

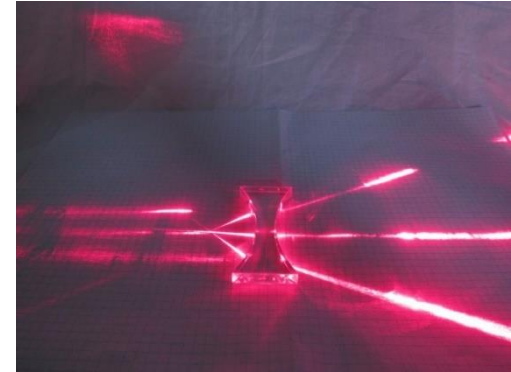


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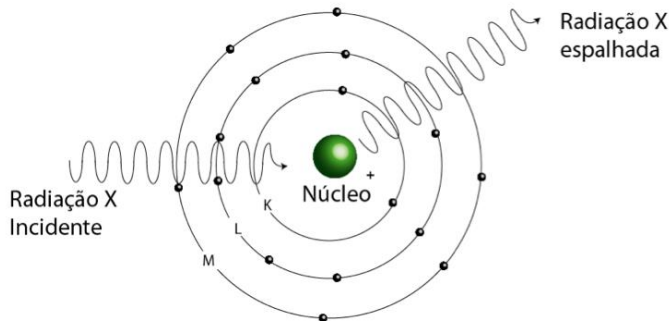
# ***Óptica Física***

## ***Determinação do diâmetro de um fio de cabelo***

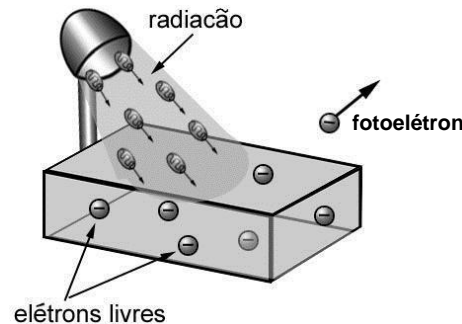
- **Óptica Geométrica** → estuda os fenômenos luminosos **sem** se preocupar com a natureza da luz.



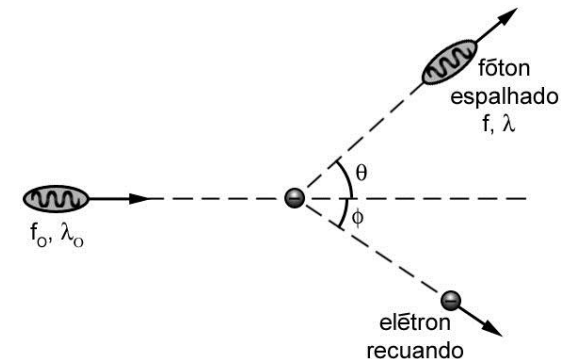
- **Óptica Física** → é o estudo da interação da luz com os objetos.



**Espalhamento Thomson**



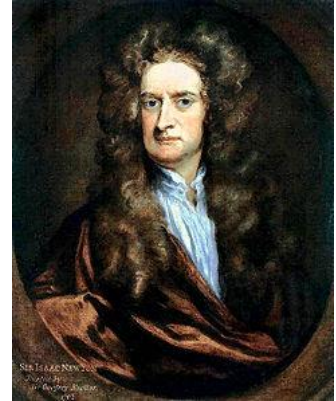
**Efeito Fotoelétrico**



**Espalhamento Compton**

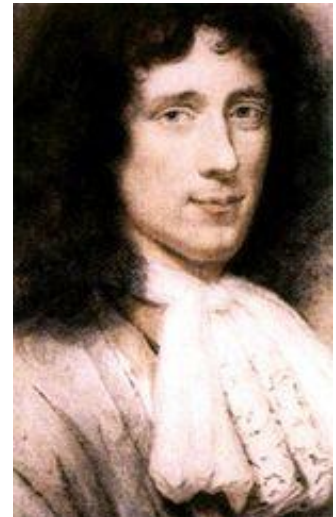
# Breve cronologia dos modelos para a luz

- Isaac Newton (1640 - 1725): sucesso do modelo mecânico para explicar vários fenômenos.



