Quantum Mechanics
Physics 237

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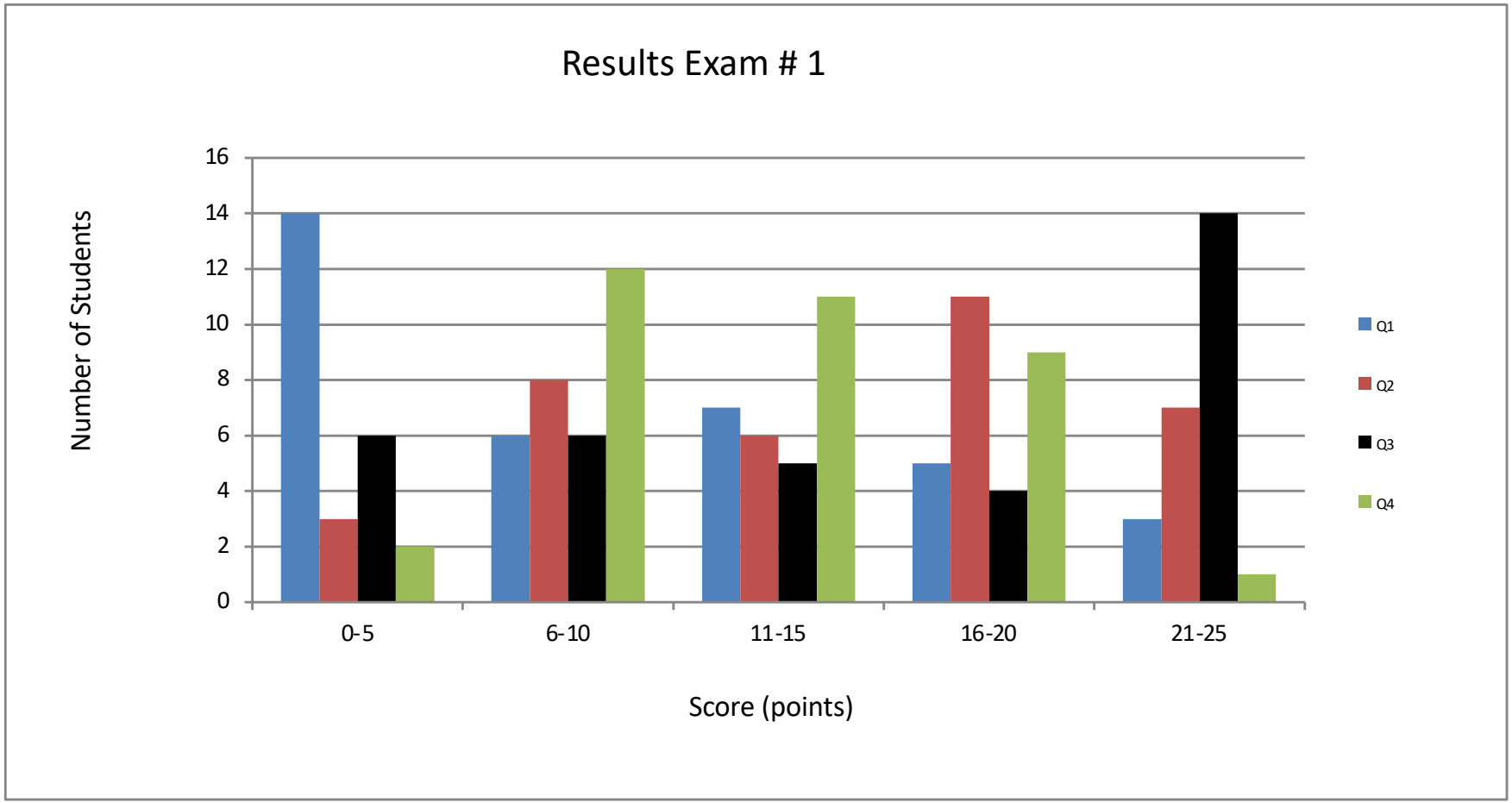
Results Exam # 1



