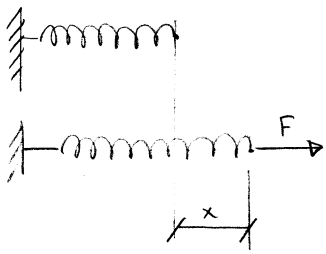
02-3
02-6
02-9
02-10
05-2
05-6
05-7
05-12
05-13

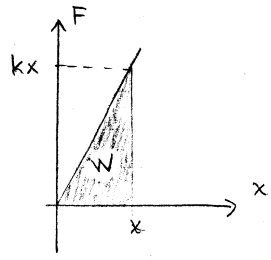
REPETITION Vågfysik

Fjädrar

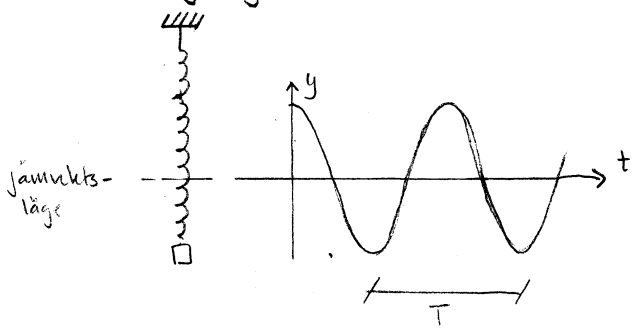


$$F = kx$$

$$W = \frac{kx^2}{2}$$



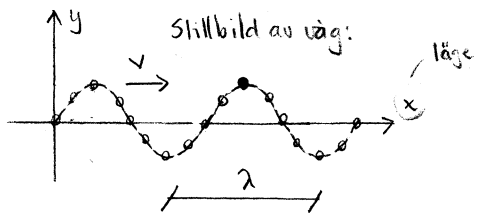
Svängningsrörelse

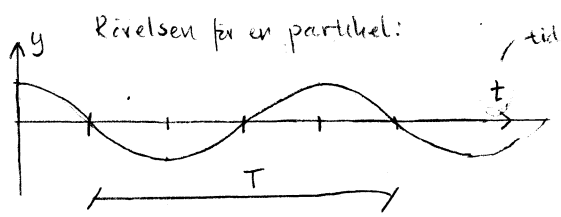


$$f = \frac{1}{T}$$

Vågrörelser

transversella (tex ljus (EM-vågor), Ullen-vågor)
longitudinella (tex ljudvågor)

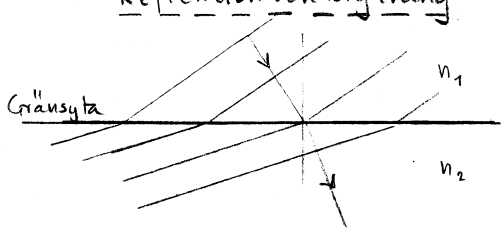




$$\boxed{v = f \cdot \lambda}$$

bestäms av medium

- Reflektion och brytning



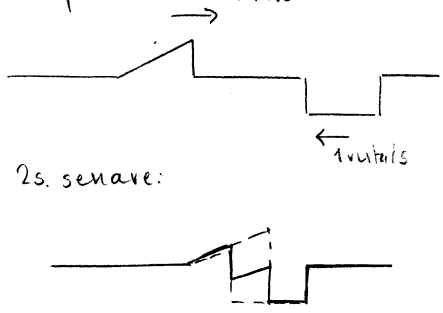
λ, v beror på medium

f (och därmed T) densamma

(För ljus: $n_i = \frac{c}{v_i}$)

◦ Superposition...

...av pulser:



... av vågor:

[jobbigt att rita]

[se tex ppt Interferens (1D)]

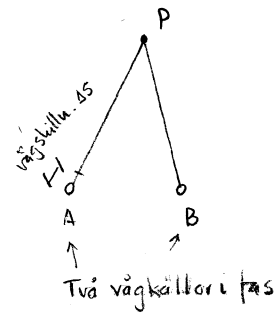
◦ Interferens

*Förstärkning (maximal total vågamplitud) i punkt P

skillnad i avstånd till vågkällorna → om vågskillnaden $AP - BP = n\lambda$, $n = 0, 1, 2, 3, \ldots$

