

Exam:

- Exams Date: January 26th and 30th
- Room: MA A1 10
- Oral – 20 min (+5min to setup) without preparation. Closed book.
- Consists in a course related question and a short exercise
 - ✓ Random choice of 2 exam sheets, pick the sheet you like best

Example:**1. General Question**

Diffusion theory for monoenergetic neutrons

(Present the topic, clearly bringing out the principal physical phenomena involved.)

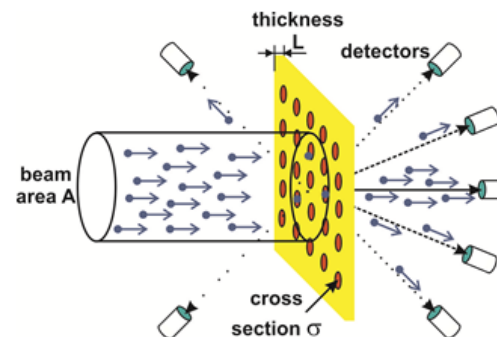
2. Exercise

A beam of 1 MeV neutrons, with an intensity I strikes a gold foil ($\approx 100\%$ ^{197}Ag , density ρ_{Au}). The thickness of the target is L . The beam has a cross-sectional area A . For 1 MeV neutrons, the total cross-section of ^{197}Ag is σ_t .

(a) What is the interaction rate of the neutrons with the target?

(b) What is the probability that a neutron will suffer a collision while traversing the target?

Assume that the decrease of beam intensity in traversing the target is negligible.



Monday 26.01.2026

Time	Name
9:00	Taylor Sande
9:25	Adonis Abbas
9:55	Maël Thoré
10:25	Sofia Ravetta
10:55	Luca Luberti
BREAK	
11:35	Christian Comunale
12:00	Caterina Ghelardi
12:25	Jordi Mitjà
12:50	Bettembourg Karim
LUNCH	
14:10	Marco Francesco Butti
14:35	Maya von Lilienfeld-Toal
15:00	Karim Assaf
15:25	Sebastian Bally
15:50	Maximilien Fay de Lestrac
16:15	Alessandro Leonardo Arnè
BREAK	
16:55	Wang Rui
17:20	Gioele Logrippo
17:45	Hadrien canches
18:10	Leonard Sandvoss

Friday 30.01.2026

Time	Name
9:00	Luke Brinkman
9:25	Solène de Montmollin
9:55	Roos Van der Linden
10:25	Névé Rion
10:55	Andràs Schilliger
BREAK	
11:35	Lorenzo Libeccio
12:00	Aloïs Millot
12:25	Carlo Veneziano
12:50	Martin Nicholson
LUNCH	
14:10	Filip Endlé
14:35	Filippo Pantano
15:00	Marius LE CHENADEC
15:25	Martin Perruchoud
15:50	Nicolas Albiani
16:15	
BREAK	
16:55	
17:20	
17:45	
18:10	

- Physics of the fission process: probability of interaction, fission products and delayed neutrons
- Neutron lifecycle in thermal and fast system. Use the six-factor formula to explain the key physical phenomena
- Neutron balance equation and diffusion approximation
- Diffusion theory in multiplying media for monoenergetic neutrons

- Multigroup theory diffusion theory and application to LWR reactor modelling
- Neutron slowing down via elastic scattering and implications for LWR reactors
- Energy and space self-shielding; impact for reactor design / operation

- Point reactor kinetics
- Role of delayed neutrons during normal reactor operation and accidents. Comments on reactivity feedbacks during accidents
- Short-term variations of reactivity in a power reactor (effects occurring within a time-scale of seconds to minutes) and their impact on safety
- Long-term reactivity variations in a power reactor and their impact on control system design
- Reactivity feedback in liquid metal cooled reactors

- Design of a (PWR/BWR) and its components
- Design of a Liquid metal Fast Reactor and its components
- Breeding and transmutation in nuclear reactors
- Design of Gas Cooled Reactors and their components
- Design of Channel type Reactors and their components

- Skip exercise (Mael)
- Two general questions:
 1. Role of delayed neutrons during normal reactor operation and accidents. Comments on reactivity feedbacks during accidents
 2. Design of a PWR and its components

- Skip exercise (Filip)
- Two general questions:
 1. Design of a Sodium Fast Reactor and its components
 2. Neutron slowing down via elastic scattering and implications for LWR reactors

- Skip exercise (Solène)
- Two general questions:
 1. Breeding and transmutation in nuclear reactors
 2. Neutron balance equation and diffusion approximation