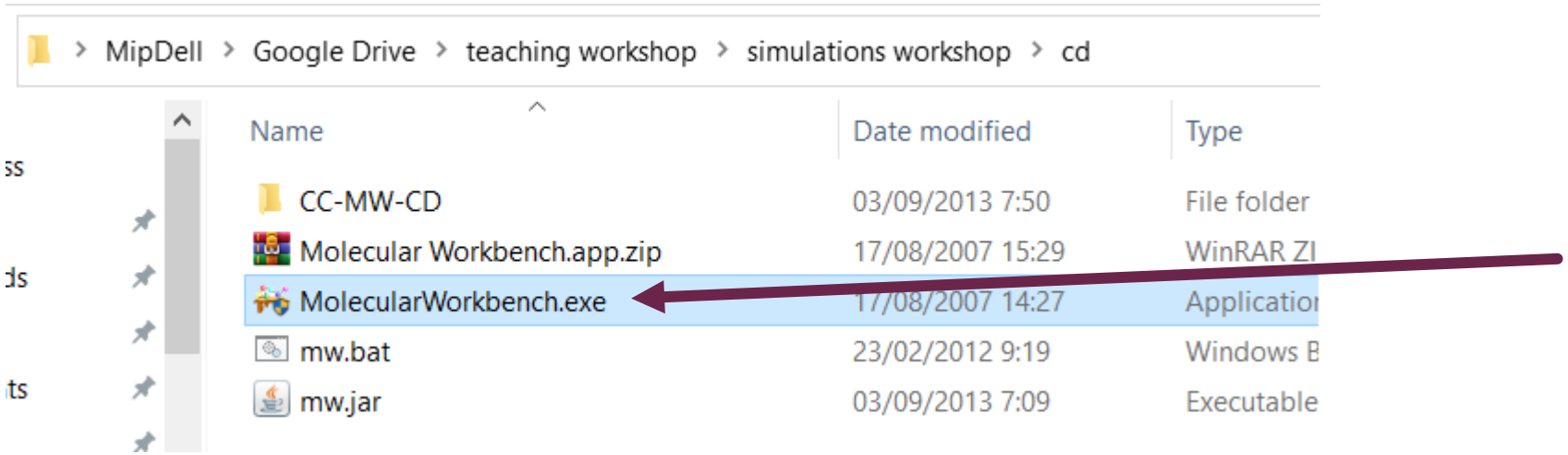
הפעלת תכנת MOLECULAR WORKBENCH

התקנה התכנה

- יש להוריד את התכנה מהלינק הבא http://mw.concord.org/modeler/cd.zip
- לאחר הורדת התוכנה יש לפתוח את הקובץ המכווץ באמצעות תכנה יעודית (דוגמת 7zip, winrar וכו...) לתיקיה במיקום ידוע, שם היא תשמר.
- על מנת להפעיל את התוכנה יש להכנס לתיקיה וללחוץ לחיצה כפולה על molecularworkbench.exe

