# Software needed for NebulAtom

Please install them **before** arriving at Choroni.

## 1) **Cloudy** version 10.00.

The Cloudy web site is http://www.nublado.org/.

- Go to the StepbyStep section and follow the instructions.
- Once you have unpacked the code, edit the Makefile in the source directory and change the following line:

```
95    CDP = $(PWD)/${SRCDIR}/../data/
```

into

```
95    CDP = ./:$(PWD)/${SRCDIR}/../data/
```

The only difference is the ":./:" at line 95

- Cloudy C10.00 reads the column containing stellar+nebular radiation instead of the one containing the stellar radiation only. To correct this, make the following changes in source/stars.cpp:

```
1290c1290
<   double cage, cwavl, cfl1;
---
>   double cage, cwavl, cfl1, cfl2, cfl3;
1294c1294
<if( sscanf( chLine, " %le %le %le", &cage, &cwavl, &cfl1 ) != 3 )
---
>if( sscanf( chLine, " %le %le %le %le %le", &cage, &cwavl, &cfl1, &cfl2, &cfl3 ) != 5 )

1348c1348
<   fluxes[nmods][ngp] = pow( 10., cfl1 - 44.077911 );
---
>   fluxes[nmods][ngp] = pow( 10., cfl2 - 44.077911 );
```

Then you can use the 'make' command to compile the code and follow the rest of the instructions.

## 2) **Starburst99**

It is located here: http://www.stsci.edu/science/starburst99/docs/default.htm .

- Download the package and place it in a convenient location. After decompacting the file, rename the directory 'galaxy' into, for example, 'SB99 V6.0.4'. Enter the directory 'SB99 V6.0.4', modify the file 'Makefile' according to your needs and execute it by typing 'make' in a terminal window.
- Create a directory for your SB99 model files and enter it. Go to https://sites.google.com/site/nebulatomtools/starburst99-tools and download the user-friendly driver goSB99. Modify the line starting with 'set dcode' to reflect your own installation.
- Download also from https://sites.google.com/site/nebulatomtools/starburst99-tools the file 'ISB_008.input' which is an input example.

### 3) Python and common Python libraries

At least version 2.6, **but not 3.x**!

Together with Python, you will need several libraries:

- ipython ( to run interactive sessions of python)
- numpy (at least 1.6.1) (this is the numerical library of python)
- matplotlib (at least 1.1.0) (this is a plotting library)
- scipy (at least 0.10.1) (this is a scientific library containing e.g. interpolating tools)

All these libraries are included in the EPD distribution. There is a free version that includes all that we need, but you can also have some interest in installing the Educational version more complete. Works very well for Mac users. They also have a Linux distribution. All this can be found here:
http://www.enthought.com/products/epd.php

To see the version of python you have on your computer, enter the following in a terminal:

```
python -V
```

To obtain the version of the python libraries, enter the following from the python session:

```
>>> import numpy
>>> print(numpy.__version__)
```

And do the same for each library.

**For Python beginners:**

A very good introduction to scientific use of Python can be found here: http://scipy-lectures.github.com/
You can download the Python-QuickReference guide from there:
http://www.interfaceware.com/manual/chameleon/scripts/quickreference.pdf

You can also read the messages from the python-astro blog: http://python-astro.blogspot.com.

### 4) pip

This is an installer for python libraries. It can be downloaded from here: **http://pypi.python.org/pypi/pip**

### 5) Other Python libraries needed for NEBULATOM

- pyfits (to read and write fits files)
- Atpy (to deal with tables)

- pyCloudy (to run Cloudy and process its results)
- pyNeb (for plasma diagnostics, not yet available)

With pip, installing these libraries is very easy. You will just need to enter the following, from a terminal:

```
pip install --user pyfits
filespip install --user Atpy
pip install --user pyCloudy
pip install --user pyNeb (not available)
```

Once a library is installed, upgrades are very easy, for example, enter in a terminal:

```
pip install --user --upgrade pyCloudy
```

You can have a look at the pyCloudy webpage: https://sites.google.com/site/pycloudy/

**6) A smart editor**

For example **Xemacs** or **Vim** for Linux users, or **Aquamacs** or **Bbedit** for Mac users.

**7) FTOOLS, Xstar and XSPEC 12**

Download the HEASOFT Software 6.12 or 6.13. It can easily found at:

http://heasarc.gsfc.nasa.gov/lheasoft/download.html

In case of problems and queries with this set of codes, please contact Jose Manuel Ramirez (josem@ivic.gob.ve)

**8.) DevinTheDevil**

This is a program to determine level populations from the atomic database in Xstar.

Please download from

https://dl.dropbox.com/u/7511178/DevinTheDevil.tar.gz

In case of problems and queries with this code, please contact Claudio Mendoza (claudio@ivic.gob.ve)