Radiation and reactor experiments

PHYS-451

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École polytechnique fédérale de Lausanne

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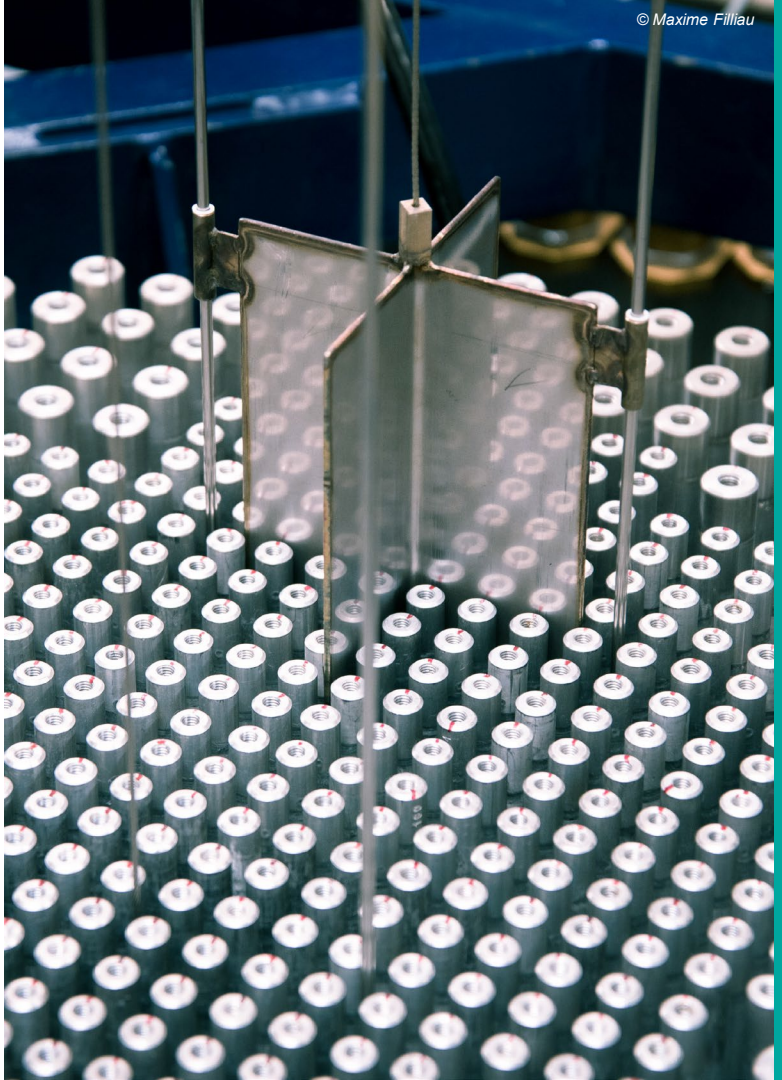

Content

- Organization
- List of experiments
- Experiment execution
- Controlled area rules
- Schedule
- Course evaluation
- A few advices for your reports

