

# Installing ASTRA and preparing for the hands-on tutorial

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Dear ISBA student,  
Congratulations on being selected to attend ISBA'25 in Shanghai!  
Because you'll be participating in the ASTRA hands-on training,  
please download and install ASTRA and the other programs  
needed to use it. Please see the following slides to see the  
programs you'll need to use.

You are also encouraged to download and read the ASTRA  
manual, located at: [https://www.desy.de/~mpyflo/Astra\\_](https://www.desy.de/~mpyflo/Astra_manual/Astra-Manual_V3.2.pdf)  
[manual/Astra-Manual\\_V3.2.pdf](https://www.desy.de/~mpyflo/Astra_manual/Astra-Manual_V3.2.pdf)

Before beginning with ASTRA, you are encouraged to familiarize yourself with some basic programming tools. You'll need to know how to use a text editor, such as emacs, vim or notepad.

You'll also need to be able to use the command line.

For Mac and Linux users, you can use a terminal application such as iTerm natively. (You may need to install XQuartz:

<https://www.xquartz.org/>

Windows users can install Cygwin to get a linux-like environment:

<https://www.cygwin.com/>, or use the native Windows Command Prompt.

You can find more information on the linux-like command line and how to use it here: <https://ubuntu.com/tutorials/command-line-for-beginners#1-overview>

For more information about the Windows Command Prompt, see e.g. <https://www.makeuseof.com/tag/a-beginners-guide-to-the-windows-command-line/>

In the tutorial, we will need to: create and change directories; create, modify, move and copy files; list files in a directory; and run

# Getting ASTRA

ASTRA is free and readily available for download and use on Windows, Linux and Mac. Windows and Linux (64-bit) are the recommended platforms, as those are the ones most often supported/updated.

It's available at <https://www.desy.de/~mpyf1o/>.

Note that there is also a very thorough manual at the "Astra documentation" section, along with some examples.

The "Utility programs" link contains some scripts to convert between ASTRA and SDDS (e.g., for ELEGANT) and HFSS for those who want to use it with other tracking codes.

ASTRA uses the following programs to generate and simulate a particle beam:

- generator: Generates particle distribution  
(You can also provide a distribution manually)
- astra: Runs the tracking algorithm

There are also several different graphics programs used for representing beam and field distributions:

- fieldplot: Plot EM fields
- lineplot: Plot beam parameters (size, emittance, &c.)
- postpro: Plot beam profiles

The graphics programs are based off of PGPLOT packages.

# Installing ASTRA

**Windows** (Assume we're using C:\\ as the default)

Create a folder in C:\\ called ASTRA and download all the .exe files into it. You can (and should) also download the manual for reference.

To make running these programs easier in the future, you can add them to your path by searching for "Environment Variables" in your system settings and adding C:\\ASTRA to the "Path" option. Alternately, you can use the command line to do the same:

```
setx path "%PATH%;C:\\ASTRA"
```

# Installing ASTRA on Windows

Now you should be able to run the .exe programs you downloaded.

In the command prompt, type

```
generator name-of-file.in
```

```
astra name-of-file.in
```

You can see results in a similar way after running the above programs:

```
lineplot filename.run-number
```

```
fieldplot filename.run-number
```

```
postpro filename.run-number
```

# Installing ASTRA

## Linux/Mac

Similar to Windows, you can download the pre-compiled executables.

Create a folder such as `~/ASTRA` and download the executables to it.

(`~` means your home directory, e.g., `/usr/yourname/home`) you may need to do `chmod 755 astra` (and `chmod 755 generator`, and...) to be able to run them.

Add this folder to your `PATH` by adding

```
export PATH=~/Astra:$PATH
```

to the file `.bash_profile`, either with your text editor of choice.

# Installing on Linux/Mac

In the directory you made, you can do `./astra` (or `./generator`, &c.) to run the programs; once the folder has been added to your PATH, you will be able to run anywhere by simply typing **astra** (**generator**, **fieldplot**...).

(Mac users may also need to right click on the icon in the Finder window and choose 'open with' in order to force MacOS to let you open it the first time you use it.)

If you've reached this point and can run the programs you downloaded, then congratulations! You have successfully installed ASTRA and are ready for the hands-on tutorial. If you are having trouble, please send me a message and I will try to help you out.