

TESHEP 2025 Hands-on Exercises

Task 0 – check if your ROOT installation works

- Download `check.py`, for example
`wget https://rafal.web.cern.ch/teshep2025/check.py`
- Execute:
`python3 check.py`
- If it works, it should display:
Info in <TCanvas::Print>: file check.png has been created

Task 1 – manual inspection of ROOT data file

- Download `test.root`, for example:
`wget https://rafal.web.cern.ch/teshep2025/test.root`
- Show how to open file with TBrowse and see distributions
`root --web=off test.root`
`new TBrowse`
- Inspect what variables are available and what distributions they have
- Run `StartViewer` from TBrowse or from command line:
`ntuple->StartViewer()`
- Make a correlation plot between two variables

Task 2 – RDataFrame

- Get the tarball with files:
`wget https://rafal.web.cern.ch/teshep2025_examples.tar.gz`
- Unpack
`tar xvzf teshep2025_examples.tar.gz`
- Copy `test.root` to the `teshep2025_examples` directory
- Run each example, for example
`python3 example1.py`
- Open the produced plot
- Look at each code and see if you can understand what it does
- In order to make sure you understand:
 - In example 1 – add 2 more histograms
 - In example 2 – add histogram of histogram of the e^+e^- pair transverse momentum $|\vec{p}_{T,1} + \vec{p}_{T,2}|$.
Keep in mind that $|\vec{p}_{T,1} + \vec{p}_{T,2}| \neq p_{T,1} + p_{T,2} = |\vec{p}_{T,1}| + |\vec{p}_{T,2}|$.
 - In example 3 – add a requirement of $p_{T,2}$ being above 50 GeV
 - In example 4 – change line style (check ROOT documentation, Google or ChatGPT)
 - In example 5 – produce two more plots with one histogram on each

Task 3 – data & MC analysis

- Get the TESHEP analysis framework:
`wget https://rafal.web.cern.ch/teshep2025_framework.tar.gz`
`tar xvzf teshep2025_framework.tar.gz`
`cd teshep2025_framework`
`make`
- Open `plots.pdf`
- Look at distributions of different variables
- Define selection that will remove background while keeping signal