*Försvagning (utsläckning, amplitud = 0) i P

om vågskillnaden $AP - BP = (2n-1)\frac{\lambda}{2}$, $n = 1, 2, 3, \ldots$

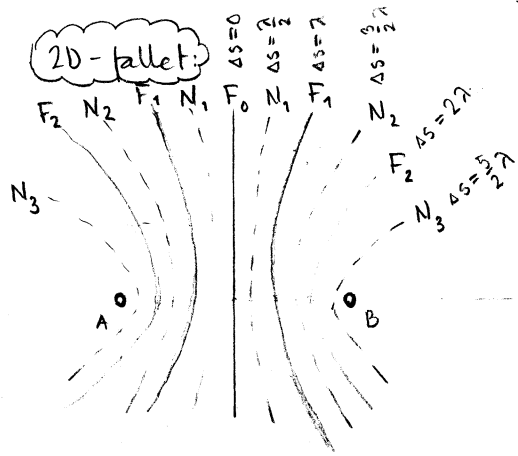


1D-fallet:

A) Vågor från samma håll

[Se ppt Interferens (1D)]

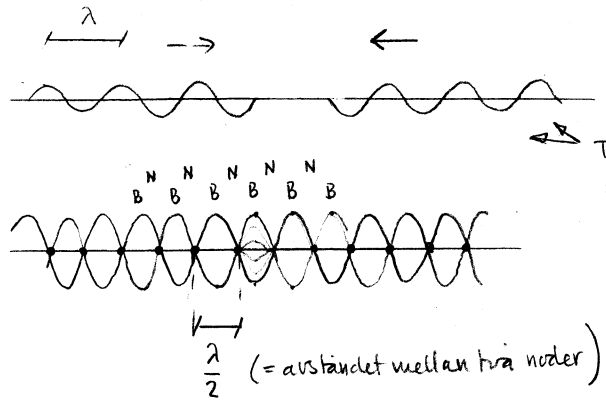
2D-fallet:



F: Förstärkningslinjer
N: Nodlinjer (försvagningslinjer)

B) Vågor från olika håll:

→ Stående vågor

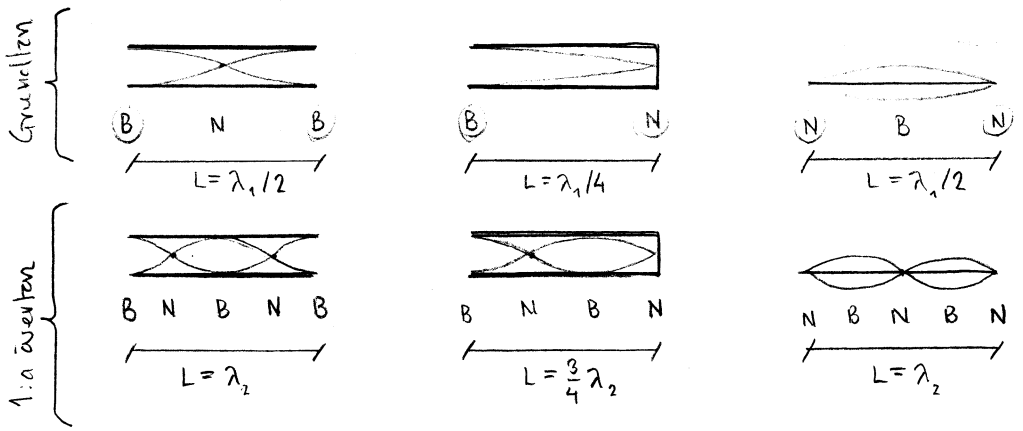


Två vågor m. samma f och λ

Ljudinstrument

- Blåsinstrument
- Strånginstrument

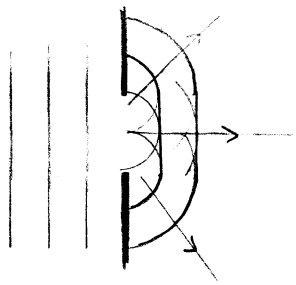
Öppet rör | Slutet rör



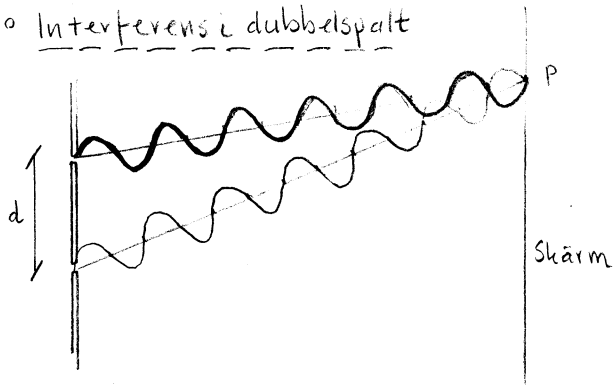
Ljudintensitet, ljudnivå
[W/m²] [dB]