Results Exam # 1

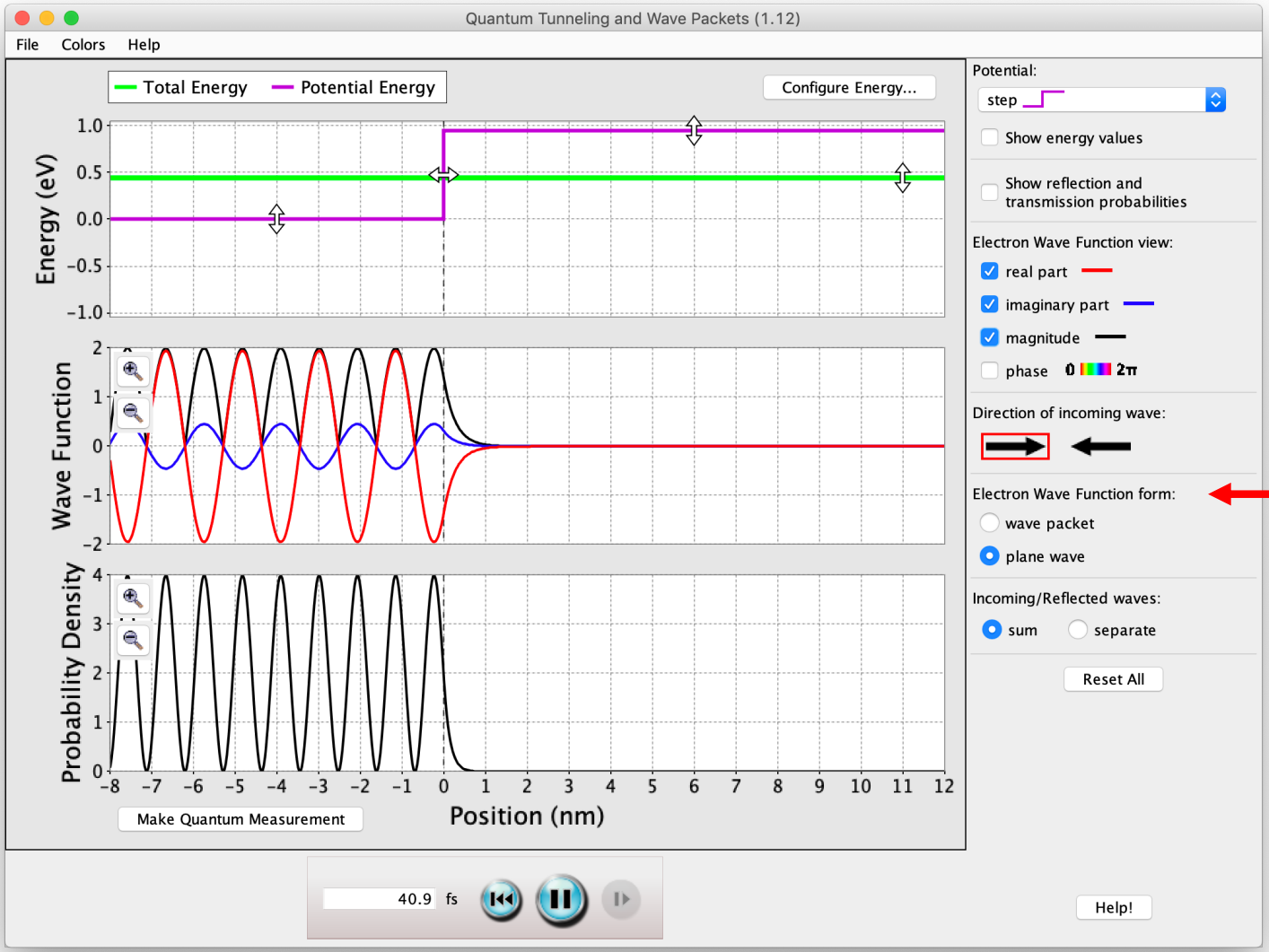
- Q1 (9.5): note my words last week on Tuesday (slide 4):
  - "Make sure you pay attention to the correspondence principle discussed in Section 4.11. This makes an important connection between the classical world (large n) and the quantum world (small n)."
- Q2 (14.7): homework set # 3, problem 5.
- Q3 (15.7): Compton scattering: related to homework set # 2, problem 3.
- Q4 (11.7): A mixture of topics.

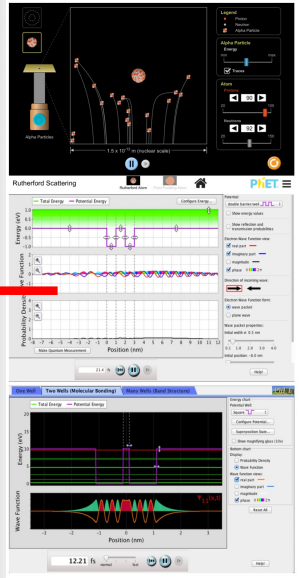
Results Exam # 1

- My experience with this course has been that the first exam is considered the hardest exam since it covers so many different topics.
- No matter your grade on Exam # 1, you can still earn an A in this course. But you may need to adjust how you study and prepare for Exam # 2.
- Look at the solutions of Exam # 1 and understand where you lost points.
- If you feel that you deserve more points on certain questions, after comparing your solutions to the official solutions that will be posted on Monday, you need to return your exam to me with a note describing why you feel you deserve more points. You have until 2/24 to make such a request. Your TAs cannot change your exam grade.

Breakfast with a view.
8/20/2021, 9 am, Schiphol.

Interactions with a potential barrier. Visualizing the solutions.



