



TELIKILAAS
Lesson: HALFLIFE & SCATTERING
EXPERIMENT
Subject: PHYSICS

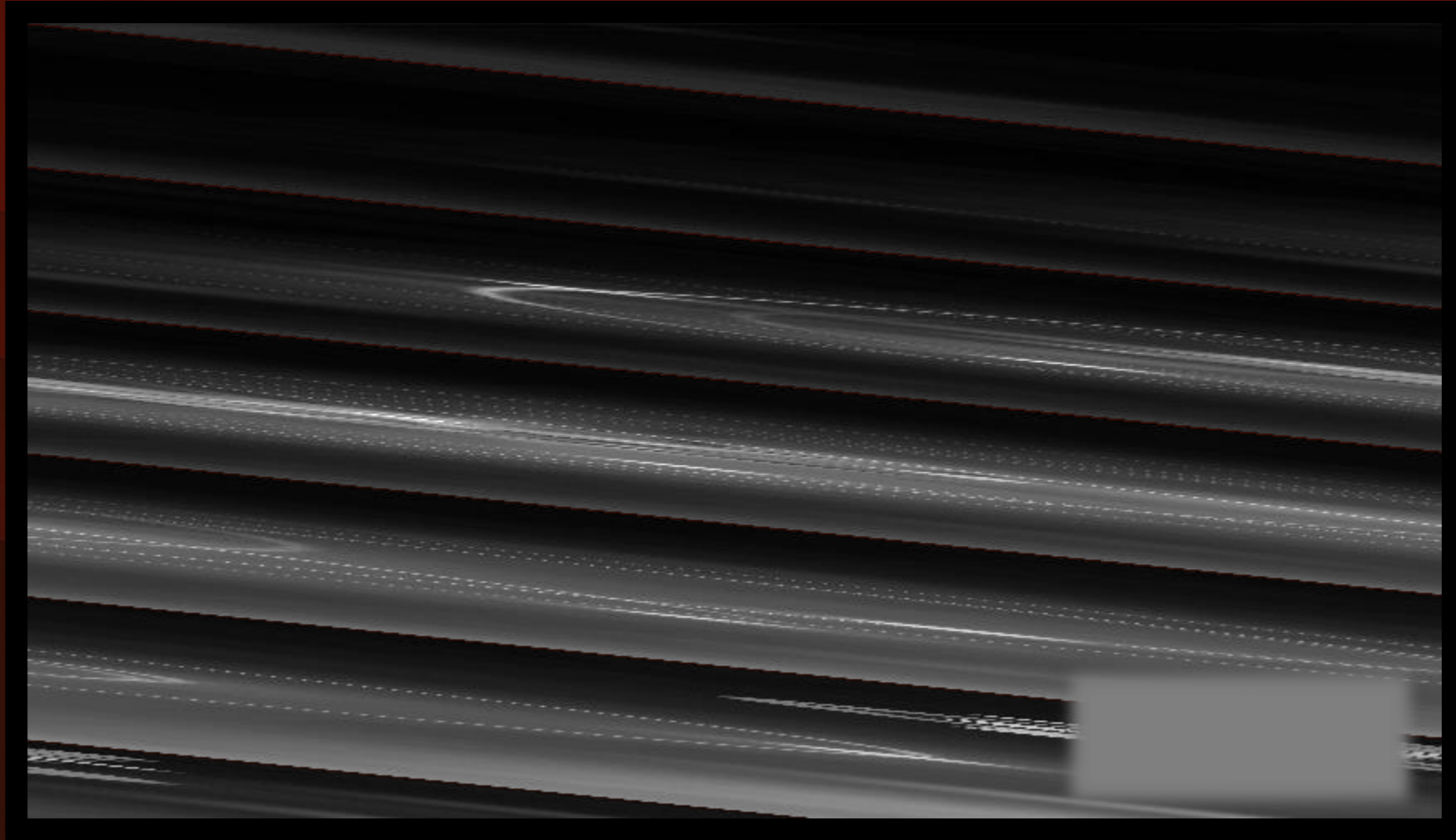
Department of Physics
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Objectives

- Use the term half-life in simple calculations
- Calculate half-life from data or decay curves
- Describe the structure of the atom in terms of positive nucleus and negative electrons.
- Describe how the scattering of α particles by thin metal foils.



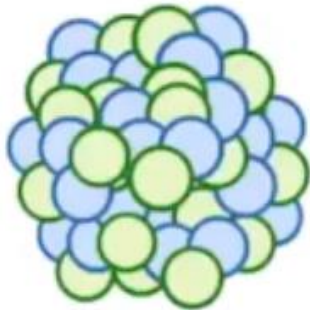
Atoms



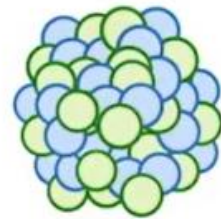
PHYSICS - GRADE 10 - HALF-LIFE & SCATTERING EXPERIMENT



Unstable Nucleus



(UNSTABLE ISOTOPES)



In simple terms....

