PH501 · Lecture 3 — Quiz Name: Date:

1. The cross section σ has dimensions of:

A. Energy (MeV)
B. Area (barn = 10^{-24} cm^2)
C. Momentum (MeV/c)
D. Dimensionless

2. The Rutherford $d\sigma/d\Omega$ diverges at $\theta \to 0$ because:

A. Nuclear force is infinite at origin
B. Coulomb is long-range; deflects at large b
C. Quantum tunnelling at small angles
D. Detector solid angle $\Delta\Omega \to 0$

3. DDX smooth hump at low outgoing energy indicates:

A. Direct (transfer) reaction
B. Elastic scattering
C. Compound (evaporation)
D. Coulomb excitation

4. The reaction cross section σ_R represents:

A. Elastic scattering only
B. Geometric area of nucleus
C. Flux removed into non-elastic channels
D. Rutherford cross section at 90°

5. Reciprocity is most useful when:

A. Both reactions have $Q > 0$
B. One nucleus is radioactive (no target)
C. Energy is below Coulomb barrier
D. The reaction is elastic

6. $d\sigma/d\Omega$ equals:

A. $f(\theta)$
B. $|f(\theta)|^2$
C. $f(\theta)^2$
D. $1/|f(\theta)|^2$

PH501 · Lecture 3 — Answer Key

Cross sections and reciprocity

Q1: B **Q2: B** **Q3: C** **Q4: C** **Q5:B** **Q6: B**

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