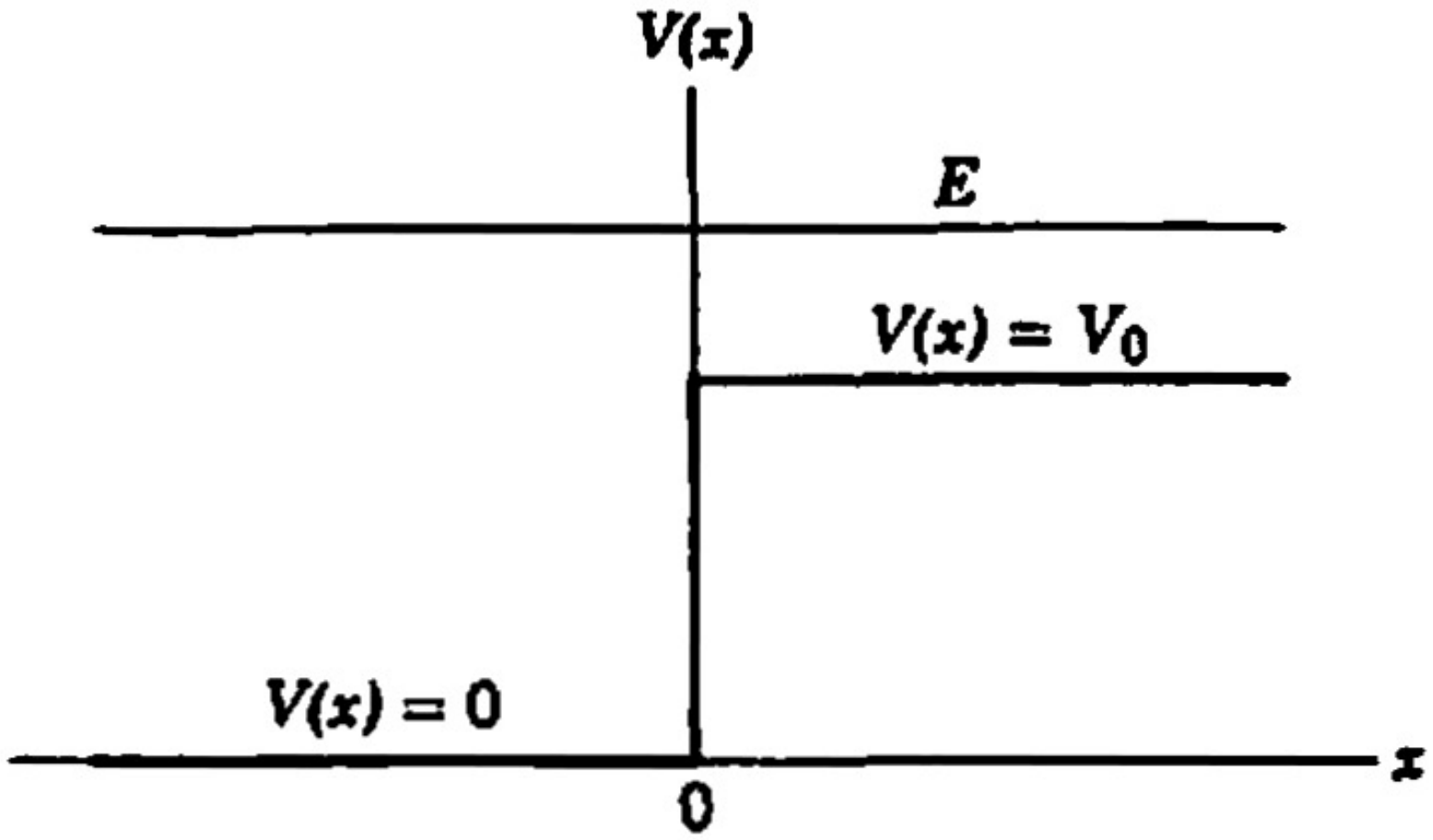


How did Rutherford figure out the structure of the atomic nucleus without looking at it? Simulate the famous experiment in which he disproved the Plum Pudding model of the atom by observing alpha particles bouncing off atoms and determining that they must have a small core.

