

STATE UNIVERSITY OF NEW YORK AT BUFFALO

Department of Mechanical and Aerospace Engineering

MAE 589 Diffraction, Microscopy and Spectroscopy Techniques

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Homework No. 8

1. Low energy ion scattering spectroscopy is performed with a scattering angle of 138° and incident ion energy of 600 eV.
 - (a). What is the atomic mass of the lightest element that can be detected if the probe ions are (i) ^{40}Ar , (ii) ^4He ?
 - (b). What is the difference in scattered ion energy between detected elements of atomic masses of 100 and 101 if the probe ions are (i) ^{40}Ar , (ii) ^4He ?
 - (c). What is the advantage and disadvantage of ^{40}Ar compared to ^4He as probe ions?

2. Derive the equation

$$k_M = \left[\frac{m \cos \theta + (M^2 - m^2 \sin^2 \theta)^{1/2}}{m + M} \right]^2$$

Simplify this equation for

- (a) $m = M$
- (b) $m \ll M$
- (c) $\theta = 90^\circ$