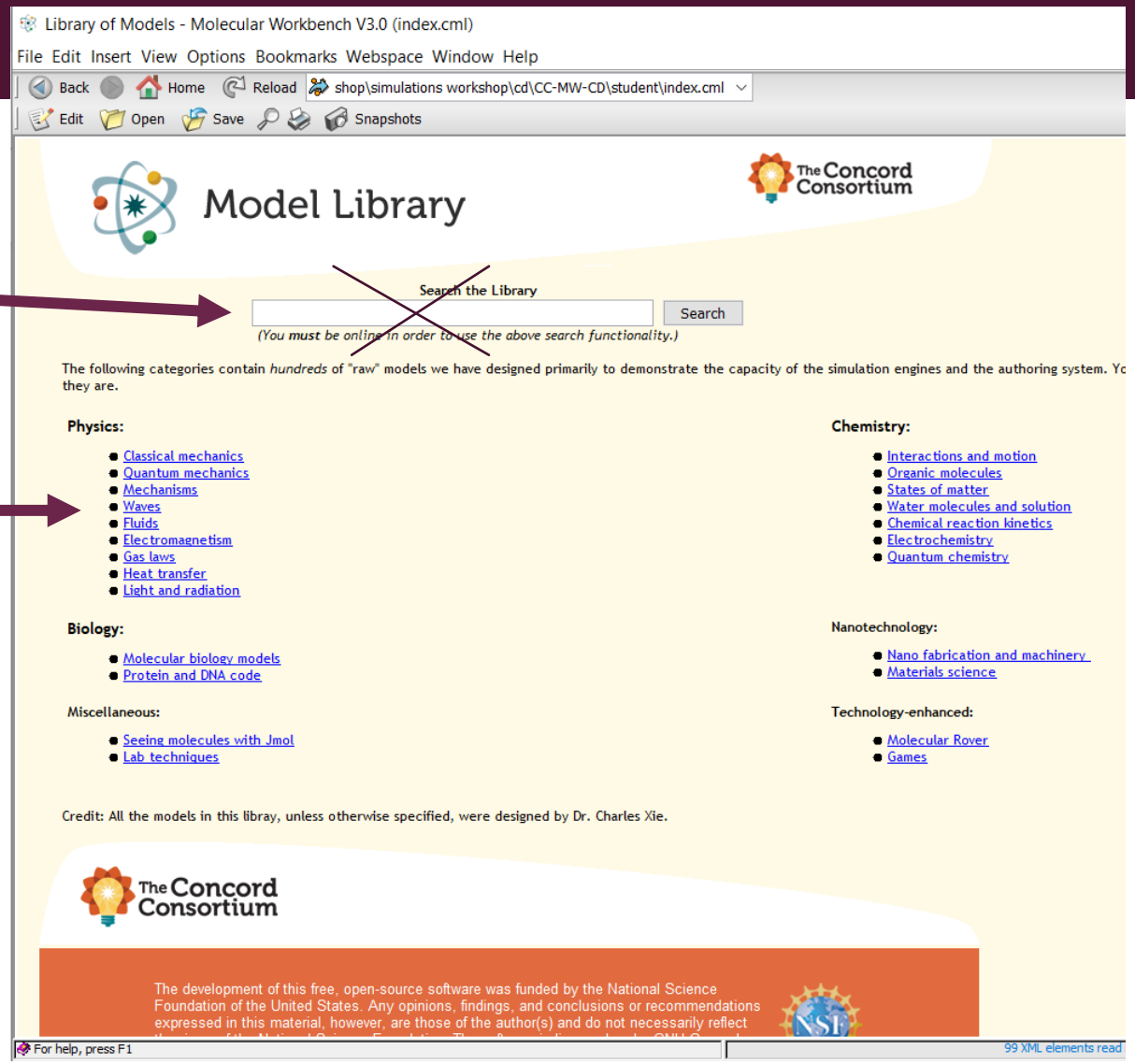


עמוד בניסה – MOLECULAR WORKBENCH

LIBRARY OF MODELS

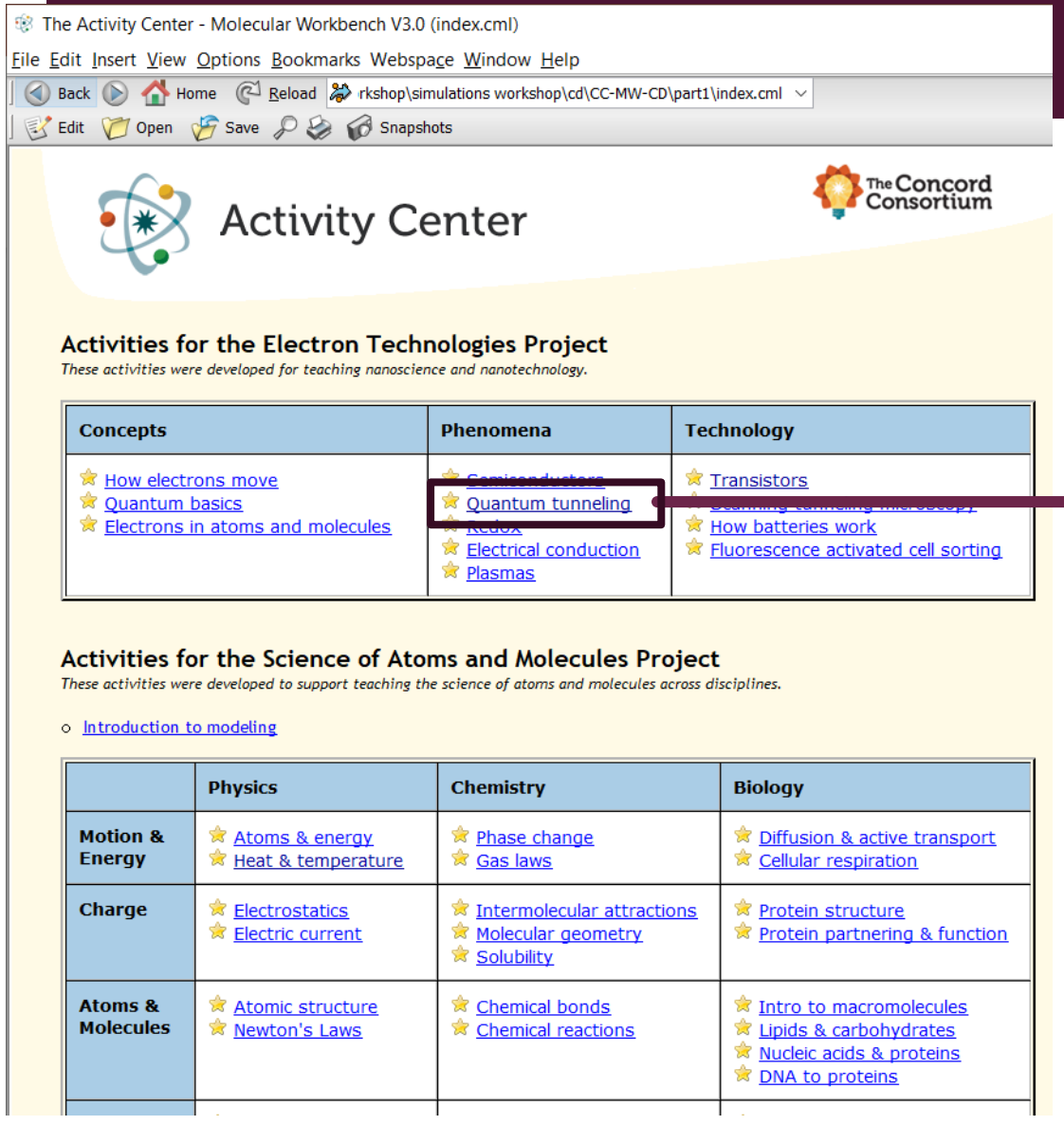
חיפוש מודל על פי מילות מפתח לא עובד בתכנה שאינה מחוברת לאינטרנט

