Practical work

M2 – NPAC – 2019/2020

Sorbonne University (UPMC)
Paris Diderot University
Paris Saclay University (PSud and INSTN)

List of proposed Practical Works

CEA-Saclay (max. 7 teams)

- Neutron – Gamma Discrimination (2 teams*)
- Gamma Spectroscopy (1 team)
- Muon lifetime measurement (2 teams)
- Micromegas Detector (1 team)
- Solar Spectroscopy (1 team)

(*presented by M. Vandebrouck*)

IPN-Orsay (max. 9 teams)

- Study of the Compton Interaction (2 teams)
- Gamma and Alpha-Gamma Spectroscopy (1 team)
- Muon lifetime measurement (3 teams)
- Cosmic Rays Study (1 team)
- Positronium decay (2 teams)

(the Practical Work description can be found at : https://npac.lal.in2p3.fr/wp-content/uploads/2019/Cours-S1/Fascicule-TL-2019-2020.pdf)

** 1 team is composed by 2 students*

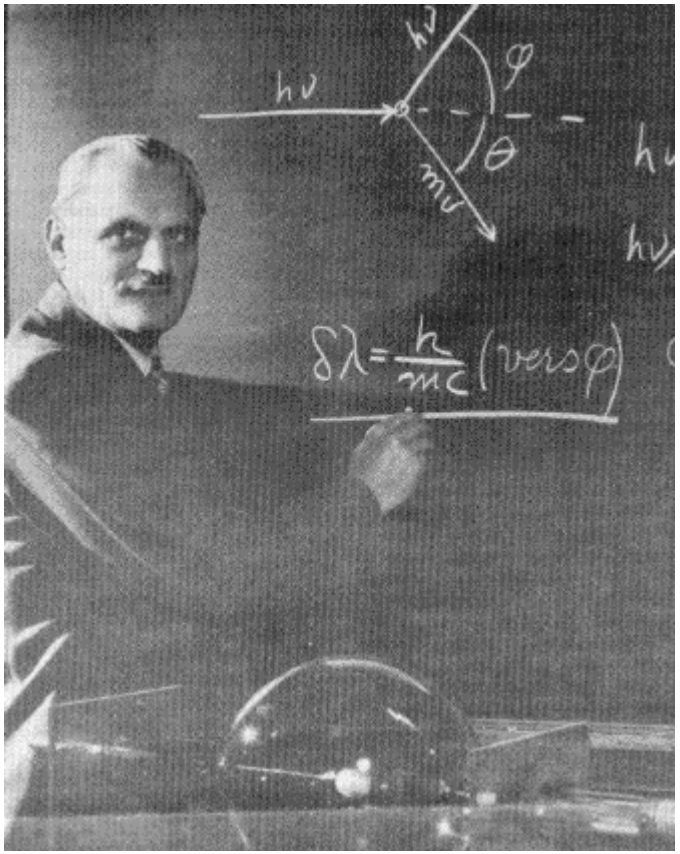
Compton interaction study

Goal:
study the Compton effect, by measuring the energy of the scattered photon, its angular dependency, and its differential cross section.

Method: coincidence measurements between incident and scattered gamma and scattered electron.

Material: NaI(Tl) scintilators – NIM electronics – ISIPEAK/FASTER acquisition card.

Data analysis: ROOT tools.



Location: IPN Orsay
Supervisor: W. Dasilva

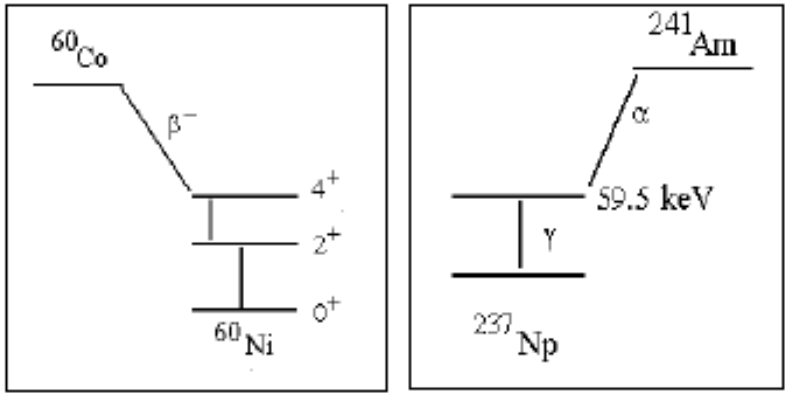
Gamma and Alpha-Gamma Spectroscopy

Goal:
Start Lab Work in Nuclear Physics
Study of gamma decay of different standard sources.
Angular correlation measurements for 60Co.
Alpha-gamma coincidence.

Method: gamma-gamma and alpha-gamma coincidence measurements.

Material: NaI(Tl) scintilators and Silicon Semiconductor detectors – NIM electronics – ISIPEAK/FASTER acquisition card.

Data analysis: ROOT tools.



