This Exercise

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Instructions for lectures

- Content
- Question to you
- Exercise for later in the hands-on part

Our schedule

- We have 7 x 1.5 hours - this is not a lot of time!
- I will give short lectures here and there
- Most of it will be hands-on work
- Depending on your knowledge we will start with pre-exercises
- At the end you should all have a calorimeter design and a reconstruction for it

The groups

- We should build a few groups
  (depending on the number of participants)
- Let’s build groups now: what are your preferences?
- Please give your group a name!

Final presentation

- At the end of Maria Laach, the group/person creating the best calorimeter design and reconstruction will receive great honour
  - The status on Wednesday 11. Sept. counts

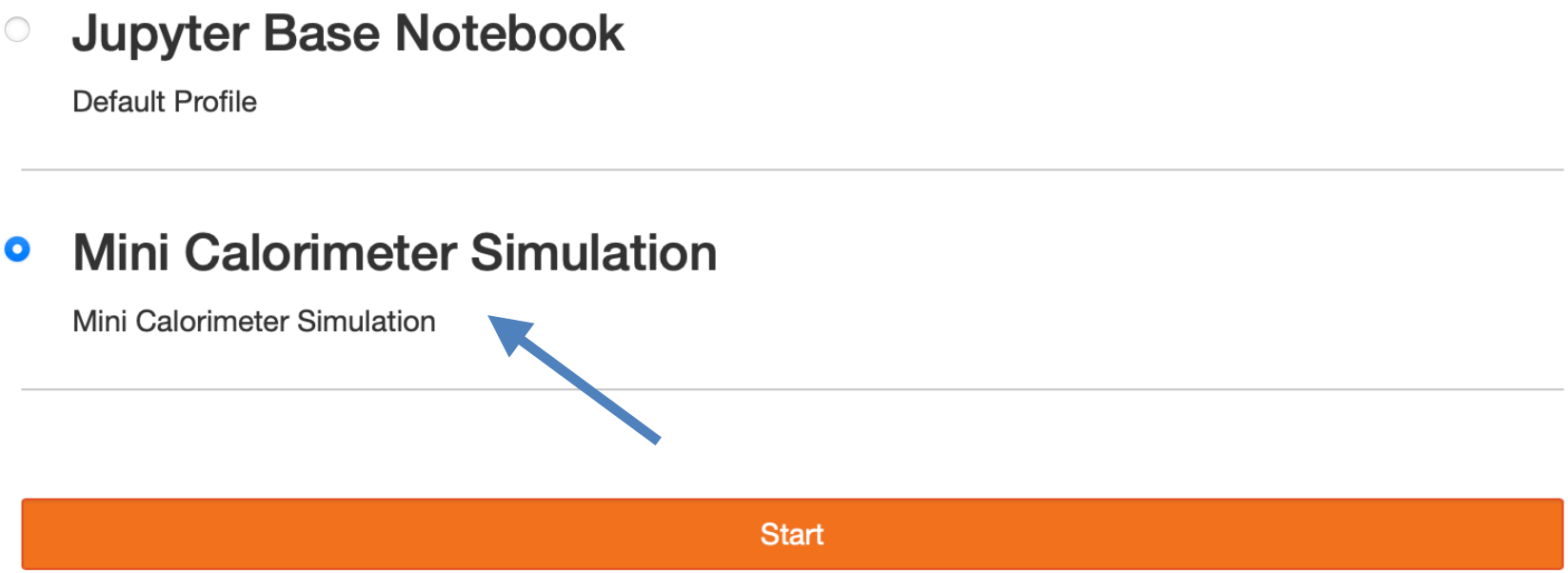
- However, don’t keep your findings to yourself, share them with other groups in the short presentations during this week
  - Doing the exact same as another group won’t get you better performance

