A. Bay, L. Pescatore

TRAVEAUX PRATIQUES 4:
ACCÉLÉRATEUR VAN-DER-GRAAF
Students on this project will:

- Understand the working principles of a particle detector
- Design and build a data acquisition (DAQ) system
- Calibrate and learn to understand the detector
- Analyse data to measure the velocity of neutrons produced in a fixed target experiment.
• The Van-der-Graaf accelerates $^2$H to 300 keV
• Target: a fixed $^3$H target. Fusion reaction:
  $$^2\text{H} + ^3\text{H} \rightarrow ^4\text{H} + \text{n}$$
• Neutrons produced in a $^2 \rightarrow ^2$ reaction have a specific speed
• Goal: measure the speed to prove this reaction is happening!
The detector

- Very high tech! Scintillator + photomultipliers.
- One detector close to the target and one moveable.
- Can measure coincidences and time delays.
- Use a $^{60}$Co source to calibrate before using the accelerator.
The DAQ: trigger and readout

• CAMAC data acquisition boards (ADC, TDC, CTF, delays, etc)
• Need to build a trigger and readout to measure:
  ✓ The energy spectrum of the neutrons
  ✓ The time-of-flight (hence speed) of the neutrons
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Practical info

- Will use ROOT and RooFit for the data analysis part
- We can install it together. Best on Linux/Mac.

- Scheduled working time: Mondays full day
- Last day is 18th Dec, report on the 12th Jan.

- You can find me in BSP 614.4
- Fell free to contact me at luca.pescatore@epfl.ch at any time.

And now time for ❤️❤️❤️