Location: IPN Orsay
Supervisor: C. Lachaud/M. Ridel

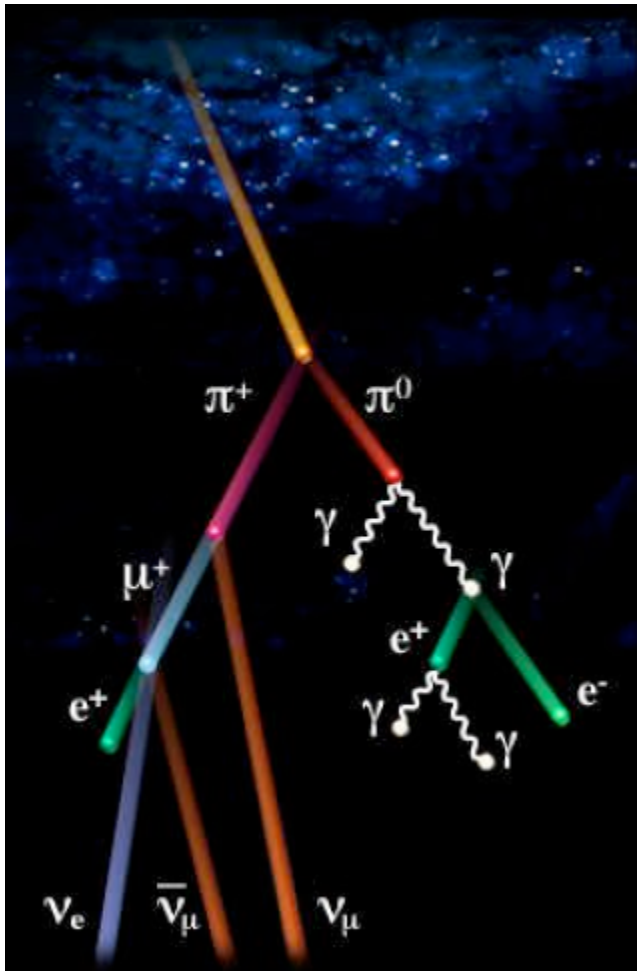
Muon lifetime measurement (3 teams)

Goal:
Muon lifetime measurement.

Method: muon and electron detection.

Material: liquid scintilators – NIM electronics – ISIPEAK/FASTER acquisition card.

Data analysis: ROOT tools.



Location: IPN Orsay
Supervisor: M. Bomben/C. Lachaud/M. Ridel

Cosmic Rays Study (1 team)

Goal:
Measure the angular distribution of muons at the surface of the Earth.

Method: muon detection.

Material: plastic scintilators – NIM electronics – ISIPEAK acquisition card.

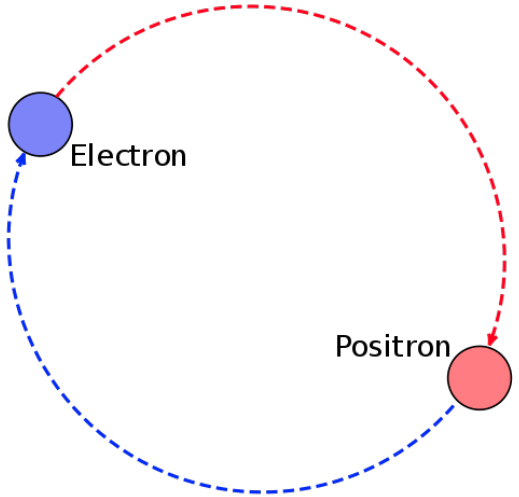
Data analysis: ROOT tools and Monte Carlo simulations and programming.

Better to have previous knowledge about MC simulation tools !

Location: IPN Orsay
Supervisor: M. Bomben

Positronium decay (1 team)

Goal:
Study the decay of different states of positronium: ortho and para positronium.



Method:
coincidence measurements.

Material:
NaI(Tl) detectors – NIM electronics – FASTER acquisition card.

Data analysis:
ROOT tools.

Location: IPN Orsay
Supervisor: J. Biteau

On the examination rules and more …

The aim of the laboratory work is to build one or more experiments using the available equipments to carry out a pre-defined physics measurement.

Five criteria are used in the final evaluation of the student laboratory work:

- autonomy and dynamism during the practical work (4 points)
- scientific interest for the subject (4 points)
- practical work logbook (2 points)
- the report (6 points)
- oral examination (10 minutes/team) (4 points)

You can find the template for the article here: http://npac.lal.in2p3.fr/1st-semester-lectures-1819/

The template SHOULD NOT be modified. Limited to 4 pages.

Important dates:

- ? September – free presentation of the subject by the students
- 11th October – send the report to the supervisor(s)
- 6th November – oral examination

Organisation informations (1/2)

The lecture on Security and Radioprotection is **mandatory** for French speaking students
(~15h30, today, DEA room)

TL choice – Tomorrow morning, from 10:00 to 11:30 (please read the TL booklet on the web)

Also:

- logbook presentation/distribution
- discussion about writing the report (more details last week of September)
- other informations …

Miscellaneous:

- TL : french or english for interaction with supervisors, for article (abstract in english)
- in case of absence : inform your direct supervisor
- library NPAC : code A5991
- if needed : IPN Library also
- don’t hesitate to speak with supervisors about the N/P/A choice

IPN internet access account

Each student has an IPN account (from 1 Sept 2019 to 1 July 2020):

- for login, see list in DEA classroom
- password: **$Achanger** (to be changed)

This is a professional account !!! Everything is checked, so DO NOT use illegal programs (even on your own laptops) !!!

Password choice – 3 out of the 4 following:

- capital letters
- small letters
- numbers
- non-alpha numerical characters (@,[, +…)

(avoid using AltGr + numerical keyboard upper row)

ATTENTION : French keyboard !!!!!