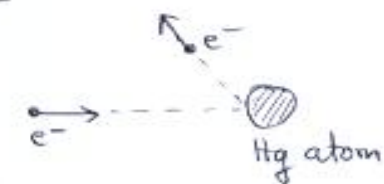


The Frank-Hertz Experiment

The explanation of the experimental results seen in Fig. 3.27 in your textbook is as follows.

When an e^- runs into an Hg atom, there are two situations:



Hg atom energy levels

incoming e^- has K.E. less than ΔE so it cannot excite the e^- from $n=1$ to $n=2$ level.



Hg atom energy level

incoming e^- has K.E. equal or more than ΔE so it can excite the e^- from $n=1$ to $n=2$ energy level in the Hg atom.

In the first situation the incoming electron bounces off the atoms and as they move toward the collector, a current is recorded in the ammeter.

In the second situation the voltage reaches a critical value and the incoming electrons have enough K.E. that they can excite Hg atoms from $n=1$ to $n=2$ during the collision.

The electron loses most of its energy and cannot reach the collector. In this case the current drops.