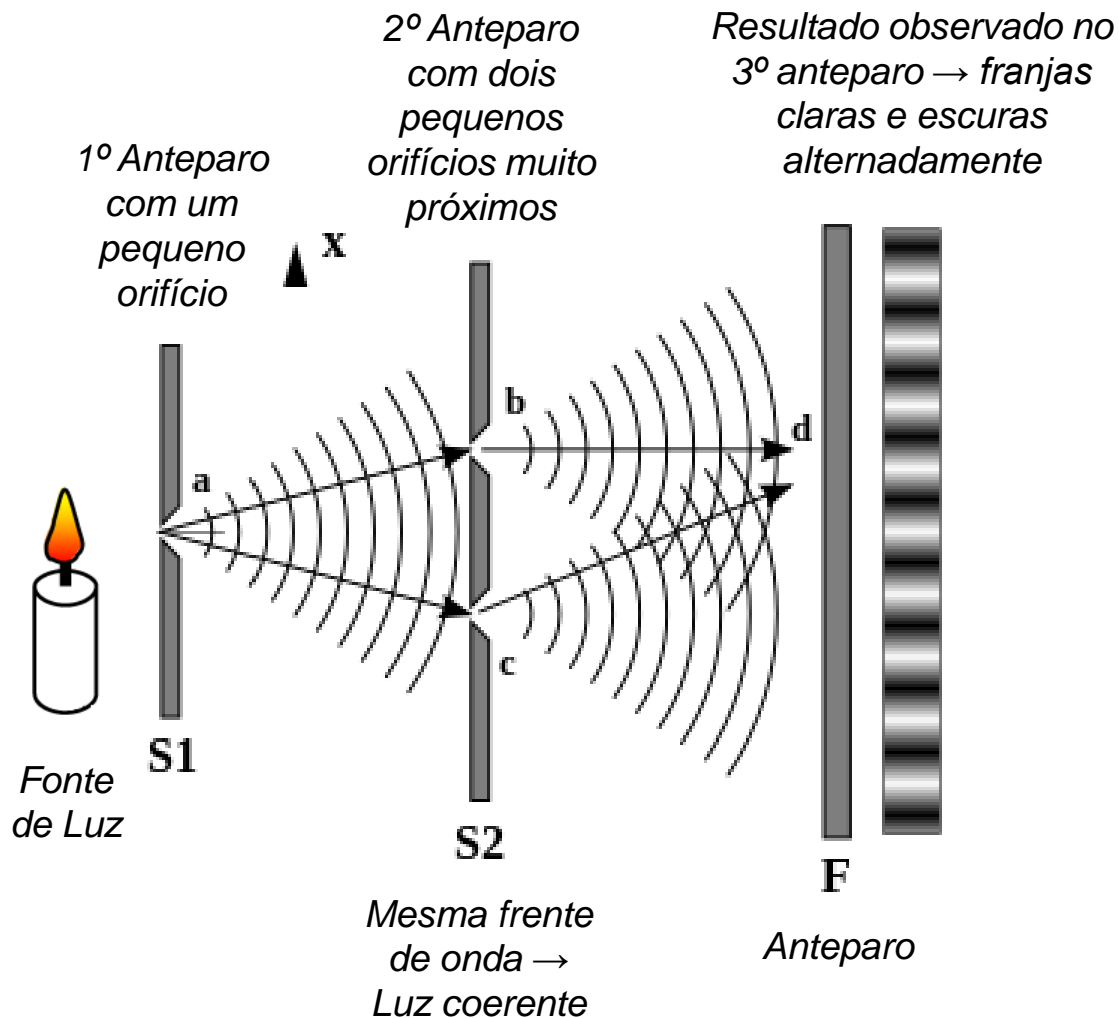
## *Modelo Corpuscular da Luz*

- Christian Huygens (1629 - 1695): fenômenos luminosos poderiam ser explicados mais facilmente considerando-os como ondas.

