

## Lab 7

### Plotting the X-ray Lightcurve of Supernova 2008bo with IDL

In this lab exercise you will expand your experience with **IDL** using *Swift* X-Ray Telescope data of a recent supernova explosion. This involves revising an already-existing **IDL** procedure, and applying it to the data. On the homework assignment you will follow this up, and also be required to conduct a literature search and prepare a brief write-up using **LaTeX**.

Log into your department unix account and start X Windows using the “startx” command. Open a browser and download the zipped and tarred data file (“lecture7-data.tar.gz”) for this lab, unzipping and untarring the file as usual. Move the generic.pro and lcurve.dat files into your data directory (the other files are needed for the accompanying homework assignment), and go to that directory.

```
gunzip lecture7-data.tar.gz
tar xvf lecture7-data.tar
mv generic.pro data
mv lcurve.dat data
cd data
```

The three columns in lcurve.dat represent the (1) time in days after the explosion of SN2008bo, (2) the X-ray flux of SN2008bo in units of  $\text{erg cm}^{-2} \text{sec}^{-1}$ , and (3) the error in the flux expressed in the same units.

Start up and initialize **IDL** as usual.

```
IDL> device, retain=0
IDL> window,0
IDL> ?
IDL> astrolib
```

Compile and run generic.pro in **IDL**, using the light curve data filename as your argument.

```
IDL> .run generic.pro
IDL> generic, 'lcurve.dat'
```

Examine the output postscript file, plot.ps, using **gv**. The task at hand is to improve this procedure so that it uses all of the data (instead of just the first five lines), produces a complete and easily-understood postscript plot, and also is streamlined. In a separate terminal window, make a copy of the **IDL** procedure file generic.pro called lcurve.pro [**cp** generic.pro lcurve.pro] and open it using your favorite text editor. Make the revisions detailed below to the procedure. It is recommended that you compile and run lcurve.pro at frequent intermediate stages leading to your final version – this makes it easier to pinpoint mistakes. ***Please hand in hardcopies of your latest version of lcurve.pro, and the postscript file that it produces, at the end of the lab.***

- 1) Change the procedure name from generic to lcurve on the first line.
- 2) Change the dimensions of the array that contains the data and the range of the “for loop” that draws the error bars so that they can handle all of the data.
- 3) Change the x- and y-axis factors so that all the data and errorbars are fully visible.
- 4) Make the procedure less generic by renaming (at the very least) the vectors x, y, and y\_err, the labels on the axes of the plot, and the name of the plot. (Make sure to make these changes universally throughout the procedure.) You may comment out unnecessary lines (e.g., PRINTs and PLOTs).