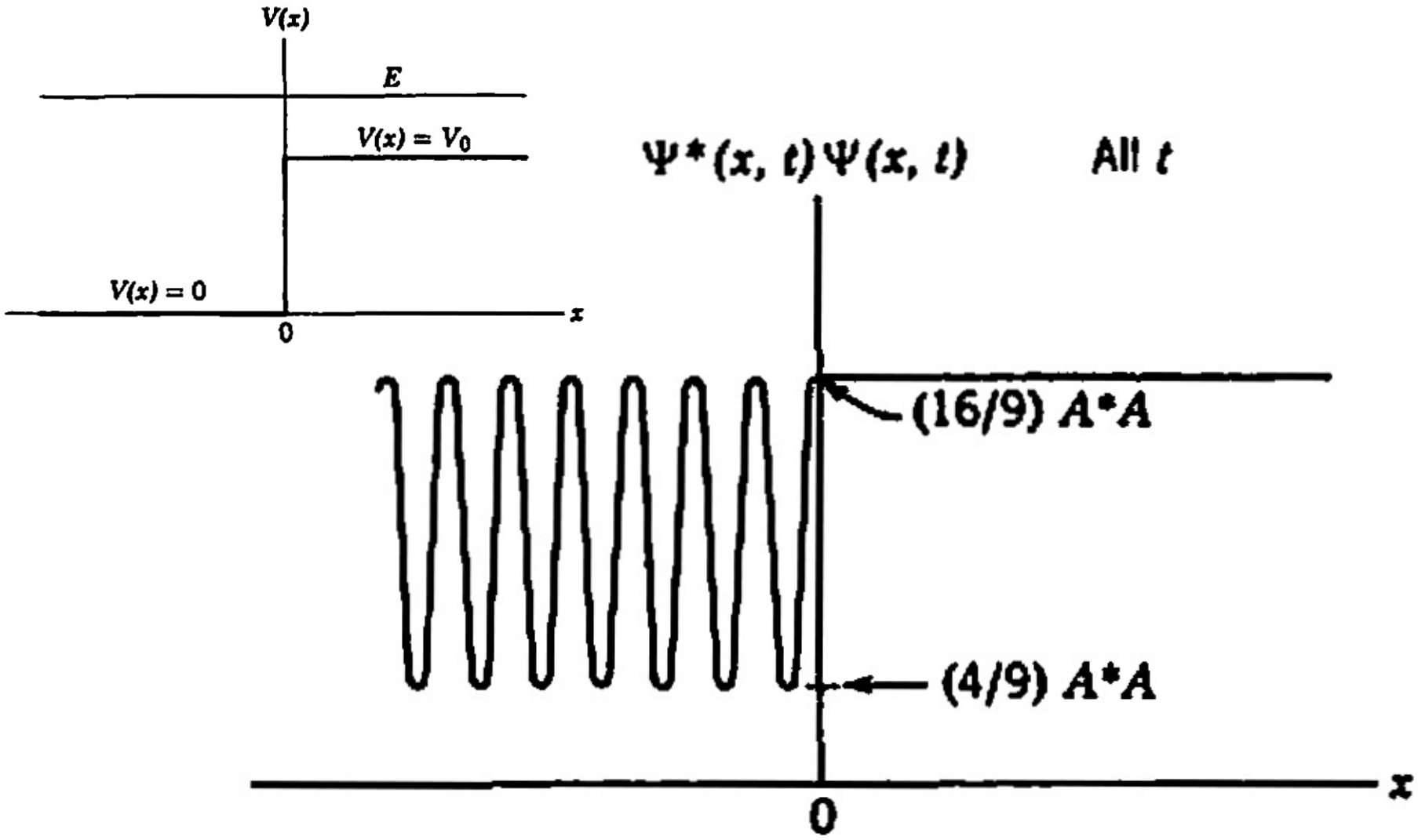
Watch quantum "particles" tunnel through barriers. Explore the properties of the wave functions that describe these particles.

Explore the properties of quantum "particles" bound in potential wells. See how the wave functions and probability densities that describe them evolve (or don't) over time.

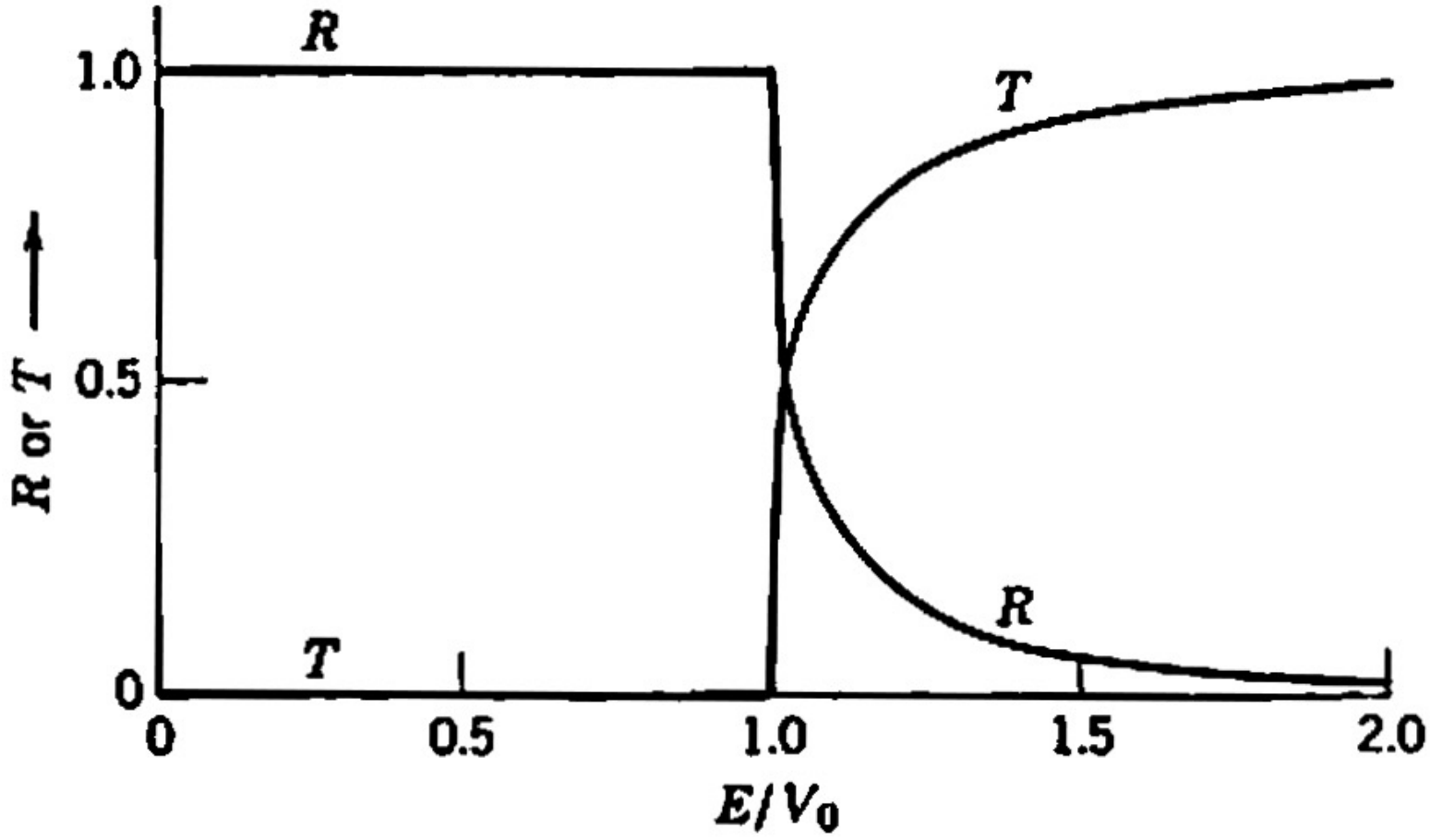
Crossing the step function.