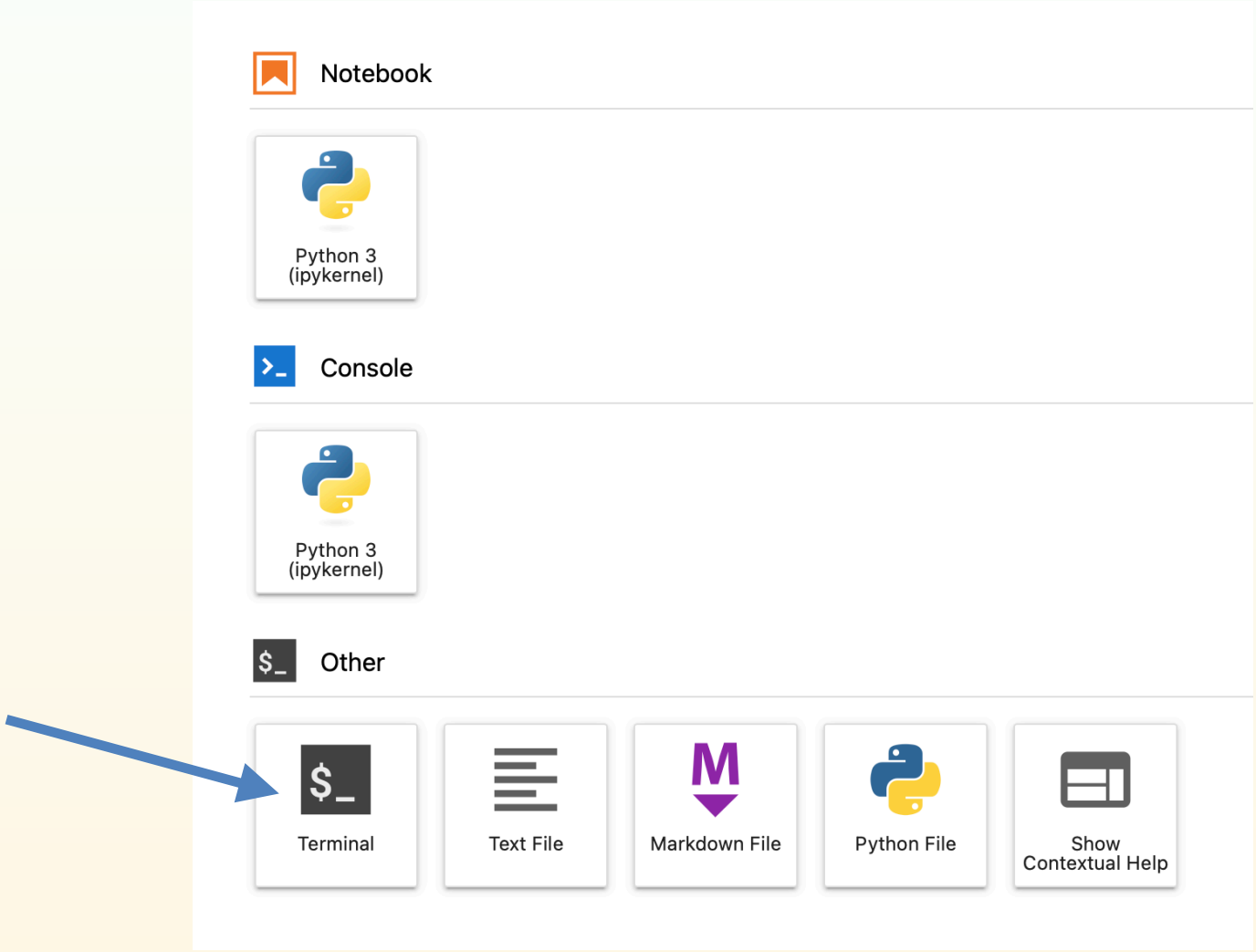
- The final presentations will be done on the 11th of Sept.
  - Which design and reconstruction did you chose?
  - How does that design map to what you have learned about calorimeters and NNs?