Ljus

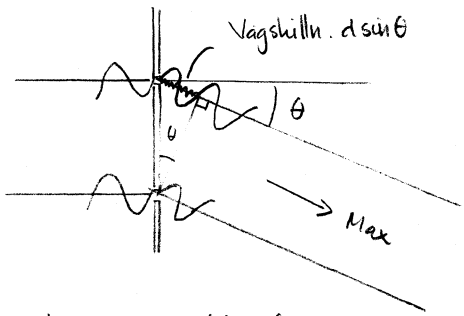
- Böjning i enkelspalt



- Interferens i dubbelspalt



Skärm långt bort:



- Gitter

Som dubbelspalt, fast många fler öppningar (och litet d)

⇒ ljusstarka ljusmax (och utsläckn. däremellan)

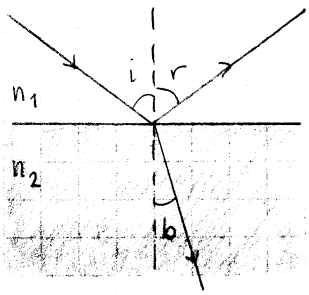
Ljusmax i riktn θ_n om

$d \sin\theta_n = n\lambda$, $n = 0, 1, 2, 3, \ldots$

02-5
05-2

REPETITION Optik

Reflektion och brytning



$$i = r \qquad \text{(reflektionslagen)}$$

$$n_1 \sin i = n_2 \sin b \qquad \text{(brytningslagen)}$$

(Brytningsindex

$$n = \frac{c_{vakuum}}{c_{medium}}$$

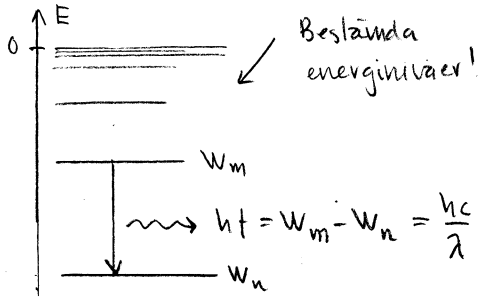
)

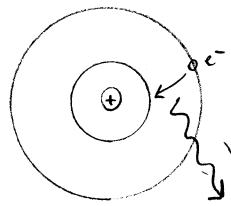
02-5
05-9
05-11

REPETITION Atomfysik

Kvanthypotesen och Bohrs atommodell

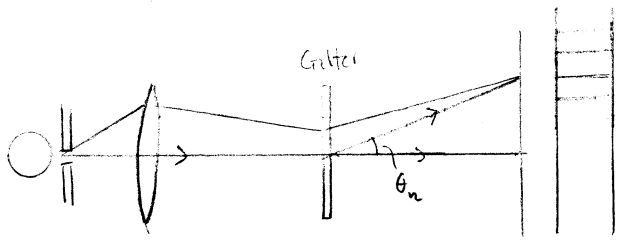
- Emissionsspektrum





$W_f = hf$ (foton)

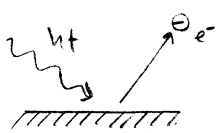
$(p = \frac{W_f}{c} = \frac{h}{\lambda})$



- Absorptionsspektrum.

[Lite som ovan, fast omvänt].

Fotoelektrisk effekt (bara då $f > f_g$ el $\lambda < \lambda_g$)



$W_k = hf - W_u$

↑ "Utträdesarbete"

Materiens vågegenskaper

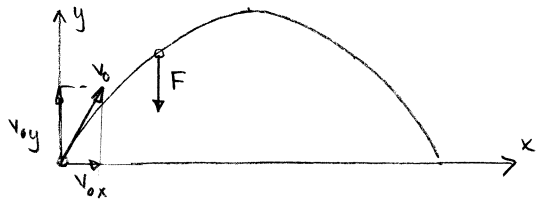
$$\lambda = \frac{h}{p}$$

02-1
02-2
02-11
05-16

02-10
05-14

REPETITION Mekanik

Kaströrelse



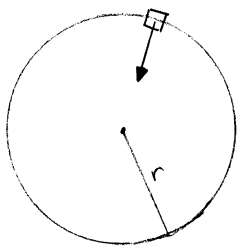
I x-led: $x = v_{0x} t$

I y-led: $y = v_{0y} t + \frac{at^2}{2}$ (se upp med tecken!)

$v_y = v_{0y} + at$

$2ay = v_y^2 - v_{0y}^2$

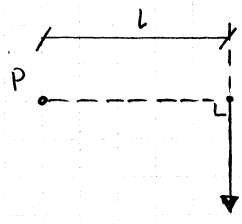
Cirkelrörelse (med konstant fart)



Newton II:

$R = \frac{mv^2}{r}$ centripetalacc.

