

Session 5

1. Nuclear Reaction Rates

[Harms, Chapter 4, section 4.2, pp. 51-55]

[Harms, Chapter 5, pp. 72-82]

- concept of flux
- reaction rate equation
- microscopic σ and macroscopic cross Σ sections
- definition of a barn
- fission reactions
- fast and thermal neutrons

2. Neutrons in Reactors

[Harms, Chapter 5, pp. 82-89]

- fission power
- moderation of neutrons
- fundamental equation [Harms, equation 5.41]

3. Shielding & Radiation Calculations

[Harms, Chapter 4, pp. 55-68]

- Gray, Sievert, quality factor
- quantification of radiation sources
- activity
- alpha and beta particle shielding
- reactions of neutrons with matter
- reactions of gammas with matter
- attenuation coefficient and equation
- shielding by distance (inverse square law)
- attenuation of neutrons & gammas different
- neutron radiography example (turbine blades)
- industrial gauges