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# Introduction

This twiki provides the set of instructions for setting up all the necessary tools that students will need for the PREFIT20 school sessions.

# Session: QCD and precision calculations (Gudrun Heinrich)

## Exercises

These are QCD exercises link

And here are the solutions for the QCD exercises link

## How to setup the tools/code

To install the program pySecDec, please follow the instructions in the installation video link [link](#)

Or follow the instructions on the pySecDec documentation pages link [link](#)

# Session: EFT UFO (Admir Greljo, Ilaria Brivio)

This session and the SMEFT session will use Mathematica with the FeynRules package.

Useful material for this session is given in the UFO\_HandsOn\_material.tar folder

The physics project we will develop during the EFT UFO and MG/PS sessions is described in the sheet PREFIT.pdf

The slides used in this and the MG lectures are available here

Group projects sheet: here

## How to setup the tools/code

Mathematica is not an open source software. Students (especially theorists) are encouraged to ask information about a licence to their home institutions and install a version of their laptops. Alternatively, a free trial version can be downloaded and used for 2 weeks: instructions on the installation will be sent by email a few days prior to the beginning of the school.

For the tutorials on EFT and UFO, you need Mathematica on your laptop. If you do not have a student license from your home institute, please download Mathematica from Wolfram and get a 15-day trial license, that will be valid for the complete school: <https://www.wolfram.com/mathematica/trial/> So please get the trial license a day or so before you leave for the PREFIT20 school.

Once Mathematica is installed, FeynRules2.3 can be downloaded from the website link [link](#) It does not require installation: it is sufficient to unzip it in a directory, whose path will be specified manually in Mathematica for import.

# Session: and Parton Shower (Admir Greljo, Ilaria Brivio)

This, the Delphes, SMEFT and Fitting sessions will use a Virtual Machine, where MadGraph5, Pythia, Delphes, MadAnalysis and ROOT have been pre-installed.

In addition, the folder MG\_HandsOn\_material.tar contains files needed for the ROOT analysis. This archive should be directly downloaded on the Virtual Machine.

## How to setup the tools/code

1. Download VirtualBox software from the following link and install it  
<https://www.virtualbox.org/wiki/Downloads>
2. Download virtual machine file 'Delphes2020.vdi' from:  
<https://drive.google.com/drive/folders/0B-t5klOOymMNYm1YT0tmNkR5a1k>
3. Start VirtualBox
4. Create a new virtual machine using the provided image:
  - ◆ Click the blue 'New' icon
  - ◆ Pick a name for the machine and select 'Linux' and 'Ubuntu (64-bit)'
  - ◆ Click continue
  - ◆ Set the memory size to at least 1024 MB and click continue
  - ◆ Select 'Use an existing hard disk file', then click on the folder icon, click on the Add button and choose the downloaded 'Delphes2020.vdi' file
  - ◆ Select the newly created virtual machine and click the yellow 'Settings' icon
  - ◆ Select 'Display' and set 'Graphics Controller' to 'VBoxVGA'
  - ◆ Click 'OK'
  - ◆ Select the newly created virtual machine and click the green 'Start' icon

Now, you should be in an Ubuntu session with all the required software installed and configured.

# Session: Machine learning (Kyle Stuart Cranmer)

## How to setup the tools/code

Please follow the instructions in "Preliminaries" section in the link [link](#).

If you have Windows and have problems installing Docker you can try following this link [link](#).

# Session: SMEFT (Ilaria Brivio)

see UFO and MadGraph sessions

For the first part you will need to download the archive SMEFT\_HandsOn\_pt1.tar on your laptop.

For the second part you will need to download a version of the SMEFTsim UFO on the VM

and the archive SMEFT\_HandsOn\_pt2.tar, always on the VM.

# Session: Fitting (Andrea Carlo Marini, Nicholas Wardle)

see MadGraph session. Material can be downloaded from the GitHub repository  
<https://github.com/amarini/Prefit2020>

## How to setup the tools/code



# Session: Delphes (Michele Selvaggi)

see MadGraph session

## How to setup the tools/code

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# Session: Jet reconstruction hands-on (Steven Schramm)

## How to setup the tools/code

In this session, we will use the FastJet software package to reconstruct a variety of types of jets, and ROOT to study key properties of the resulting jets. The input data will also be in ROOT format. You will thus need to have both FastJet and ROOT installed in order to complete these hands-on exercises.

1. ROOT can be downloaded from this page [↗](#). The binary distribution is typically the most convenient. Please do this before the session, as it can take a while to install ROOT.
  - ◆ After you download ROOT and unpack the folder it comes in, you will find instructions for how to install it in the file named `INSTALL` within the `README` subdirectory.
2. FastJet is split between core and contrib(uted) packages. We will need both. Please do this in advance, as while it typically takes only a few minutes to install, there can be complications (especially with the contrib package).
  - ◆ The core package can be downloaded and installed as described here [↗](#) [direct download link here [↗](#)]
  - ◆ The contrib package can be downloaded and installed as described here [↗](#) [direct download link here [↗](#)]

The data for the hands-on sessions is not yet available for download. It will be made available closer to the start of the session.

-- SenkaDuric - 2020-02-06

- solutions\_E1.pdf: Solutions for the QCD exercises.

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This topic: VBSCan > PREFIT20

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