Crossing the step function.
The wavefunction.



Reflection and transmission coefficients.

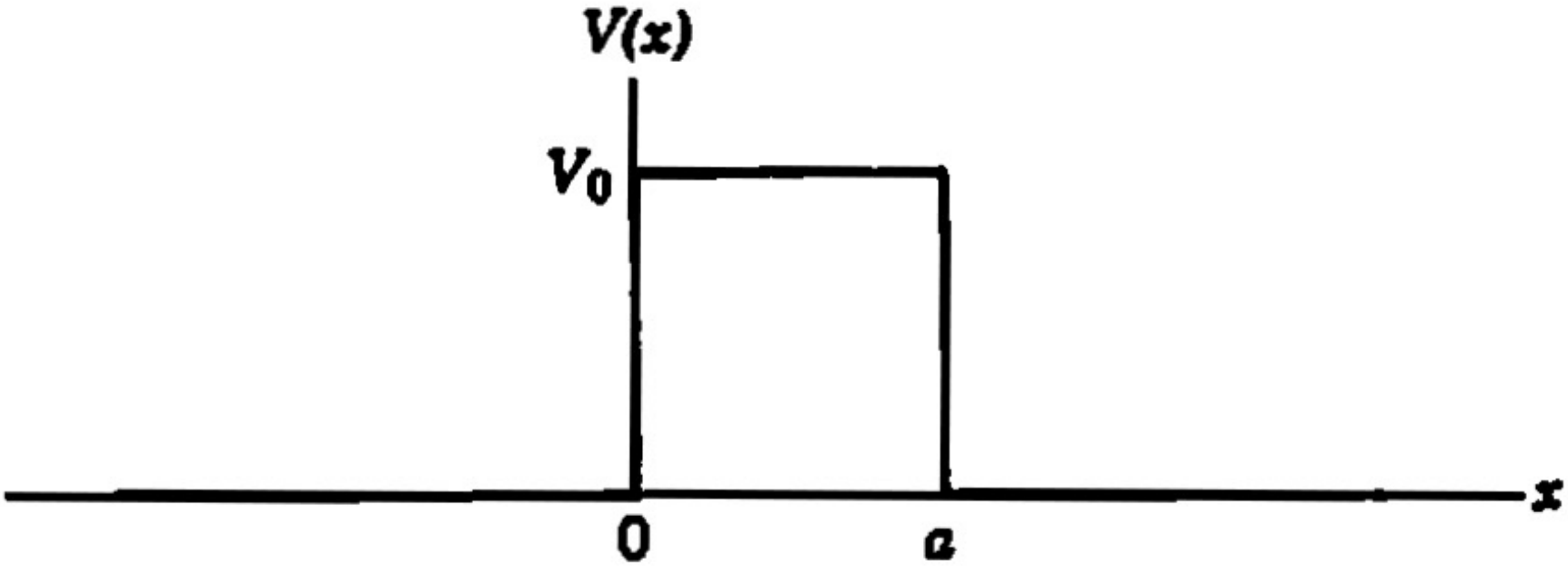


4 Minute 01 Second Intermission.

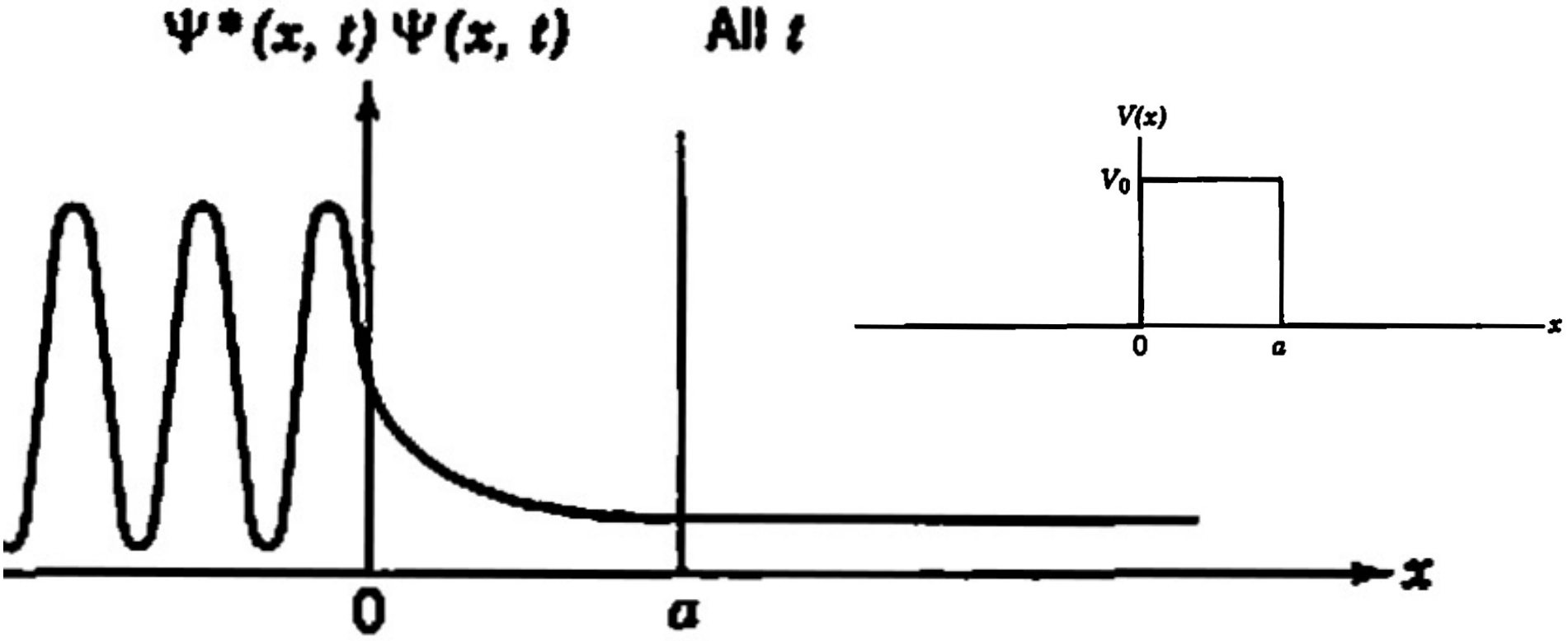
- Since paying attention for 1 hour and 15 minutes