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## Tunneling: Microwave analogy using wax prisms.

(F)Modern and Contemporary Physics - F+30: Quantum Mechanical Barrier Penetration

Tunneling: Microwave analogy using wax prisms. In situation 'A', a microwave transmitter beams 3 cm microwaves into a large paraffin wax equilateral prism. The beam strikes the face of the prism at about a 55 degree angle, and total internal reflection occurs. This can be tested by moving the receiver to different positions around the prism. In situation 'B', the receiver is placed in line with the incident beam, and a second identical prism is moved in towards the first. When the distance between the prisms is 5 cm or less, the receiver will strongly pick up the microwave beam. The microwave beam has 'tunneled' through the air barrier into the second prism. Classical wave theory predicts that evanescent standing waves penetrate into the air a few wavelengths past the prism interface, so the tunneling produced by moving the second prism into this region seems understandable. However, in quantum mechanics, material particles can also tunnel. The behaviour of the microwaves is analogous to the behavior of matter waves striking a potential barrier with a total energy less than the potential energy within the barrier. Ref.:Physics Demonstration Experiments by Harry Meiners, 1970 ed., Vol II, p. 1188-1190

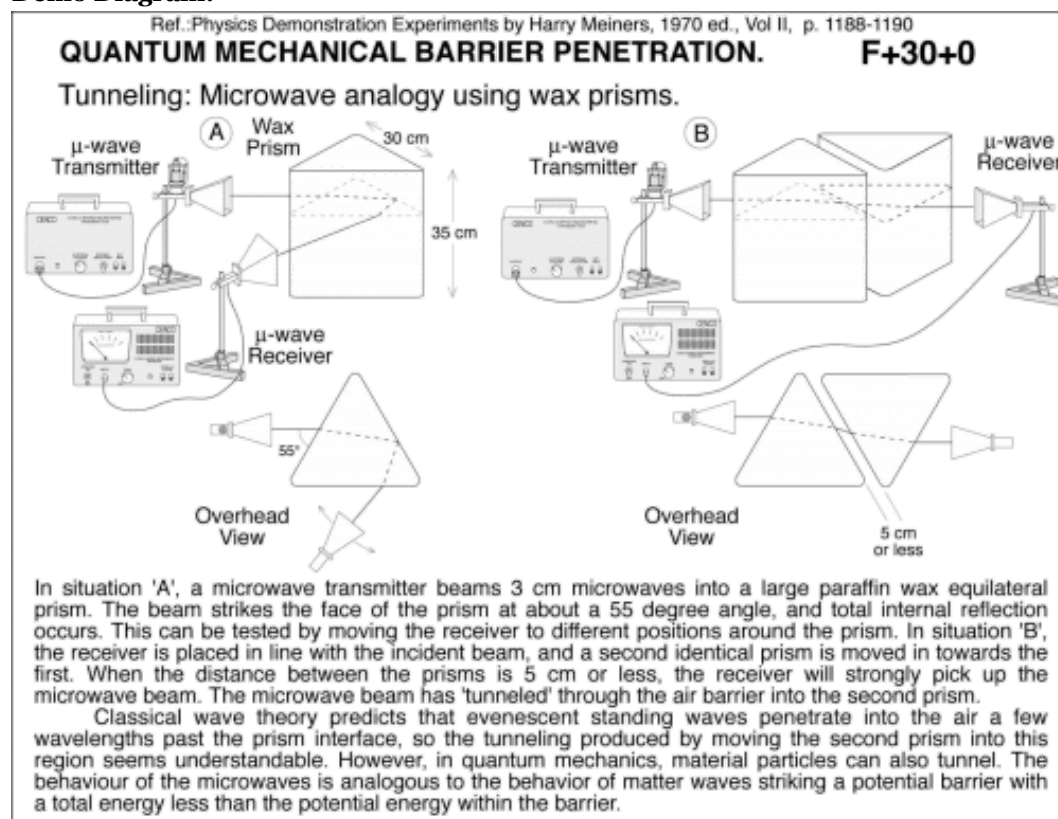
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7A50.20

**Demo Diagram:**



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