Activity

of disintegrations taking place in a second

Or

of radiations that are emitted in a second

Half-Life

Time taken for the activity to reduce to half from its initial value

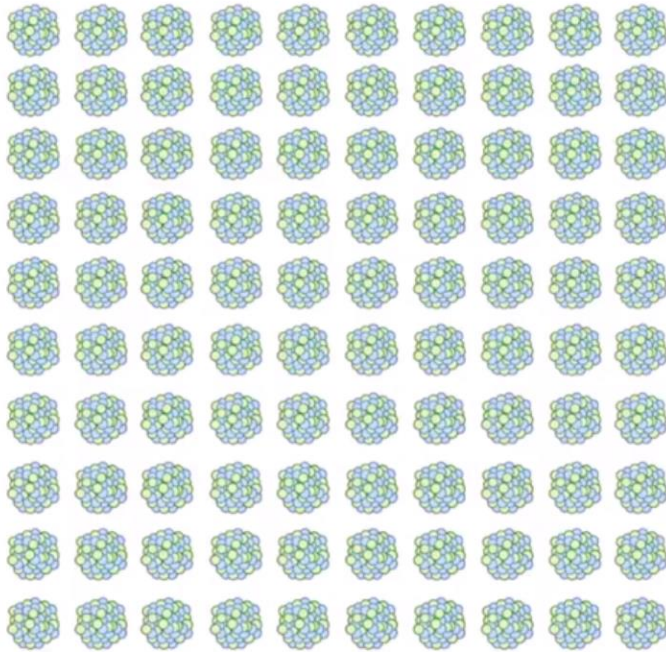
Initial activity is 2000 \rightarrow 1000

Time taken for the number of radioactive nuclei to half from its initial value

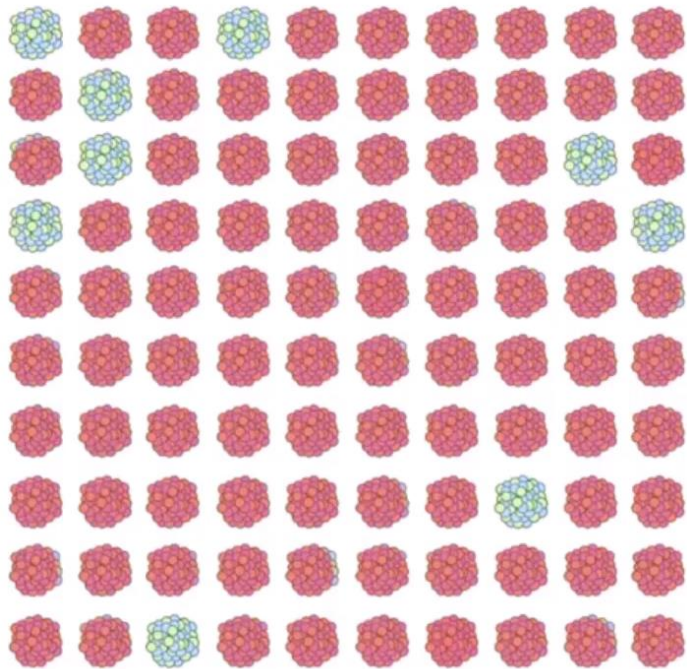
Initial nuclei is 1,000,000 \rightarrow 500,000



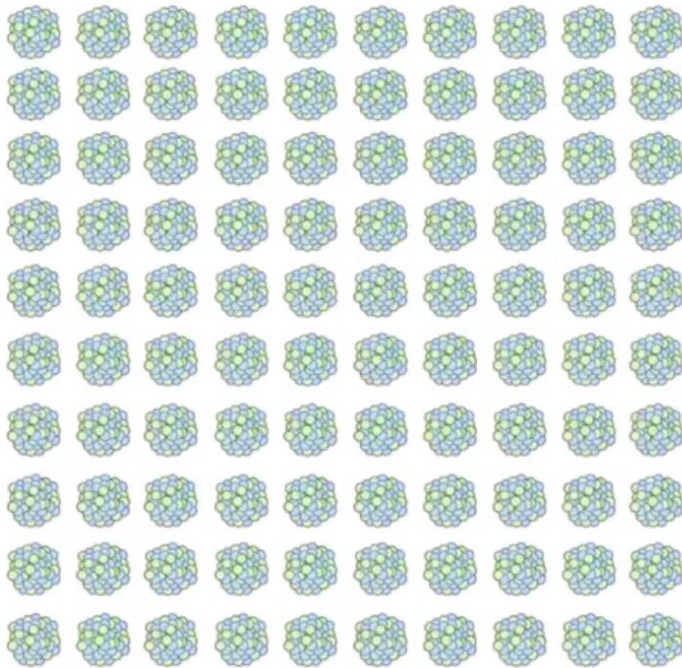
Half Life



Decay Curve



Decay Curve



Half-life Calculations

A reading is taken every 10 minutes of the number of emissions per second from a radioactive source. The table shows the readings.

