The ATLAS Project Flowchart

Before you begin, please read this document!

As with all IRIS projects, the ATLAS Project offers training and an opportunity for students to apply that training to a research project of their choice. However, the ATLAS Project offers students multiple routes, depending upon their interests and experience.

Look at the flowchart below.

The **green boxes** show the training notebooks that students can complete – *these notebooks must be completed in the order shown but students do not have to complete them all.* The notebooks become more challenging as Python skills are progressively developed and applied to analysing and interpreting data.

The **blue boxes** show opportunities to (a) complete the optional exercises to help consolidate student learning before moving on to the next Notebook, or (b) to leave the training notebooks and use the exercise/s as a student research project.

All students start at Notebook 1, which provides some background to the ATLAS Project. However, from Notebook 2 onwards it is up to the student how far they go before switching to their research project. For example, it would be acceptable to gain some Python training in Notebook 2 before switching to the optional Notebook 2.5 and use one or more of the exercises as their research project. Alternatively, the student could dip into to Notebook 2.5 to gain some consolidation, before proceeding to Notebook 3 and beyond.

Note that other than Notebook 2.5, all optional exercises/research opportunities are at the end of each Notebook (for notebooks 3 to 7). You can choose to ignore these optional exercises, use them for consolidation or select an exercise for your research project.

In June, IRIS will be running three conferences for schools. We hope that you will be able to attend and show what you have achieved in the ATLAS Project! You can do this by creating a PowerPoint talk or by creating a poster. You can find out more about how to do this in the Phase 4 folder of the ATLAS Project on IRIS' dedicated resource centre (ask your teacher how to access this).

Happy coding!

Notebook 1

Before we begin

an introduction to particle physics and accelerators

Consolidation/project ideas

Notebook 2 Intro to Python 1

an introduction to coding in Python

Notebook 2.5

Using Python for Physics

optional exercises for consolidation or as ideas for your own research

Notebook 3

Intro to Histogramming

an introduction to computing techniques used in High Energy Physics (HEP) analysis

Notebook 3

Optional Histogramming exercises or project ideas

optional exercises for consolidation or as ideas for your own research

Notebook 4

Z° decays #1: finding the Z° boson mass

an introduction to Feynman diagrams and Lorentz vectors

Notebook 4

Optional Z^o exercises or project ideas

optional exercises for consolidation or as ideas for your own research

Notebook 5

Z° decays #2: quark – antiquark interactions

quark interactions & production of Z°

Notebook 5

Optional Z^o exercises or project ideas

optional exercises for consolidation or as ideas for your own research

Notebook 6

Searching for the Higgs boson

#1

using the $H \rightarrow \gamma\gamma$ channel

Notebook 6 Optional Higgs exercises or project ideas

optional exercises for consolidation or as ideas for your own research

Notebook 7 Searching for the Higgs boson

#2

using the $H \rightarrow WW$ channel

Notebook 7 Optional Higgs exercises or project ideas

optional exercises for consolidation or as ideas for your own research