Organisation

Tuesdays
or
Wednesdays
8:15-12:00

4 groups of 2 or 3 per session

13 experiments

Organisation

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Wednesdays
8:15-12:00

Each week, one group, one experiment

6 groups of 2 or 3

Oral exam on last week

13 experiments

Groups merged on CROCUS

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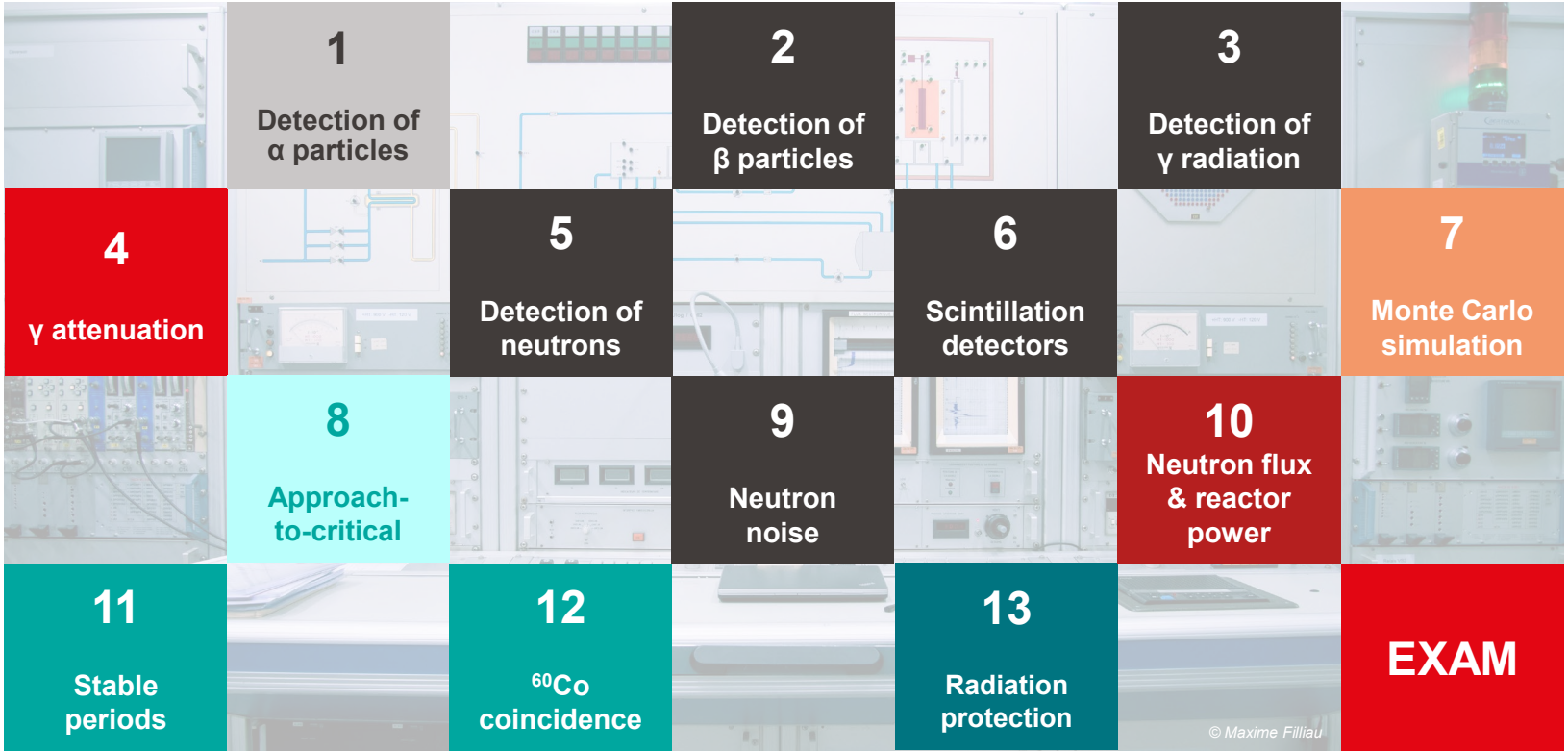
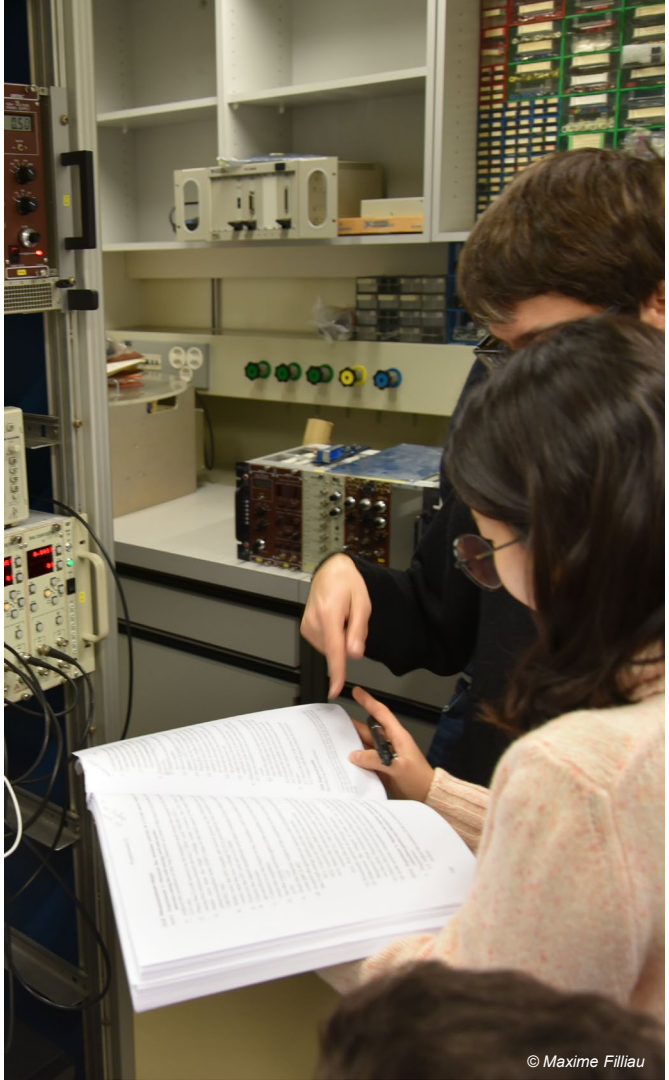
Experiments