time/min	number of emissions per second
0	800
10	560
20	400
30	280
40	200
50	140
60	100

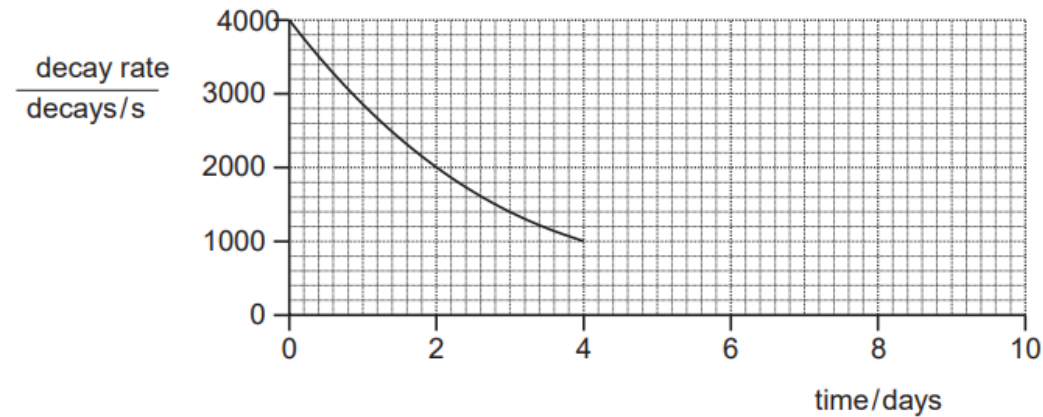
What is the half-life of the source?

- A 10min B 20min C 40min D 60min



Half-life Calculations

The graph shows how the decay rate of a radioactive source changes with time.



What will be the decay rate at 8 days?

- A. 0 decays/s
- B. 125 decays/s
- C. 250 decays/s
- D. 500 decays/s



Half-life Calculations

A radioactive source produces a count rate on a detector of 1600 counts/s.
After 32 hours the count rate has fallen to 100 counts/s.

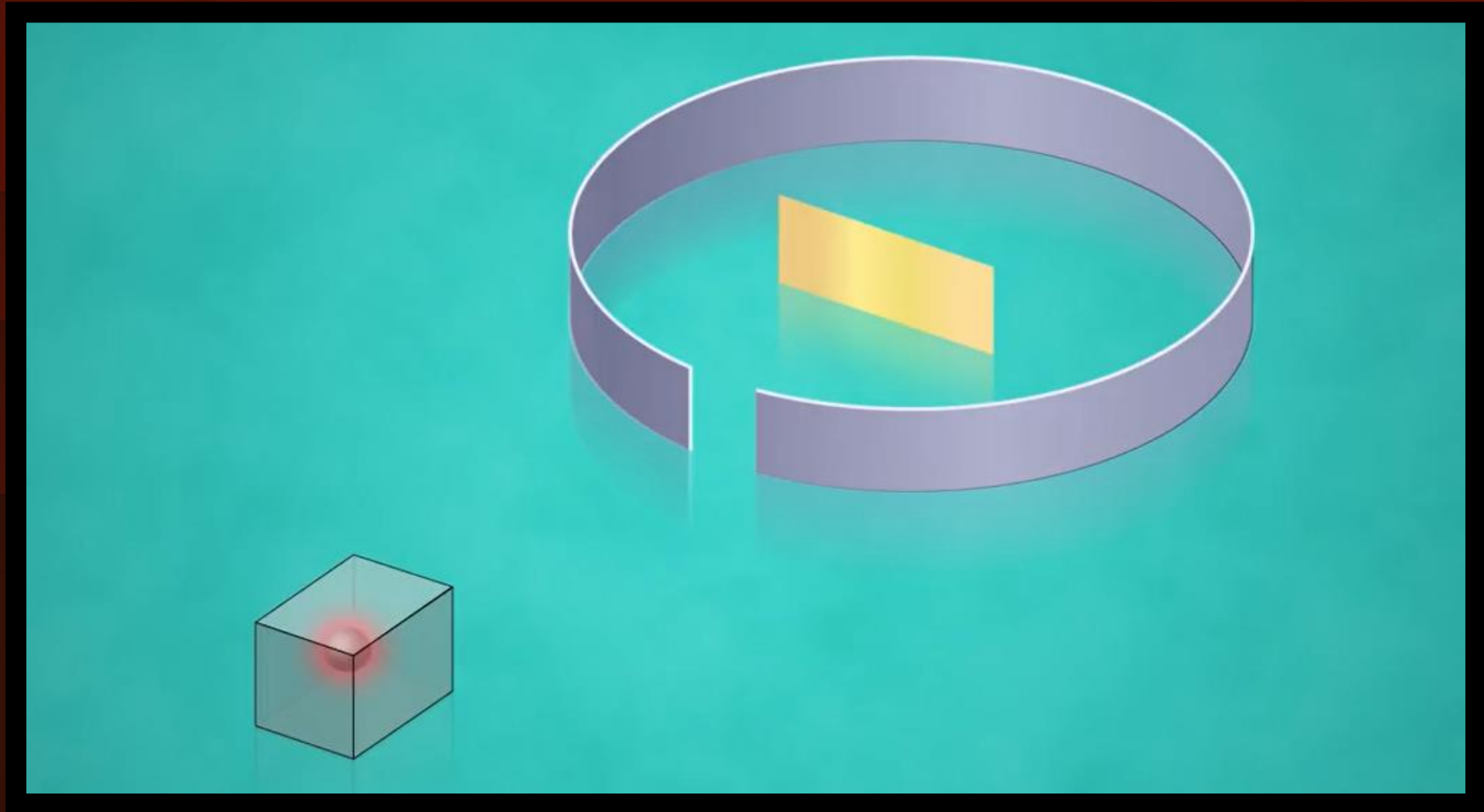
Both count rates have been corrected for background radiation.