Vridmoment (kraftmoment)



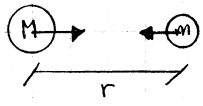
Vridmoment (m.a.p. P)

$M = F \cdot l$

Om ett föremål är i jämvikt är $\overrightarrow{M} = \overleftarrow{M}$

Gravitation

$F = G \frac{Mm}{r^2}$



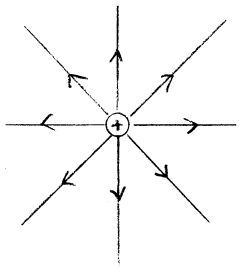
Gravitationsfältstyrka $g = \frac{F_g}{m}$

02-4
02-7
02-12
02-15
05-1
05-4
05-10
05-14

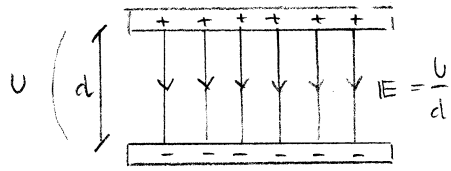
REPETITION Elektromagnetism

Elektriska fält

Radiellt fält



Homogent fält



Elektrisk fältstyrka

$$|\mathbb{E}| = \frac{F}{q}$$ (kraft på laddning q)

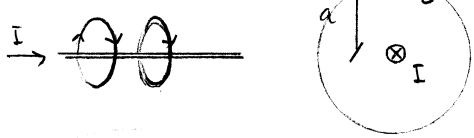
$(\Rightarrow F = q|\mathbb{E}|)$

(Kom ihåg: $U_{AB} = \frac{W_{AB}}{Q}$)

Magnetiska fält

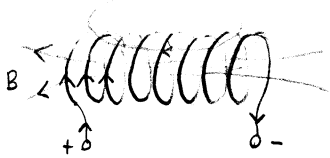
Elektriska laddningar i rörelse (strömmar) $\longrightarrow$ magnetfält

Rak ledare 1)



$$B = k \cdot \frac{I}{a}$$

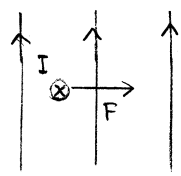
Spole 2)



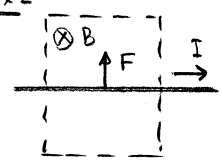
Kraft på ledare i magnetfält

$F = BIl$

Ex1



Ex2



Kraft på laddad partikel som rör sig i magnetfält:

$F = qvB$

Induktion

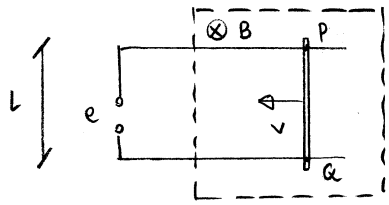
Flöde (vinkel mellan normal till ytan och fältet)

$$\Phi = B A_\perp \qquad (= B A \cos\varphi)$$

Induktionslagen

$$e = N \frac{d\Phi}{dt} \qquad \text{(Polaritet fås mha Lenz lag)}$$

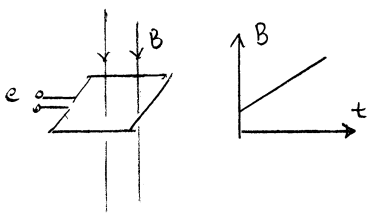
Φ kan variera om: 1) $A_\perp$ ändras



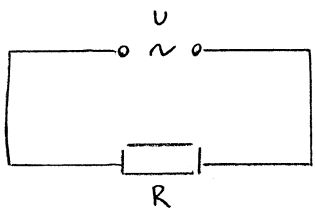
Mellan P och Q induceras elektromotorisk spänningen

$$e = lvB$$

2) B ändras



Växelström



$$u(t) = \hat{u} \sin \omega t$$

$$i(t) = \hat{i} \sin \omega t$$

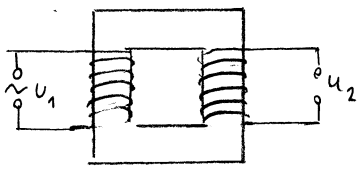
Effektivvärden

$$U = \frac{\hat{u}}{\sqrt{2}}; \quad I = \frac{\hat{i}}{\sqrt{2}}$$

Medeleffekt

$$P = U \cdot I$$

Transformator



$$\frac{U_2}{U_1} = \frac{N_2}{N_1}$$