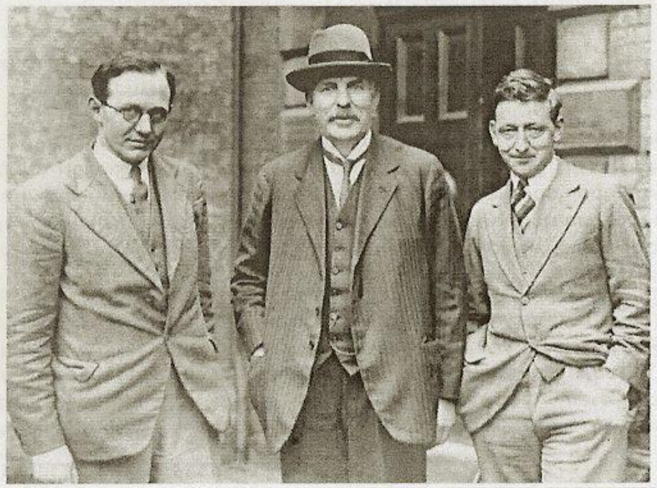


Ernest Rutherford, Hans Geiger and Ernest Marsden

What photo credit? Do you have legal permission to use these images? You need such for publication. ms.

Background

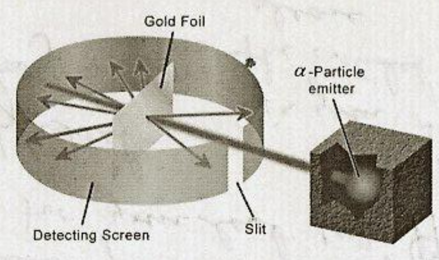
In 1911 Ernest Rutherford published the results that would change our view of the atom forever. Prior to his analysis of alpha particles incident on gold foil, the atom was thought of as a "plum pudding" in which electrons, the plums, resided in a pudding of positive charge. The experiments conducted starting in 1909 by Hans Geiger and Ernest Marsden, under the supervision of Ernest Rutherford, would disprove this model and create a newly accepted view of the structure of the atom.

cite maybe nobel laureate website?

In this famous experiment, commonly called the gold foil experiment, alpha particles (Helium +2 ions) were incident on a very thin sheet of gold foil. The expectation was that most of the alpha particles would have been deflected by a very small angle. What was found was quoted to be the equivalence of "as if you fired a fifteen-inch shell at a piece of tissue paper and it came back and hit you". What was found that was that most alpha particles passed right through the gold foil, however a small percentage of these alpha particles were reflected by angles up to 90 degrees. This led to the conclusion that since most particles passed right through; the atom was mostly empty space. The fact that some alpha particles went through a large deflection angle led to the conclusion that there was a very dense nucleus to the atom. The nucleus was also determined to be positive in charge as a result of this experiment.

invert these please

save the famous quote for after the physical description + attribute it please (Rutherford, I think?)



Gold Foil

Picture courtesy of: email them + notify them if you re-use please

http://www.dlt.ncssm.edu/TIGER/diagrams/structure/GoldFoilExperiment.jpg

The results of this experiment changed our views of the atom forever. This was not the end of this type of analysis however. This type of analysis is still used today. Information on the atomic scale can be gathered from analysis of the scattering of ions from the surface layers. Elemental composition as a function of depth can be obtained from this type of analysis. An example of such analysis would be looking at the penetration of rust into stainless steel. With Rutherford Backscattering Analysis we could determine the depth of rust penetration with a precision on the atomic scale (10^{-15} m). Additionally we could also determine the percentage of rust/stainless steel as a function of this depth.

Included in this paper is a link for a computer simulation of the Rutherford experiment. Finkelstein (2005) reflects on the benefits of the use of computer simulations in the classroom in his article (p. 8), *When learning about the real world is better done virtually: A study of substituting computer simulations for laboratory equipment.*