Let’s get started

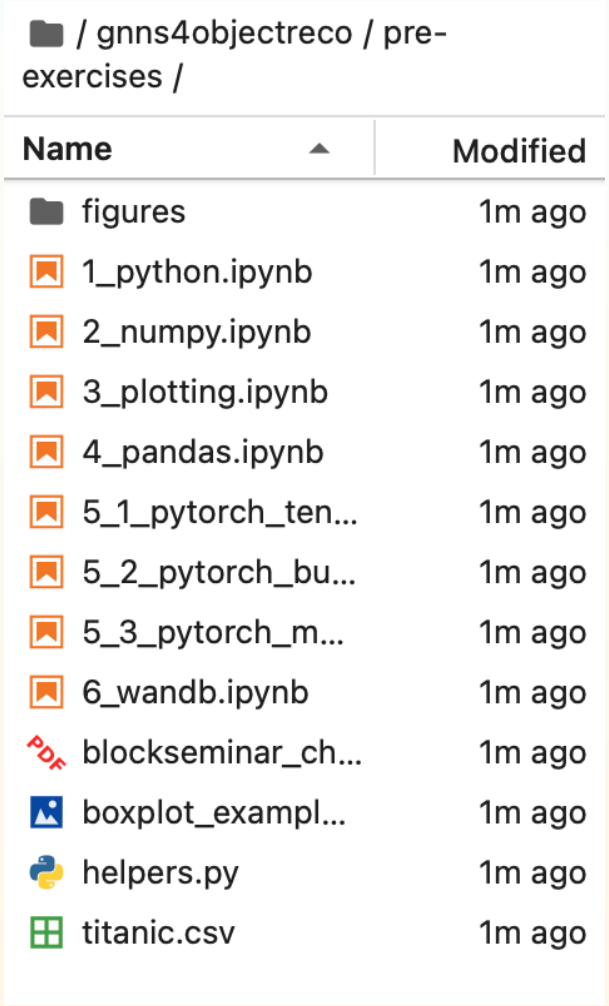
- Exercises will be done in Jupyter notebooks
- They can be accessed via giffels.me
- You get a username + password from me
- There is no need for you to setup/install anything