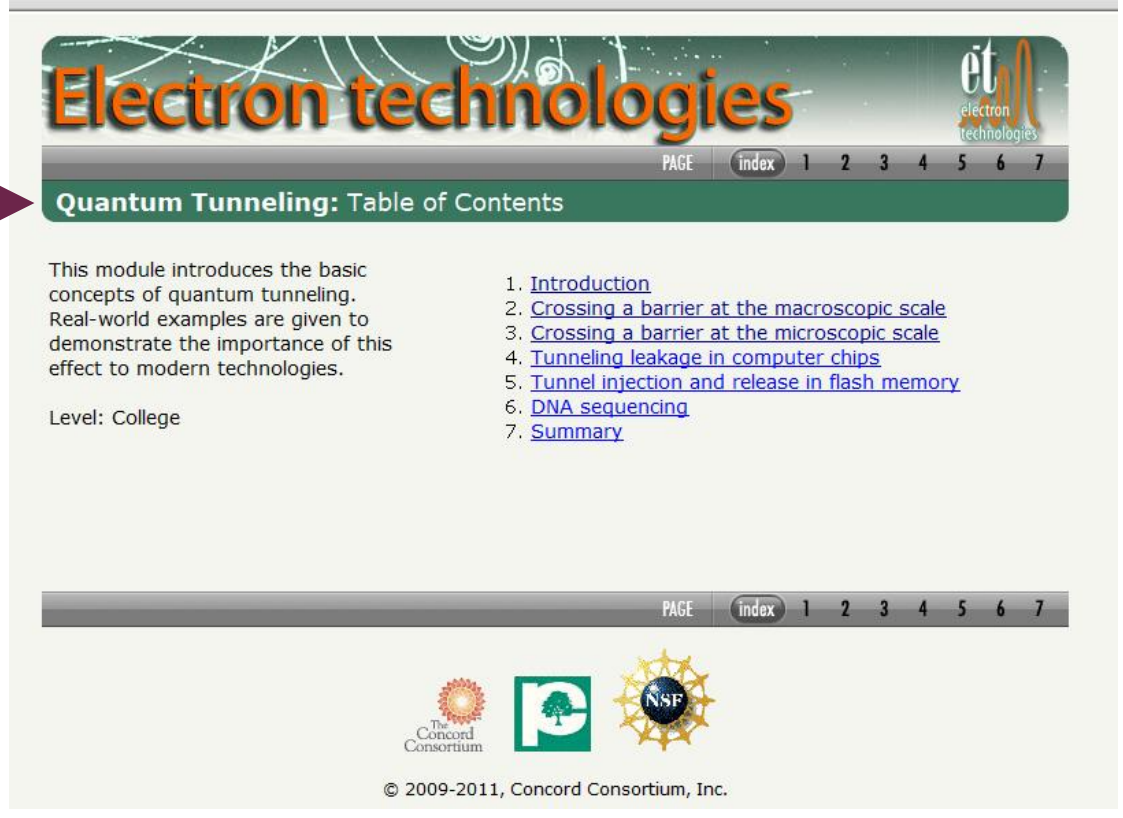
חיפוש ידני בין המודלים לפי תחומי עניין.



