YETI 2009 Tutorials Introduction

1 Login

Your login details:

- **Username:** dvs8tmXX
- **Password:** YEti2009
- **Cluster node:** nYY

Since all PC's in the class room have an utterly useless operating system installed, you'll have to go through a few login steps to get to the machines which we will use for these tutorials:

- Login to Windows using the username and password above
- Start Vega Hi-Res, either from the link on your desktop or from the Start menu (`Start\Durham Network\Connect to ITS linux\Vega Hi res`), and login.
- For event generation, open a terminal, and log into the cluster node reserved for you: **ssh nYY**. This will take you straight into your home directory and you are allowed to run two jobs on that node at the same time.

Note: All indented commands are a continuation of the previous command and should thus be entered on the same command line.

2 Sherpa

The way a particular simulation runs in Sherpa is defined by several parameters, which can all be listed in a common file. This steering file is called Run.dat. The first step in running Sherpa is to adjust all parameters to the needs of the desired simulation. For this tutorial you are supplied with all of the necessary steering files. Instructions for properly constructing these files are given in the Sherpa manual (`http://www.hepforge.org/archive/sherpa/howto-1.1.3.pdf`), but for now we will discuss a couple of the most important features of this file.
In the (*processes*) section of the Run.dat file, the processes that will be simulated are specified. The particles are identifed by their PDG codes. There are also so-called particle containers, which allow you to specify several processes with one line. For example, the particle container for jets, "93", includes all processes with $d, \bar{d}, u, \bar{u}, s, \bar{s}, c, \bar{c}, b, \bar{b}, G$ in this place. A list of particle codes and particle containers is displayed when Sherpa is run.
For all steps in these tutorials, we have prepared Run.dat files, which you can copy from the mentioned location into a working directory. Once you have a working directory with a Run.dat you simply run the `Sherpa` command in that directory.

3 Rivet

Rivet is a tool for analysing simulated collider events, allowing the results to be directly compared to measured data. The command line options used in these tutorials are "-a" to specify a certain analysis to be applied to the events, "-H" for the filename of the output histogram file, "-i" for the filename of the input HepMC event file (or a fifo pipe, see below), and "-n" for the number of events to read from that file.
More information on Rivet can be found at `http://projects.hepforge.org/rivet`.

3.1 Using Rivet with Sherpa

For these tutorials we will be using fifo (First In, First Out) pipes. Essentially, Sherpa is instructed to write the event output to a file, and Rivet is instructed to read the data from the same file for analysis. However, instead of the data being written to disk as an intermediate step, the fifo file pipes the data straight from Sherpa to Rivet. Therefore, both Sherpa and Rivet must be run simultaneously. The commands to do this are given explicitly in the tutorial instructions.

3.2 Plotting your results using Rivet

Because the cluster nodes don't have any graphical interfaces installed, the plotting has to be done on Vega directly. To access your event generation results which are stored on the cluster, your cluster home directory is linked as `node-home` and automatically entered when you open a bash shell.
Rivet output is in the AIDA format. Rivet supplies two scripts which can be used for comparing and plotting histograms from AIDA files. First, the comparison script **compare-histos** is run, which compares the monte carlo results with each other and with the reference data. This produces a set of ".dat" files, which can be used to make publication-quality plots using the **make-plots** script. These commands are given more explicitly in the tutorial instructions.