

Tunelling (2)

Aim:

- To show an every day phenomenon that can be explained by means of the tunnelling effect.

Subjectcode: 7A50 (Wave Mechanics)

Diagram:



Equipment:

- Beaker glass, 2 liter;
- Ruler, 50 cm.
- Camera.

Tunelling (2)

Presentation: The beaker is filled with water and monitored from above by the camera. The position of the camera is such as if you look into the beaker (see Diagram). In the far inner side of the beaker a reflection of the ruler is seen (see Figure 1A).

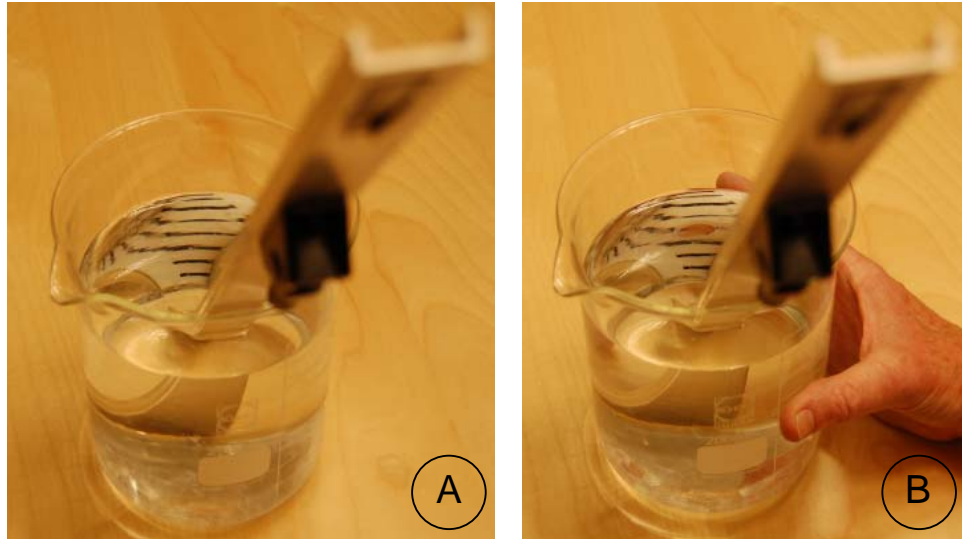


Figure 1

When a finger is lightly held to the side of the glass it is invisible; only the ruler is seen, so only that reflection is visible. However, when the finger is firmly pressed against the glass, the camera sees the person's fingerprint and the reflection of the ruler disappears at that spot (see Figure 1B).

Explanation: Firmly pressing your finger against the glass brings it within less than a wavelength to the glass surface, allowing photons from the ruler to tunnel out. At the same time photons from your fingertip tunnel through the glass to the camera.

Remarks:

- The demonstration "Tunelling (1)" in this database shows it in a more fundamental way.

Sources:

- [Giancoli, D.G., Physics for scientists and engineers with modern physics](#), Third edition, pag. 744.
- <http://demo.physics.uiuc.edu/LectDemo/> demoID=1227.