is hard when the topic is physics, let's take a 4 minute 01 second intermission.

- You can:
  - Stretch out.
  - Talk to your neighbors.
  - Ask me a quick question.
  - Enjoy the fantastic music.

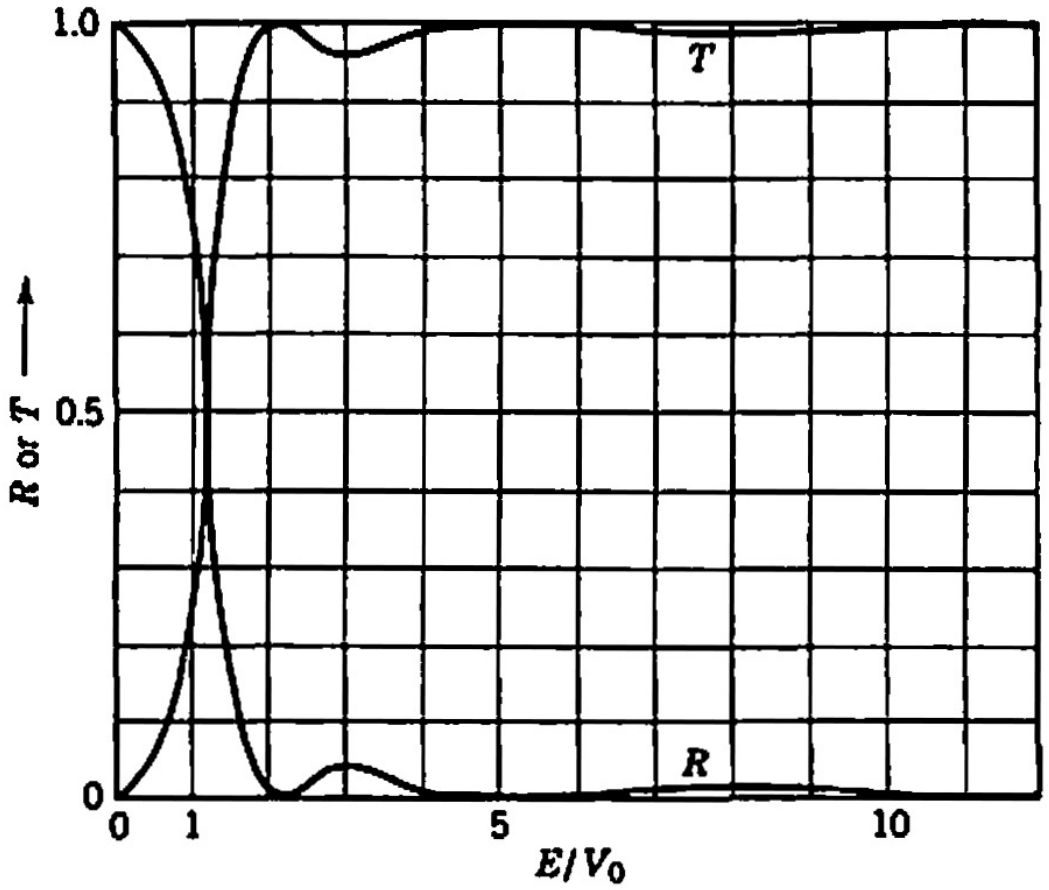
Potential barrier.