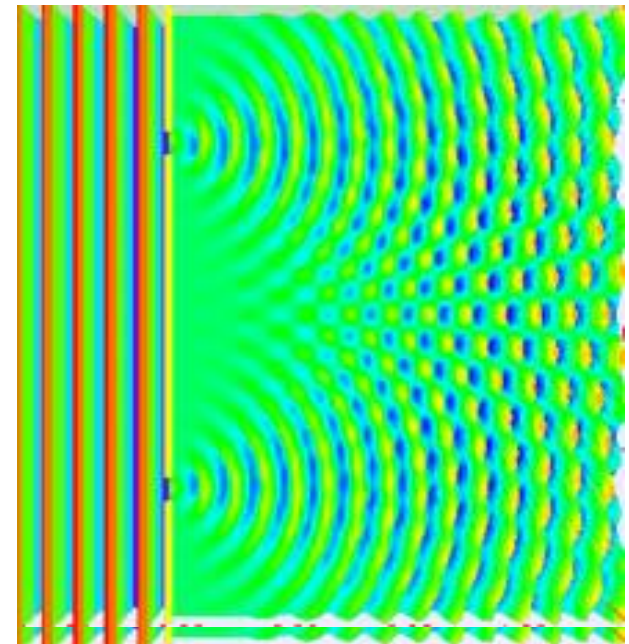


## *Modelo Ondulatório da Luz*

# Experimento da dupla fenda



Thomas Young  
1773 - 1829



Natureza Ondulatória da Luz  
(1.801)

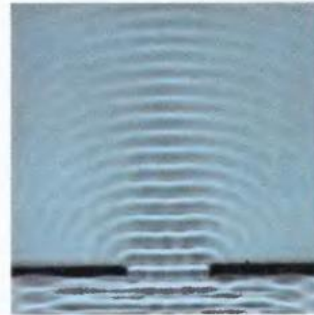
# Difração e Interferência da Luz

## Aspectos fenomenológicos

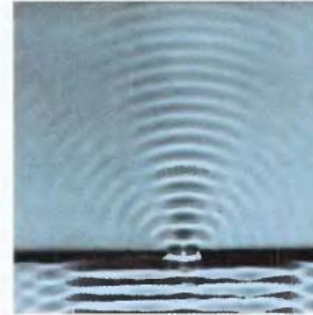
- Difração de ondas:



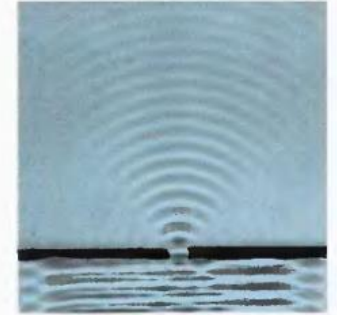
Motuopao Island, Cape Reinga  
Nova Zelândia