What is the half-life of the source?

- A 2.0 hours B 6.4 hours C 8.0 hours D 16 hours



α Particle Scattering Experiment

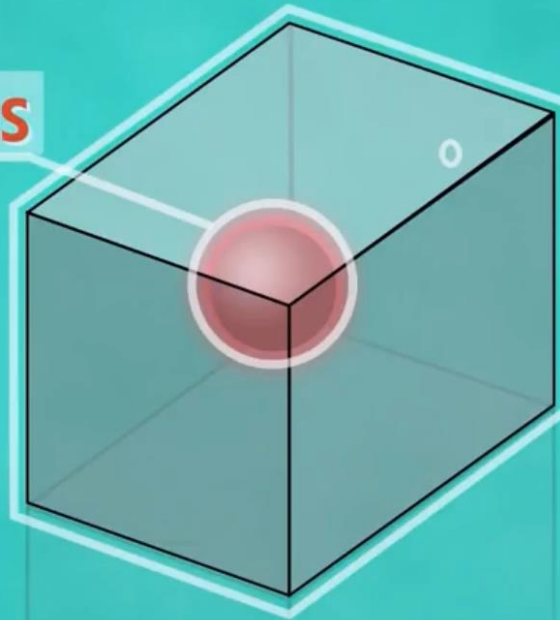


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α Particle Scattering Experiment