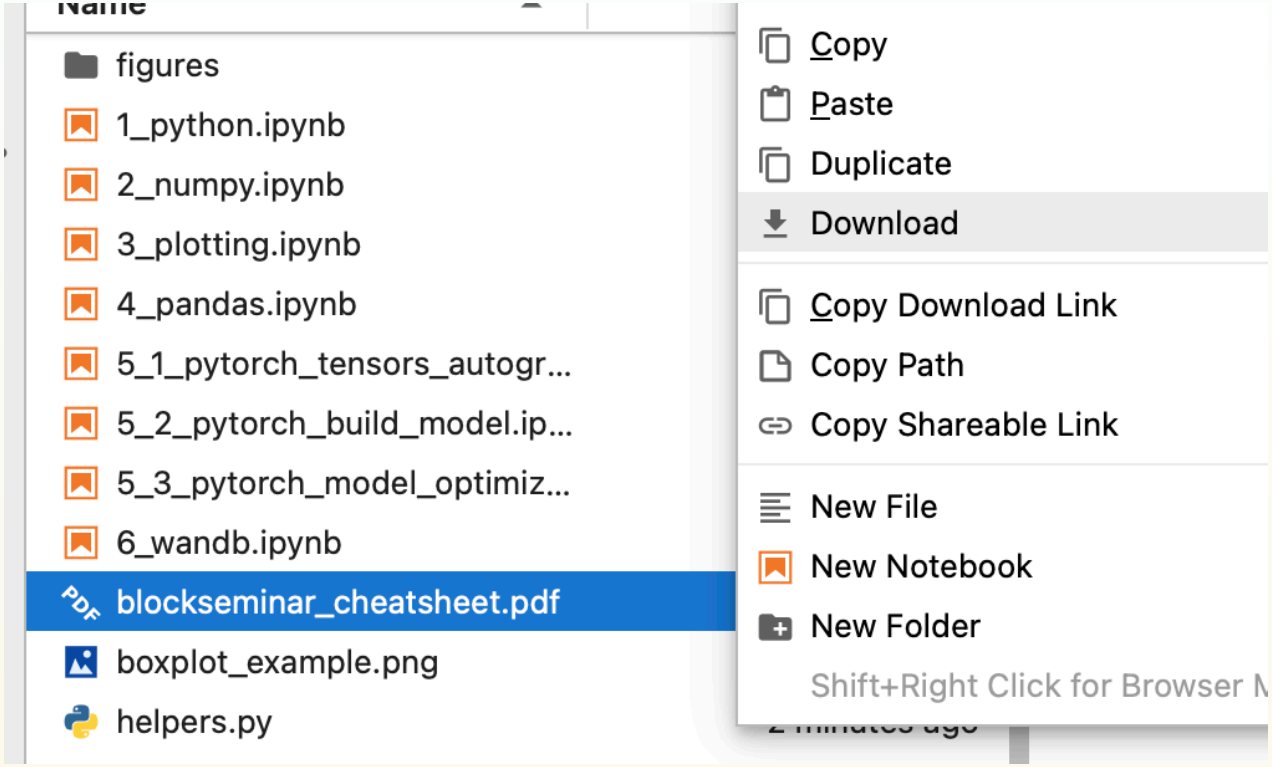
Server Options




Notebook
Python 3 (ipykernel)
Console
Python 3 (ipykernel)
Other
Terminal
Text File
Markdown File
Python File
Show Contextual Help

- Starting point is the repository: https://gitlab.etp.kit.edu/Lehre/gnns4objectreco
- Please “git clone” it and start with the pre-exercises
  (maybe we can skip that)
- For the main exercises, please switch to branch workshop-2024





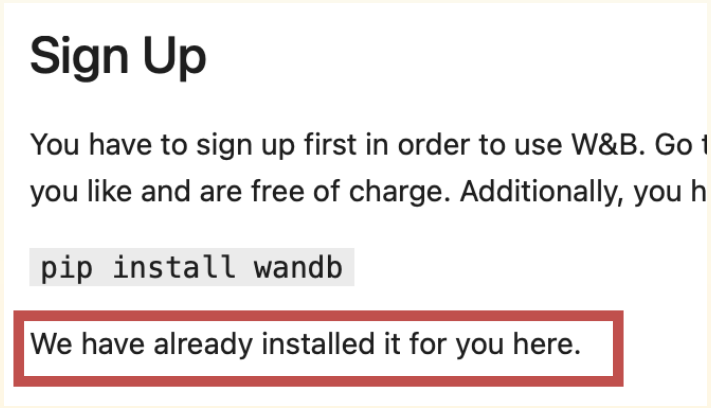
- Please download and go through the cheat sheet
- If you can answer all questions, you may be able to go very quickly through the pre-exercises and then help the others
- Take a few minutes and let me know