a



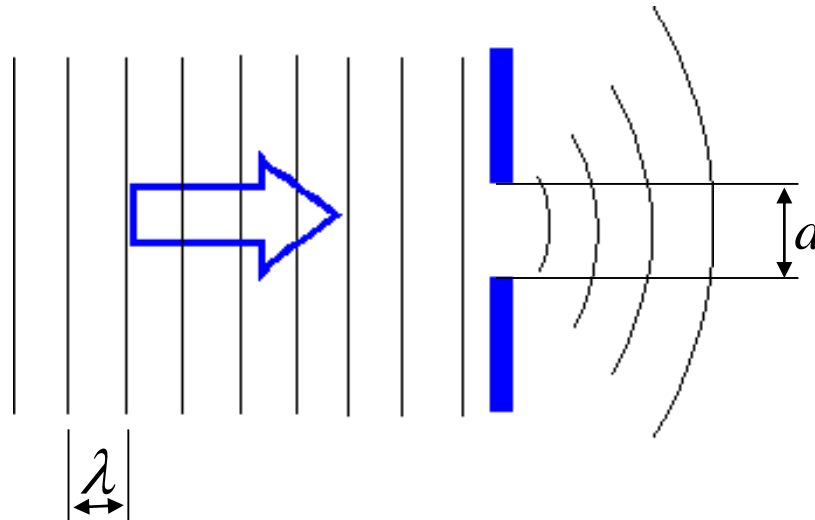
b



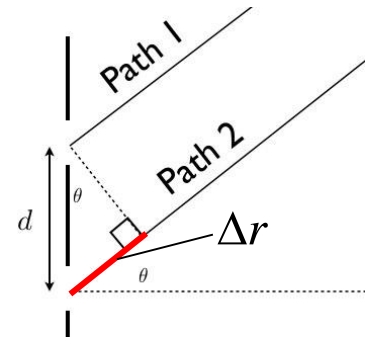
c

Cuba de ondas

$$\lambda \approx d$$



- **Interferência de ondas:**  $\rightarrow I_{luz} \propto E_{Res}^2$

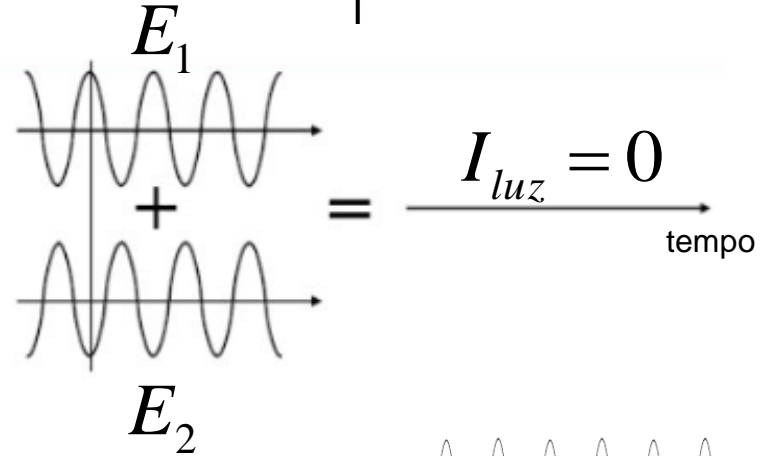
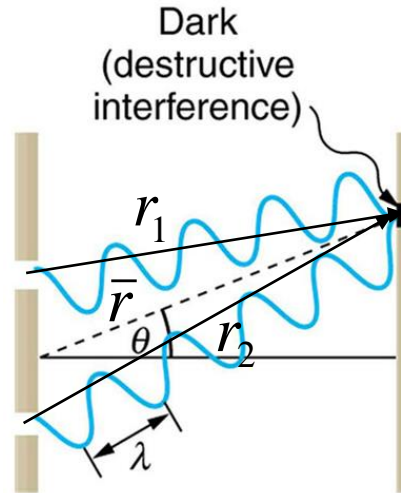


- **Múltiplas fendas**

- Destrutiva

$$r_2 - r_1 = \Delta r = d \cdot \text{sen} \theta = \left( n + \frac{1}{2} \right) \cdot \lambda$$

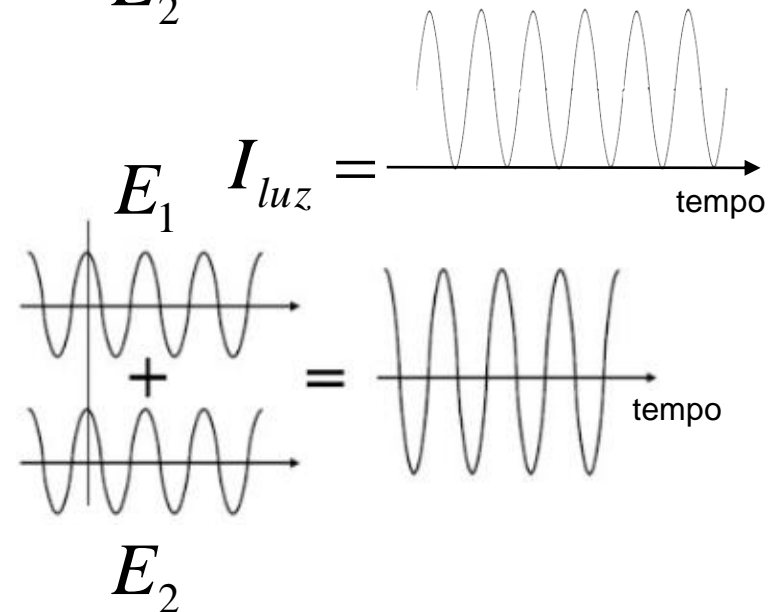
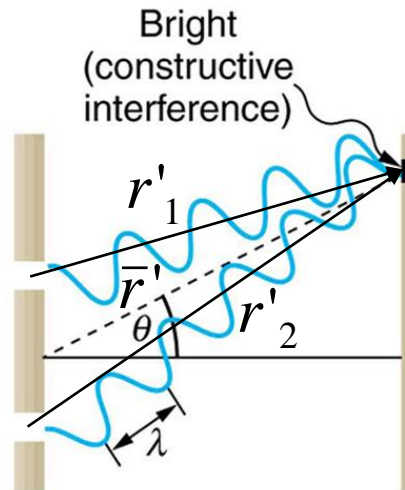
$$n = 0, 1, 2, \dots$$