Experiment execution

Before starting

- At home: Reading theory and description
- Assistant introducing the experiment

During the experiment

- After its introduction, starting the experiment
- Collecting data, and performing analysis
- Discussing the results with the assistant

After finishing

- Cleaning up the working area
- At home: Writing the report

Controlled area

- **Masks mandatory and provided**
- Access requires CAMIPRO badge
- One dosimeter per group at the entrance
- Dose to be recorded in logbook at the end; course responsible to be informed if > 1µSv
- Jackets and bags in the locker room
- No eating or drinking inside
- Inform course responsible for temporary exit

Radioprotection rules are available on Moodle

Group structure

Group	Students	First experiment
A	Rimoldi Emanuele Wälti Eric Lee Borkowicz Martyna Maria *(Soury François-Henri)*	1
B	Bellucci Alessandro De Martino Flavio Giovanni Garces Pauline	2
C	Chatwin Harry Peter Blain Vadim Mathieu Alciati Marco	3
D	Ronchi Giovanni Habri Younes Evraert Paul-Armand Serge	4
E	Torrente Bishal Reibel Mathieu Philippe Théo Swiatkowska Julia Janina	5
F	Monlon Andry Guillaume Jean-Marie Lobresco Francesco *(Baudier Sébastien)*	13

Preliminary schedule

Reactor experiments

Group	20.09	27.09	04.10	11.10	18.10	25.10	01.11
A	1	2	3	4	5	8	13
B	2	3	4	5	13	8	1
C	3	4	5	13	1	8	2
D	4	5	13	1	2	3	8
E	5	13	1	2	3	4	8
F	13	1	2	3	4	5	8

Group	08.11	15.11	22.11	29.11	06.12	13.12	20.12
A	10	6	11	7	9	12	**EXAM**
B	10	7	11	12	9	6	
C	10	12	11	6	9	7	
D	6	10	7	11	12	9	
E	7	10	12	11	6	9	
F	12	10	6	11	7	9	

Course evaluation

- *Criterion I: Score obtained for written report*
  - Written reports (**one per group**) to be uploaded, latest by Sunday/Monday evening (5 days after the lab took place)*
  - Will be returned graded the next day before the lab session on Tuesdays/ Wednesdays
  - Final score for Criterion I: average value of all such written-report grades (minus the worst one)

  ** Penalty on the report grade (-1 point) if not made available on Sunday/Monday 23:59*

- *Criterion II: Oral examination*
  - Each student to be examined orally on **20.12. 2023**
  - 20-minute question period, to evaluate general comprehension of important practical aspects of conducting nuclear reactor measurements.

Final grade for course: equally weighted, mean score obtained

Reports

Uploading of reports via ***Moodle*** by Sunday/Monday 23:59:59

- Format for file name: GRX-EY-day-month-year.pdf (X: group no.; Y: experiment no.)
- Concise: <10 pages
- Formatting at scientific publication level
  - Proof-read the report before submitting

Sample 2 proved to be a very weak beta minus emitter (it is probability a material artificially activated some time ago, exceeding its half life).

feeds another Counter input itself. The [illegible] Counter were used to calculate the activity according to equation 2. When [illegible] signals coming from the two amplifiers are recorded with delay 0 (supposing that the two gammas are basically emitted at the same time), in the coincidence mode the coincidences are measured. If the delay is increased, the true coincidences are lost and only the random delay is obtained. The model approximates only true coincidences and neglects the random ones.

Read yourself before you submit

  - Figure, Table captions exist and are correctly referenced in the text

Reporting results

- Always attach the raw measurements to the report when submitting on moodle
  - Table in Appendix
  - .tka file
- Measurement values reported without associated uncertainty are useless
  - An attempt to estimate the absolute or relative (specify!) uncertainty should always be made
  - One or two significant decimal digits are adequate for uncertainty (2 when the leading digit is 1 or 2)
- Pay attention to the number of significant digits
  - Related to the uncertainty of the measurement!

$y = 1.024$ V $u(y) = 0.028$ V

$y = 1.02$ V,

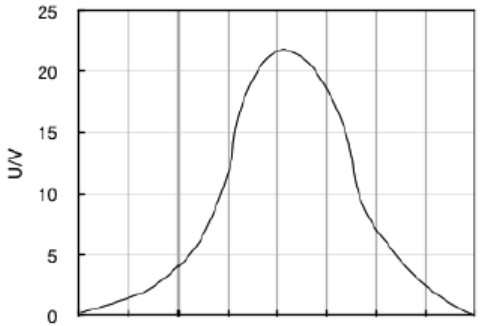
Water Level (mm)	cps (s^{-1})	σ_{cps}
910	21.23	0.19
920	27.1	0.2