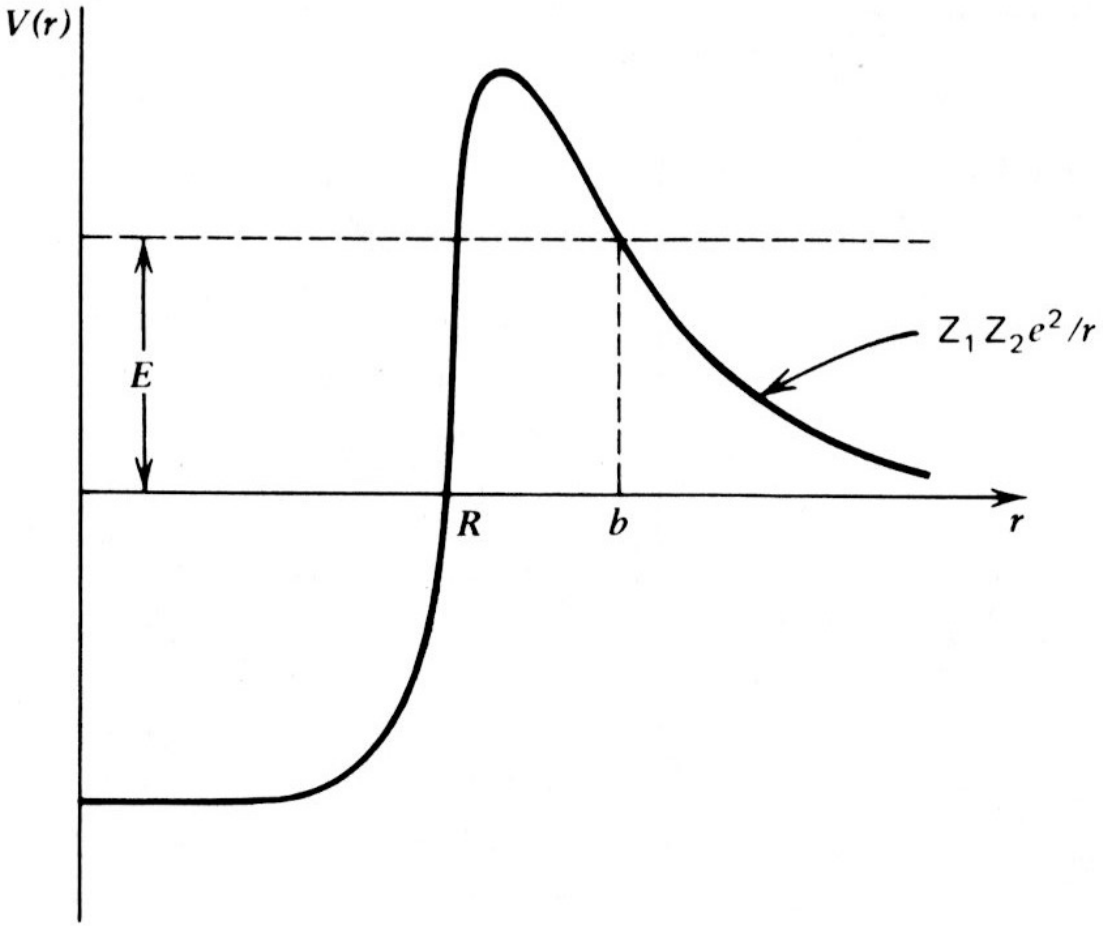
The wavefunction.



Transmission and reflection.



