

CHIANTI-XSPEC Model

Test Version
Biswajit Mondal, PRL

1 Installation

To install this model, initialize the heasoft package in your terminal and then run ‘setup.sh’ (this is a bash script, which will configure/build all the required library for installation.) file under the model directory in your terminal, as follows:

```
$ cd Model_directory # Go to the model directory.  
$ heinit # Initialized Heasoft in your environment if it is not globally set in  
your environment.  
$ chmod 777 setup.sh # Make the file setup.sh executable.  
$ ./setup.sh # Run the setup.sh file.
```

2 Intrduction

This program will use the CHIANTI Atomic database-v9.01 to generate the Isothermal spectrum in the energy range of 0.01-30.01 keV. The energy resolution in the present version is 10 eV and it will work only for XSM response. The temperature range has been set to 1 Mk - 20 Mk. The abundance values (A) of the elements(x) is defined in the logarithmic scale as follows:

$$A = 12 + \log_{10}\left(\frac{A_x}{A_H}\right) \quad (1)$$

Here, A_H is the abundance of H.

The parameters of this model are Temperature (in logarithmic scale), abundances of the elements (Z=2 to Z=30) and the normalization (or emission measure). In the default settings the temperature, and the abundance of the elements Mg, Al, Si and S is considered as a free variable. But one can be able to free/freeze any of the parameter values by using the XSPEC ‘thaw’/‘freeze’ procedure. The unit of the normalization parameter is $1.0e46cm^{-3}$

3 Import to XSPEC

After the installation, one can use this model as a local model of XSPEC. It can be imported to XSPEC by using the ‘lmod’ procedure of XSPEC, as follows:

```
xspec > lmod isoth model_directory
```

Here, ‘isoth’ is the pre-defined package name and the ‘model_directory’ is the full path of model directory in your system.

After this a dummy response/XSM response is required for model calculation for a known energy grids. One can define a dummy response by using

XSPEC ‘energy’ procedure as follows:

```
xspec > energies 0.1 30.1 3001
```

After this one can call the model by using XSPEC model procedure by the model name ‘chisoth’, as follows:

```
xspec > model chisoth
```