Source of
Alpha particles

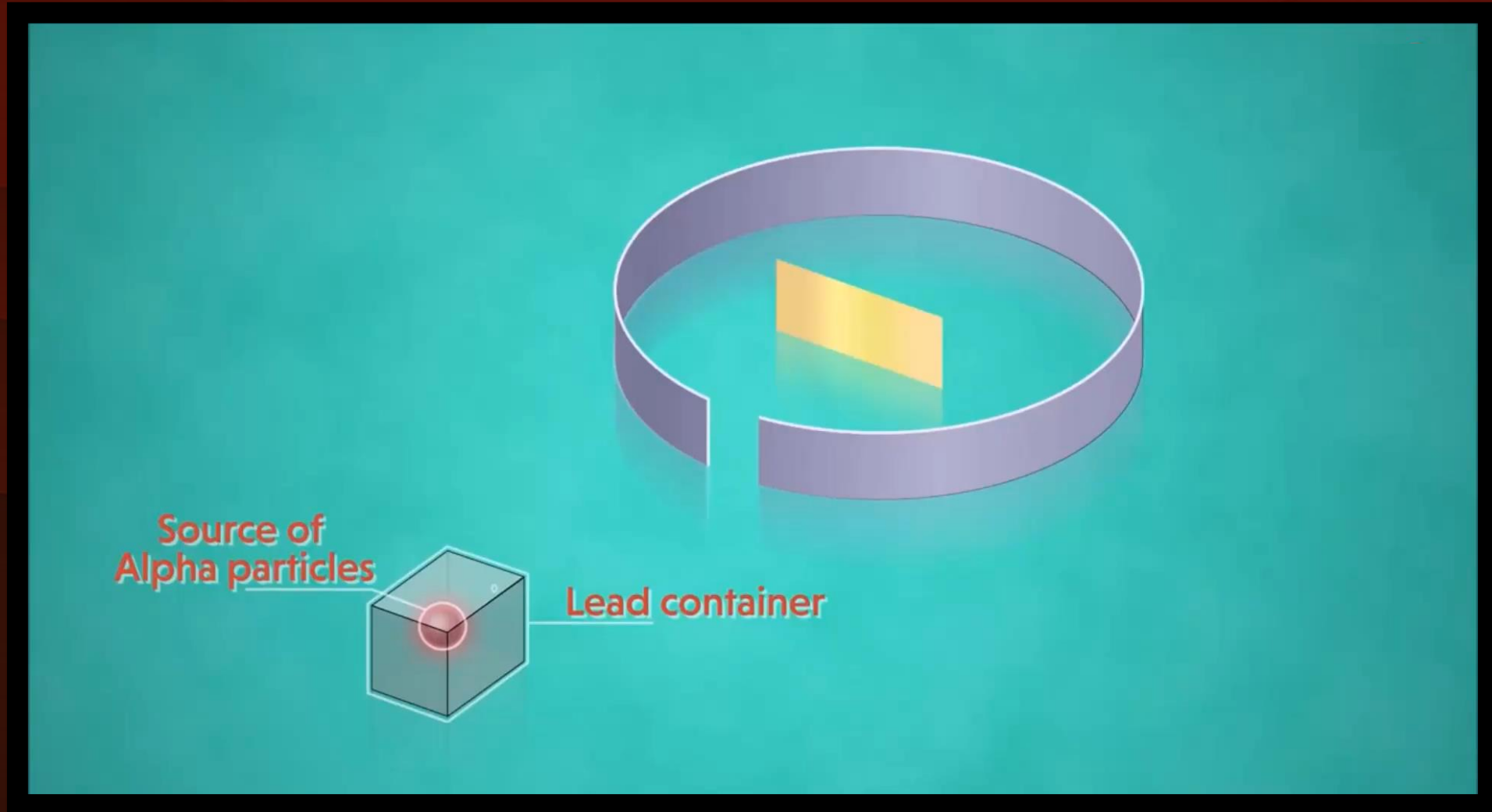


Lead container

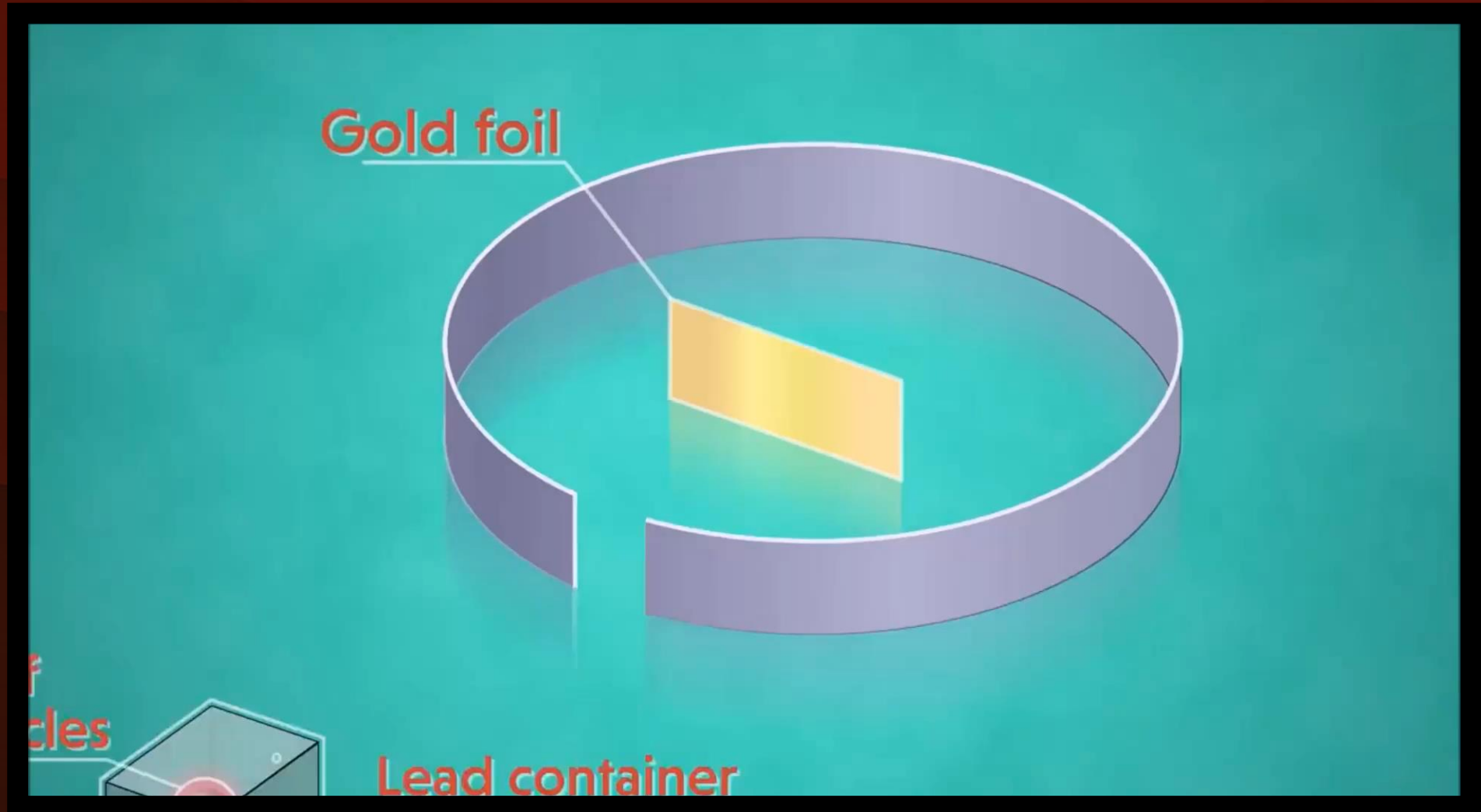
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α Particle Scattering Experiment