Alpha Decay



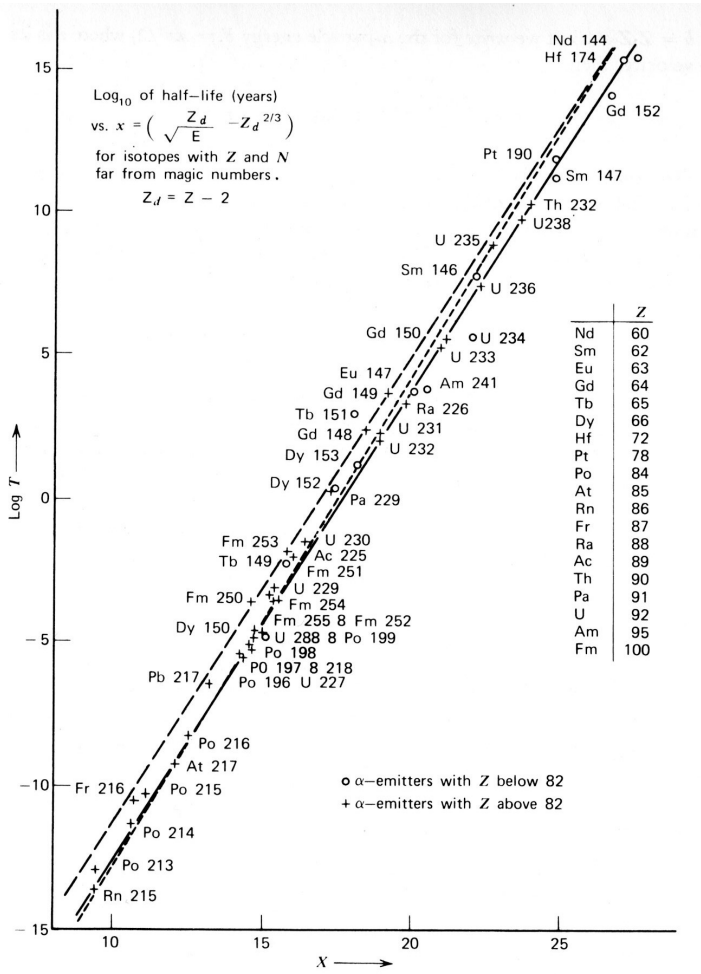
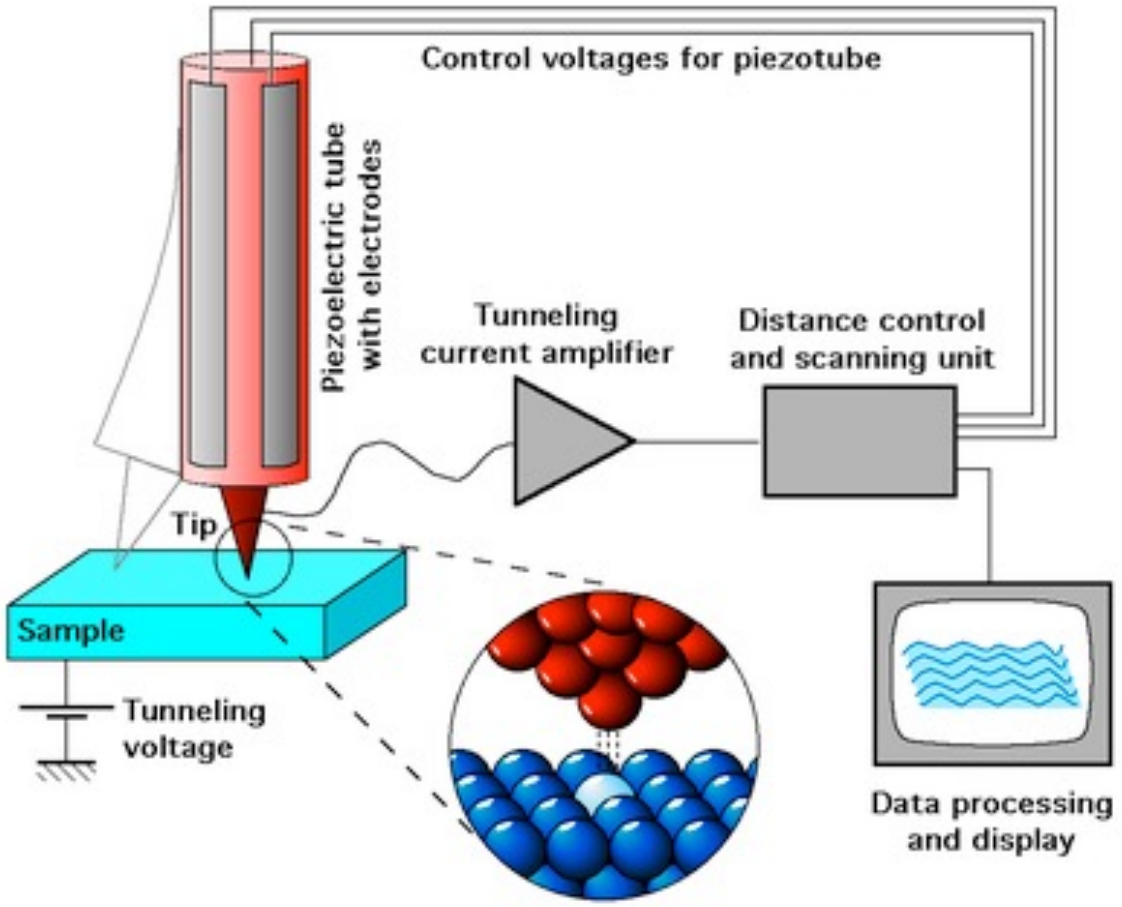


Fig. 5-13. Plot of $\log_{10} 1/\tau$ versus $C_2 - C_1 Z_1/\sqrt{E}$ with $C_1 = 1.61$ and a slowly varying $C_2 = 28.9 + 1.6\, Z_1^{2/3}$. (From E. K. Hyde, I. Perlman and G. T. Seaborg, *The Nuclear Properties of the Heavy Elements*, Vol. 1, Prentice-Hall, Inc. (1964), reprinted by permission.)

Scanning Tunneling Microscope.



http://www.absoluteastronomy.com/topics/Scanning_tunneling_microscope

ENOUGH FOR TODAY?