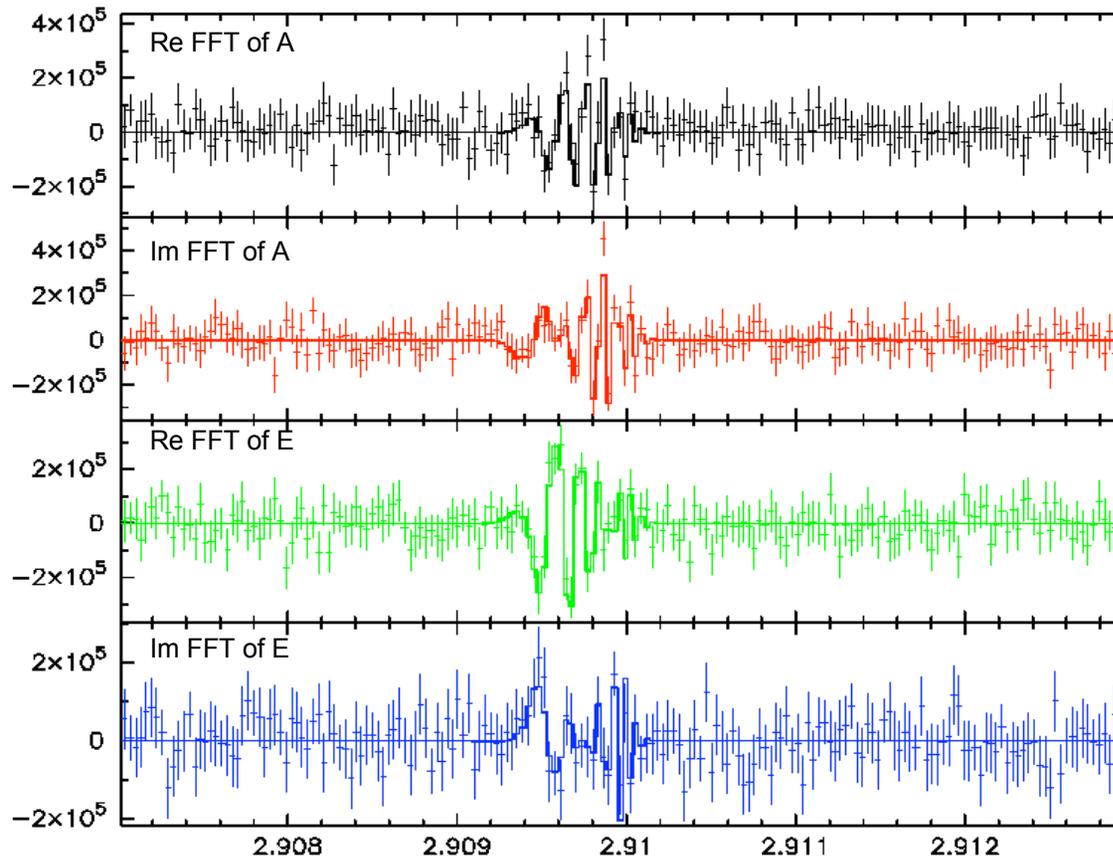
To encourage development of LISA data analysis methods and help identify key hardware requirements.

Simulated datasets are hosted on the HEASARC servers.

The challenge consists of a sequence of increasingly complex tasks. We started with datasets containing only one source and have worked up to models of the entire galaxy plus SMBH-SMBH mergers and EMRIs.



# XSPEC: Beyond e-m chauvinism



Simulated LISA observation of a single Galactic binary with constant frequency in source frame. From the Mock LISA Data Challenge.

kaa 5-Dec-2006 22:44