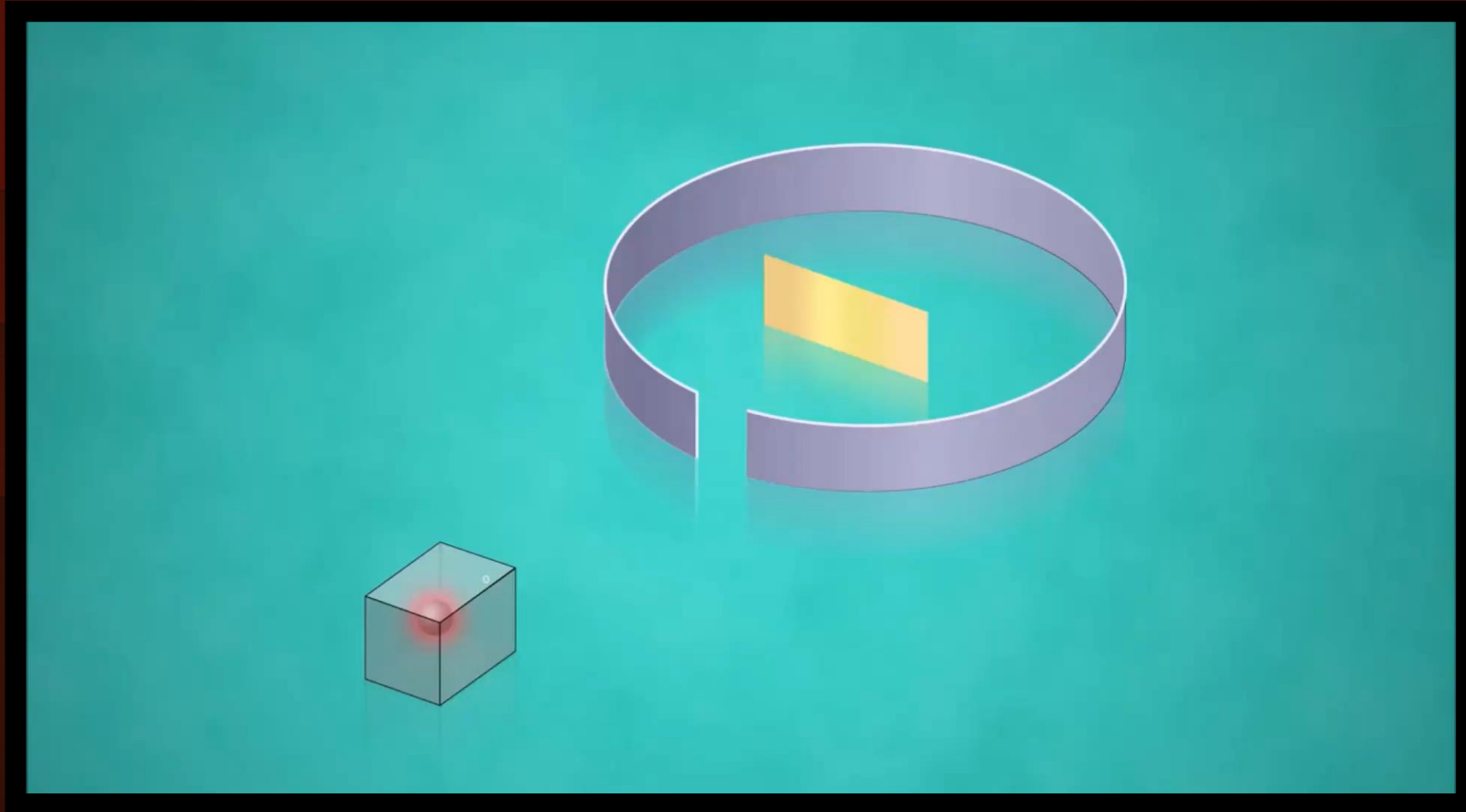
α Particle Scattering Experiment



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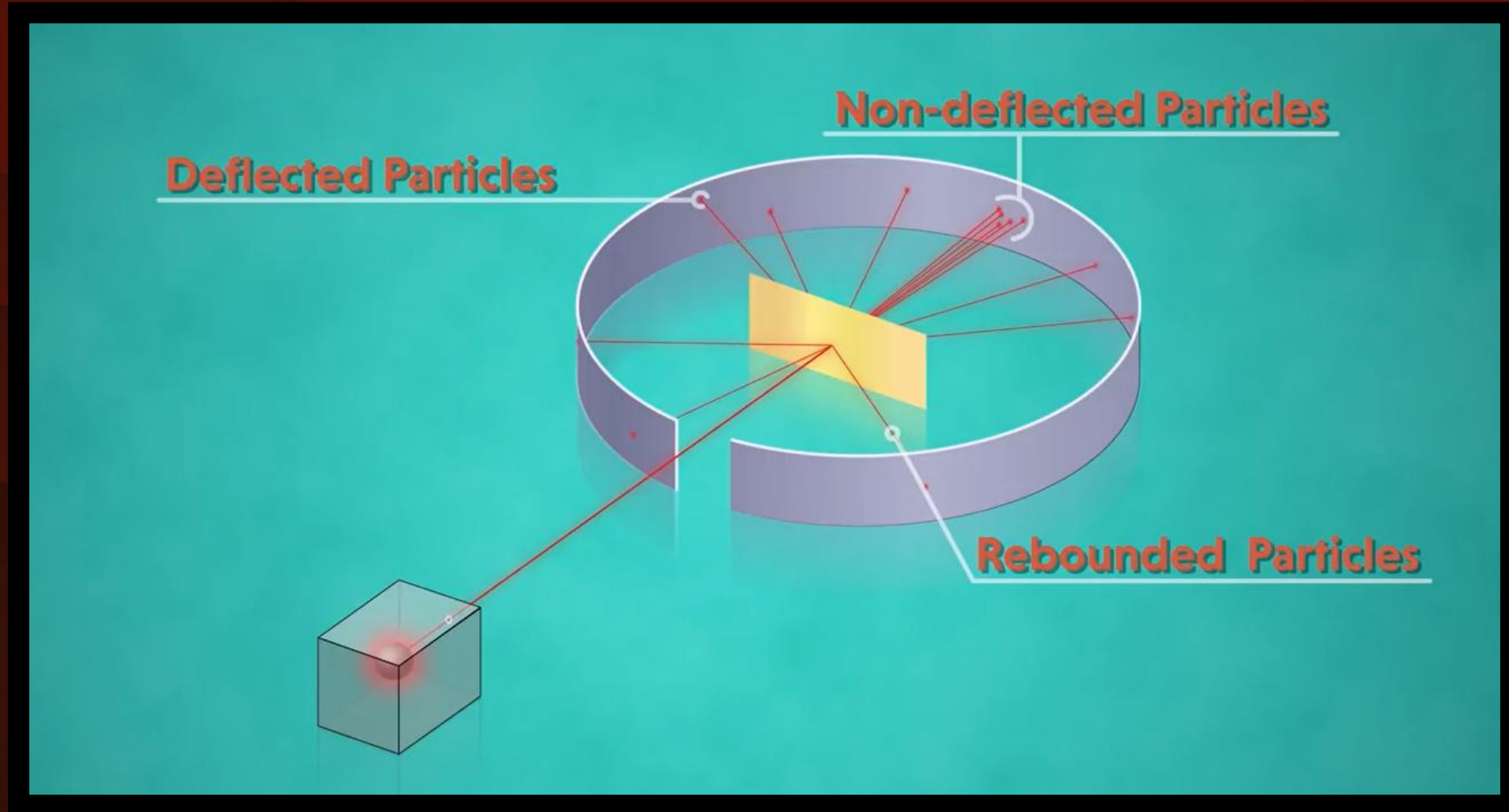
α Particle Scattering Experiment