Water Level (mm)	cps (s^{-1})	σ_{cps}
910	21.23	0.188
920	27.11	0.233

Too many digits both in the mean and unc. values

Figures

- *Axis labels!*
- *Add captions*



(b) *Amplifier output of detector 1.*

Reporting results

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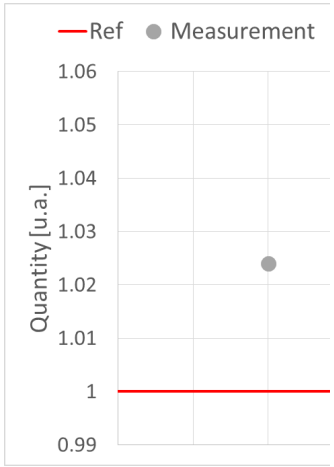
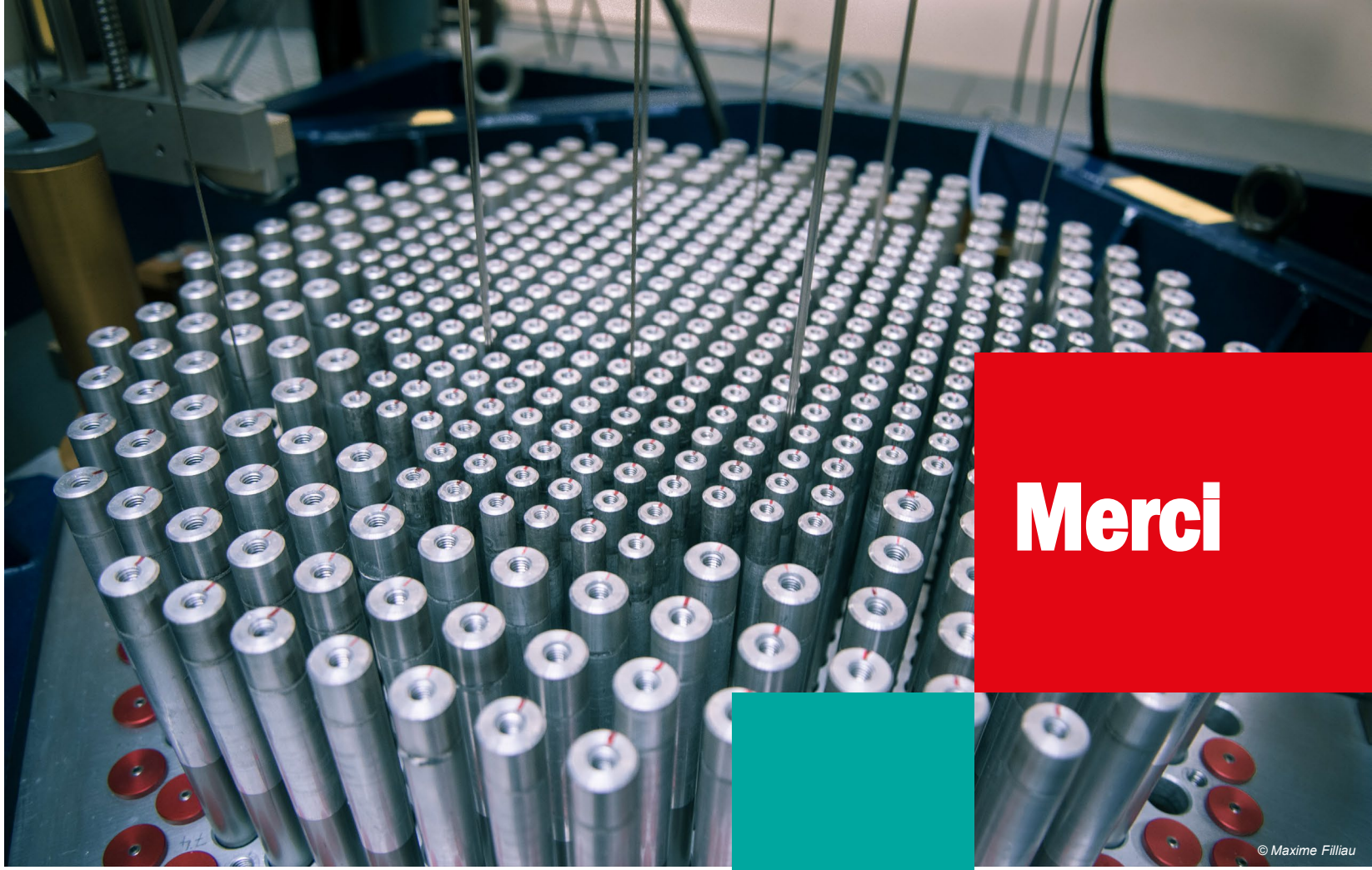
- Always conclude on a reported measurement
  - Compare to reference values



  - Good or bad agreement is decided by uncertainty!



Merci