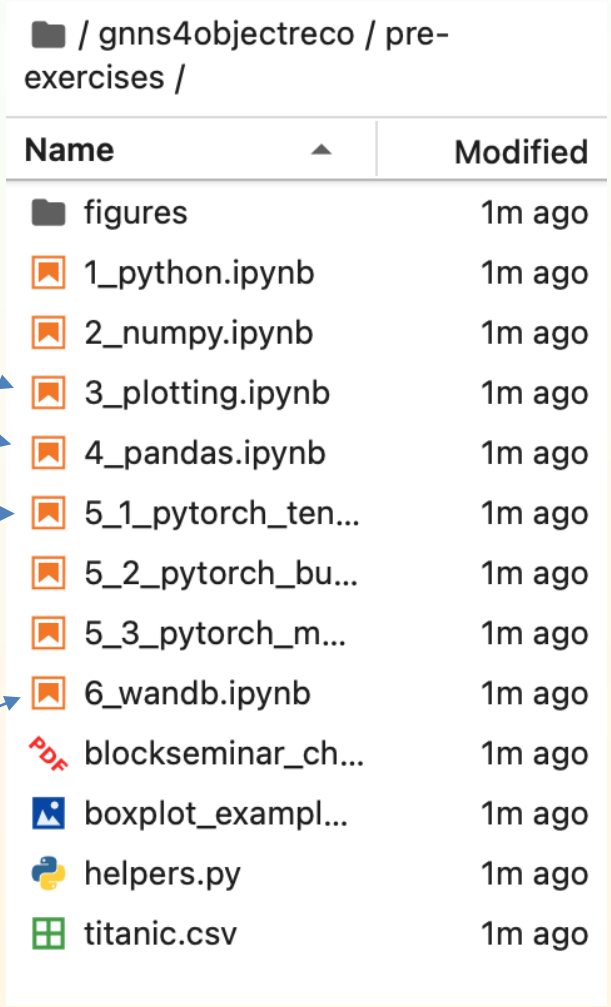
It is up to you

If you feel confident with matplotlib
or even want to use another library
that you know very well, skip as you like

Only up to Summary Statistics

Skip automatic differentiation
(just know it exists)





Let’s get started (2)

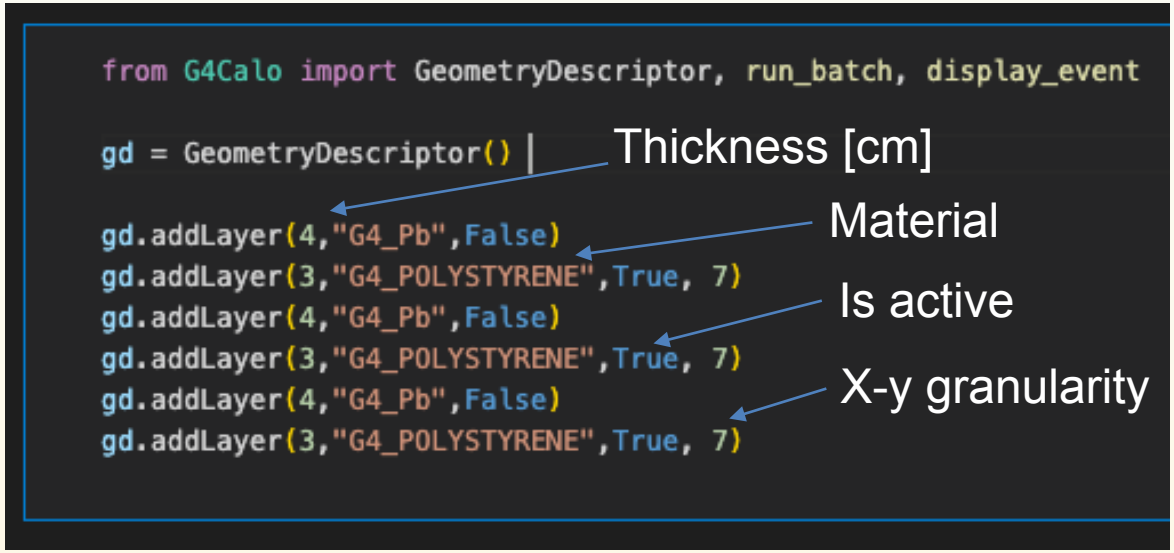
- With the pre-exercises you will have all skills you need!

- But I am / we are here to help and will provide you with some code snippets here and there along the lines
- Feel very encouraged to export functions you might use more often into modules outside of the notebook

- If you encounter problems:
  1. Try (hard) for a few minutes - not too long, don’t get stuck
  2. Ask in your group
  3. Ask the internet / chatGPT is also fine (don’t trust it blindly)
  4. Check the answer:
     if is very evolved and complicated it is probably not the right one, if in any doubt, **ask me/us**

Geant4 simulation

- That's what we will be working with in addition to what's covered in the pre-exercises
- Created a convenient wrapper around full Geant4 simulation
  (the state-of-the art used by the LHC experiments, and many others)
- Examples can be found in the branch 'workshop-2024' in the GNNs4ObjectReco gitlab repository: **calo_example.ipynb**



(NB: I would not build *that* calorimeter for EM showers, next lecture will tell you why)

- **This is just a preview, we will get back to it**