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α Particle Scattering Experiment



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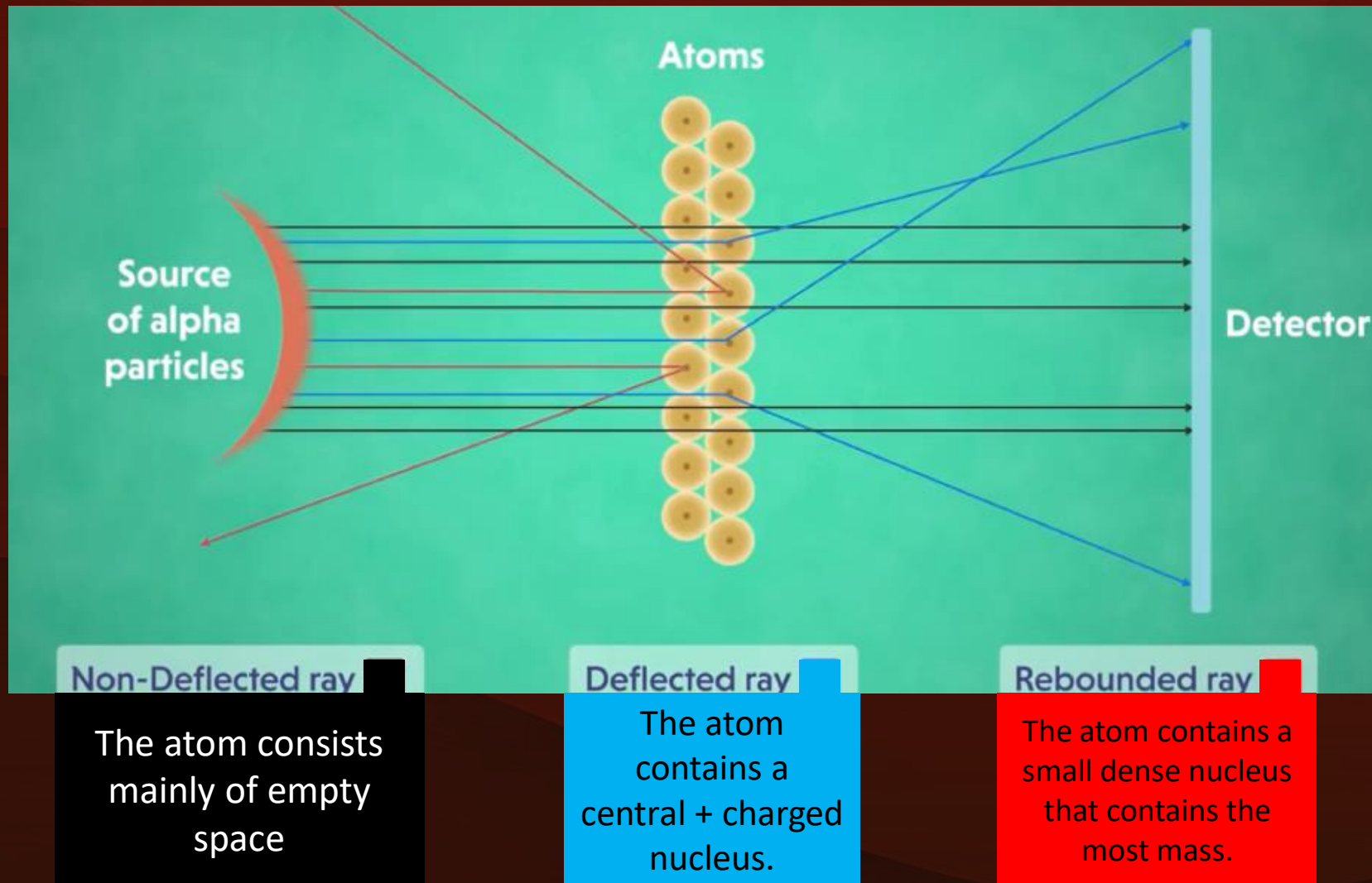
α Particle Scattering Experiment



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Conclusions



Summary

- Use the term half-life in simple calculations
- Calculate half-life from data or decay curves
- Describe the structure of the atom in terms of positive nucleus and negative electrons.
- Describe how the scattering of alpha particles by thin metal foils provide evidence for nuclear atom



Reference

- https://www.youtube.com/watch?v=B-k_kMwB1zM
- <https://www.youtube.com/watch?v=PlsWy2q0hVc>
- <https://www.youtube.com/watch?v=1EdTw4l6L0U&t=145s>
- <https://www.youtube.com/watch?v=zXw2cOSBB8E&t=191s>





Thankyou