

Notes for *Waves*, Institute of Physics
Christmas Lectures – 9/1/64 and
15/1/64

Notes (1)

Hear of light waves, sound waves, water waves, radio waves.

Why? by analogy with water waves.

What do water waves *do*?

Rubber cord

Ripple tank

sketches of straight and curved wavefronts

Waves *travel*
in *straight lines*
and are *reflected*

But then so do billiard balls.

But sometimes waves change direction without being reflected.

This is called *diffraction*.

sketches with large, small, gap, obstacle

Obviously this couldn't happen with light, because light travels in straight lines and causes sharp shadows – doesn't it?

Television display

Ripple tank

Acoustical interference

Television display

Thomas Young; Lord Henry Brougham; *Edinburgh Review*.

Acoustical Michelson

Microwave Michelson

Show with bits of this

reflection

diffraction

Newton's rings, Mica sheet

Microwave F-P interferometer

Optical multiple-reflection interference.

Layout sketches for all above

Notes (2)

Familiar with terms: lightwaves, sound waves, radio waves.

What is common type of behaviour which leads to use of word: waves?

Wave on rubber cord: travelling kink. Various kinds.

Water wave: travelling kink.

Wave on rubber cord can be reflected.

Wave on water can be reflected.

Slides to show complexity of waves on sea

Colour slides

Ripple tank to show water waves under controlled conditions.

Plane wave

Plane wave at straight edge – effect in both regions.

at two straight edges – slit

at two straight edges – obstacle.

2 slides

Fresnel – Poisson – Arago.

Television display – obstacle

– slit.

Waves from two {single first} sources on ripple tank. Tank off.

Two loudspeakers – set at MIN.(put one on first, then other)

Television display with two slits.

Slide

Other schemes for producing two interfering beams: (At this point, bring mike over to Michelson and also one speaker)

Acoustical Michelson.

Slide

Microwave Michelson. (Plug detector output into scope and take out mike.)

Newton's rings

Laser.

Slide

Diffraction and interference by multiple narrow slits

Handkerchief

Gauze

Diffraction grating.

Apparatus for Waves lecture

- Rubber cord
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- Ripple tank – as set.

1 250W MV lamp
20" Aldis lens
6" f/2.9 lens
Slit
Large prism.
Small prism.
Perspex tank
1 tripod-base retort stand: 2 bossheads, 2 clamps, prism table
1 retort stand, 1 bosshead, 1 clamp.
1 retort stand, 4 bossheads, 2 rings, 1 lens holder (large).
Vibrator, and ripple sources.
1 Tecpc'J1 AF generator.

- Television display.

1 camera, 2 monitors }Bolton.
Stands (handy angle) for monitors.
1 250W MV lamp, retort stand, bosshead and lamp.
2" condenser lens
Slit
Optical bench circular table
1 metre optical bench, and 4 saddles
Needle in plasticine
Optical bench aperture with razor blades and pin.

- Acoustical interference

H-1 oscillator (6.7 kc/s).
2 L/speakers on Handy Angle frame.
Microphone on short retort stand.
Transistor amplifier.
Oscilloscope.
Acoustical Michelson reflector (2) and gauze sheet.

- Newton's rings

250W MV lamp, retort stand, bosshead and clamp.
4" dia optical bench condenser lens.
2" dia optical bench condenser lens.
Newton's rings device
Optical bench lens holder (large)

- Microprojector

Micro projector

2" dia optical bench condenser lens.

Silvered slide

250W MV lamp, retort stand, bosshead and clamp.

Optical bench lens holder (large)

2 saddles

1/2 metre optical bench

- Microwave optics From Leybold, via Dr Brown.

- Laser From Ferranti, via RMS. Gauze in slide Diffraction grating.

Also 3 iris diaphragms and saddles.

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