שימוש בלומדות

- לחיצה על הנושא תוביל ללומדה בנושא, המורכבת מאוסף של חומר רקע, סימולציות ושאלות מנחות בנושא מסויים





דוגמא ללומדה – אפקט המנהור

Quantum Tunneling: Crossing a Barrier at the Macroscopic Scale

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Whether or not a macroscopic object can cross a barrier is a matter of energy. If it has enough energy, it will cross. Otherwise, it will not.

Let us review how macroscopic objects cross barriers with an example.

Climbing up a hill

Consider rolling a ball up a hill. Play with a simulation to the right to see if how much energy is needed to roll the ball over the hill top.

Use the slider to adjust the starting energy.

Starting energy (arbitrary unit)

0 2 4 6 8 10

Run Stop Reset

Which of the following is the minimum energy needed for the ball to go over the hill top?

- A. 4
- B. 6
- C. 8
- D. 10

Check Answer

Which of the following will make it harder for the ball to surmount the hill? (Check all that apply.)

- A. Increasing the slope of the left side.
- B. Decreasing the slope of the left side.
- C. Increasing the height of the hill.
- D. Decreasing the height of the hill.

Check Answer

Quantum Tunneling: Crossing a Barrier at the Microscopic Scale

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Because electrons are very tiny, the rules that govern balls do not apply to them. They behave differently when they encounter barriers.

The behavior of electrons is governed by quantum mechanics. This is an entirely different world than the one you are familiar with in everyday life. To understand the world of electrons, you have to accept the following rules: ❶ The position of an electron cannot be precisely determined until it is measured. We can only say how probable it is to find an electron at a given position. ❷ The probability distribution of an electron in space can change over time like waves (scientists call this an **electron wave**).

A tunneling experiment

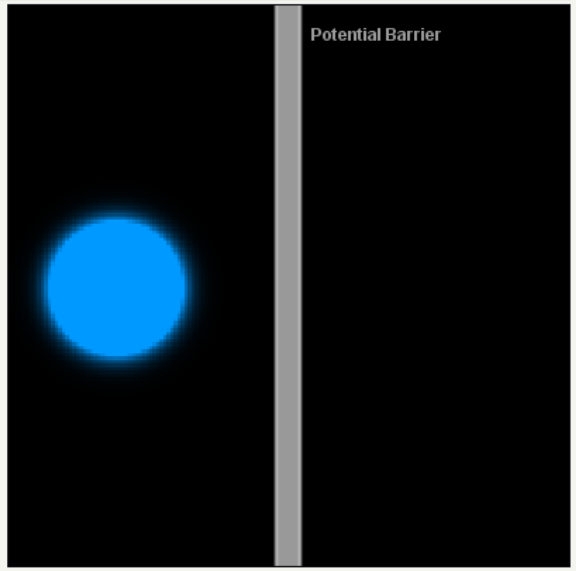
To the right is a simulation that shows what happens when an electron wave (the bluish haze) smashes into a barrier (the gray slab in the middle).

Instructions:

1. Click the "Run" button to start the simulation and observe what happens. To observe it again, click the "Reset" button and then the "Run" button again.

2. Click the "Reset" button. You can change the thickness or potential energy of the barrier using the corresponding sliders. Then run the simulation again.

3. Reset the simulation and adjust the "Electron energy" slider. Observe what happens.



Barrier thickess

Thin Thick

Barrier potential energy

Low High

Electron energy

Low High

Run Stop Reset Snapshot

עבור כימאים/ביולוגים – ספריית מולקולות ב JMOL

Back Home Reload shop\simulations workshop\cd\CC-MW-CD\student\index.cml
Edit Open Save Snapshots

Model Library

The Concord Consortium

Search the Library

STM Search

(You must be online in order to use the above search functionality.)

The following categories contain *hundreds* of "raw" models we have designed primarily to demonstrate the capacity of the simulation engines and the authoring system. Yo
they are.

Physics:

- Classical mechanics
- Quantum mechanics
- Mechanisms
- Waves
- Fluids
- Electromagnetism
- Gas laws
- Heat transfer
- Light and radiation

Biology:

- Molecular biology models
- Protein and DNA code

Miscellaneous:

- Seeing molecules with Jmol
- Lab techniques

Credit: All the models in this libray, unless otherwise spec

The Concord Consortium

MW uses the popular Jmol viewer to display molecules. Several unique features were added to the Jmol viewer in MW in the hope that they will help students to learn.

- Amino acids
- Nucleotides
- Lipids
- Sugars
- Photosynthetic molecules
- Hydrocarbons
- Drugs
- Other small molecules
- Crystals

- Zeolite
- A lipid bilayer membrane
- Flying into hemoglobin
- Myoglobin
- DNA double strand
- A protein-DNA complex

- Molecule of the Month from the Protein Data Bank

- D-galactose
- D-glucose
- D-mannose
- D-xylose
- L-glucose
- Sucrose