

# RUT - Rutherford Scattering

## Signature Sheet

Student's Name \_\_\_\_\_ Partner's Name \_\_\_\_\_

### Before the Lab

You must watch the Radiation Safety video, and get a Radiation Ring before you use the apparatus in this experiment. View the Rutherford video about this experiment online.

Ring # \_\_\_\_\_ Issued (Date and Signed) \_\_\_\_\_ Returned (Date and Signed) \_\_\_\_\_

### Suggested reading to start with (see the end of the manual for more):

1. 111B RUT Manual
2. A. C. Melissinos, "Experiments in Modern Physics", Academic Press, New York, 2003, the section on Rutherford Scattering.

### Pre-Lab Discussion Questions

It is your responsibility to discuss this lab with an instructor before your first day of your scheduled lab period. This signed sheet must be included as the first page of your report. Without it you will lose grade points. You should be prepared to discuss at least the following before you come to lab:

1. Describe Rutherford scattering. What particles are involved in our experiment, and what interaction causes the scattering?
2. Derive the Rutherford scattering formula. What assumptions have been made in this formula and how this system different from our experimental setup? Define or explain each of the terms in the formula. What is a solid angle and what is a scattering cross section? How is the cross section related to what you actually measure in the experiment?
3. Estimate how often multiple scattering is expected in our foil. What physical parameters control it?
4. The Rutherford formula diverges as  $\theta \rightarrow 0$ . Why does this divergence occur? Explain why our measured counts at small angles remain finite.
5. Why is it difficult to obtain data at large scattering angles, give the reason quantitatively.
6. When fitting data to determine the gold nuclear charge  $Z$ , how would you choose an angular fitting window?
7. What steps must you take to ensure the safety of yourself and the apparatus?

Staff Signature \_\_\_\_\_ Date \_\_\_\_\_

Completed before the first day of lab? (Circle one) Yes / No

**Mid-Lab Discussion Questions**

1. By day 4 you should have enough data to demonstrate the angular dependence of Rutherford scattering. Show it to an instructor and ask for a signature.

Staff Signature \_\_\_\_\_ Date \_\_\_\_\_

Completed by day 4 of lab? (Circle one) Yes / No

**Checkpoint Signatures**

1. PN Detector

Staff Signature \_\_\_\_\_

2. Vacuum System

Staff Signature \_\_\_\_\_

3. Signals

Staff Signature \_\_\_\_\_

4. Measurements

Staff Signature \_\_\_\_\_

5. Trial Run Analysis

Staff Signature \_\_\_\_\_

6. Spectrum

Staff Signature \_\_\_\_\_