

# Rutherford Scattering

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## Abstract

These experiments studies the Rutherford scattering of protons on atomic nuclei. Energetic 400 keV protons were generated using a Van de Graaff accelerator and directed onto thin metal foils of Au/C, LiF, B, and Al and the scattering cross section of the target atoms was measured as a function of the scattering angle in the range xx to 160 degrees. The cross section showed a clear angular dependency as ....., as expected. The thickness of the target layers Au/C were determined from the stopping power of the layers to be ..... The nuclear reactions of protons with boron were demonstrated by ... Mere is den dur bla bla bla ... In conclusion ...

paper, and to keep our discussion simple and relevant, we will only examine elastic collisions in the semi-classical regime, governed by the Sommerfeld critercriterion for classical scattering. (Paetz gen Schleck, 2014, p. 14)

This is usually fine for low energy physics, in which internal energies remain constant and no further particles are created or annihilated. For our experiment, which involves a single Van-de-Graaff accelerator with energies of the order of 400 keV, this will be a very fine approximation.

## 1 Introduction

Almost all of our knowledge in the field of nuclear and atomic physics has been discovered through scattering experiments, and the theory of scattering underpins one of the most ubiquitous tools in physics. Even more, in low energy physics, scattering phenomena provide the standard tool to explore solid state systems, and historically this was used as a first step towards our current understanding of the atom.

This paper examines the Rutherford scattering of a beam of 400 keV protons with a Au/C solid target. To limit the extend of the

## 2 Materials and Methods

### Experimental Setup

Using a single Van-de-Graaf accelerator (see fig. 3), the incident beam of protons was accelerated to 400 keV.

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Figure 1: something to do with setup1



Figure 3: something to do with setup1



Figure 2: something to do with setup1

### **3 Angular dependency of the Rutherford cross section**

### **4 Angular dependency of the proton energy**

### **5 Target dependency of the Rutherford cross section**

### **6 Thickness of the target layers**

### **7 Nuclear reactions of protons with boron**

### **8 Discussion**

### **9 Conclusion**

## References

- Krane, K. S. (1987). *Introduction to nuclear physics*. John Wiley & Sons.
- Paetz gen Schleck, H. (2014). *Nuclear reactions: An introduction*. Springer.