- Construtiva

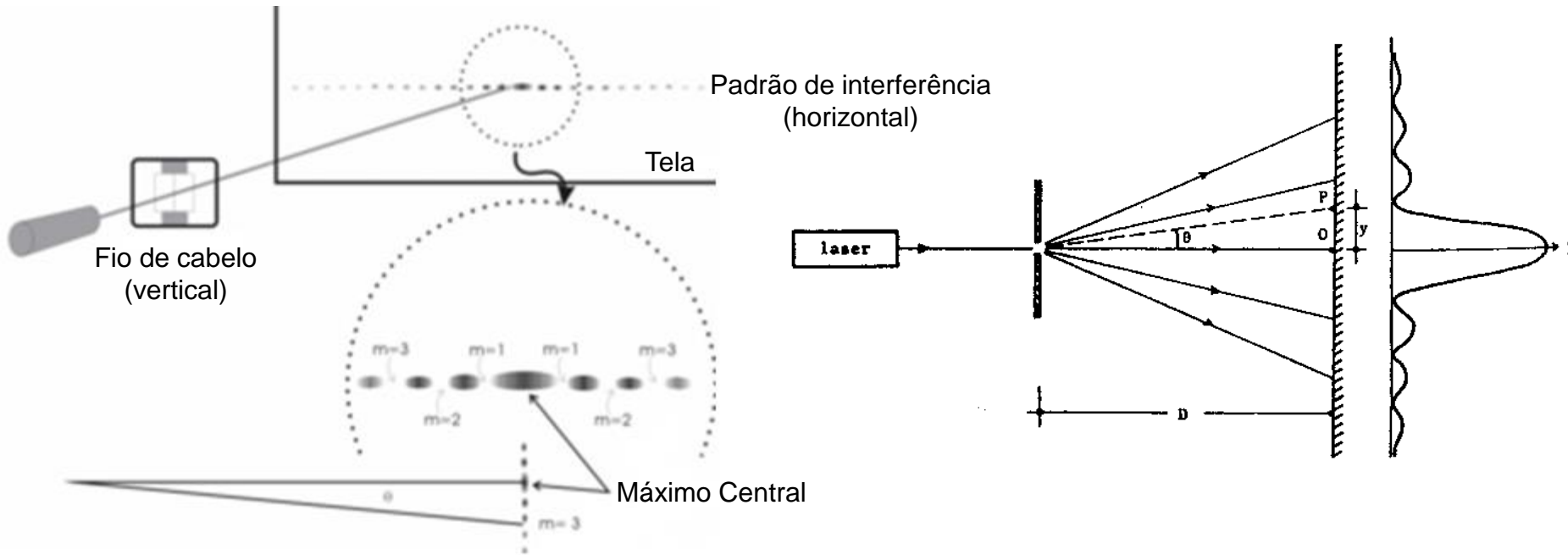
$$r'_2 - r'_1 = \Delta r' = d \cdot \text{sen} \theta = n' \cdot \lambda$$

$$n' = 0, 1, 2, \dots$$



# Observações experimentais

fenda (ou obstáculo) simples



$$m.\lambda = d.\text{sen}\theta \quad , \text{ com } m = 1, 2, 3, \dots$$

$m$  = nº de ordem do ponto de **mínimo** de difração em **fenda** (ou **obstáculo**) **simples**

$\lambda$  = comprimento de onda do feixe luminoso, em **nm** (etiqueta adesiva no *pointer*)

E como determinar  $\theta$ ?

$$\text{tg } \theta = \frac{y}{D} \rightarrow \theta = \text{arctg } \frac{y}{D}$$

# **Atividade experimental 1**

## Estimativa experimental do diâmetro de um fio de **cabelo**

### **Referências Sitigráficas**

- <http://www.sbf1.sbfisica.org.br/eventos/snef/xvi/cd/resumos/T0710-3.pdf>
- [http://davinci.if.ufrgs.br/wiki/index.php/Difra%C3%A7%C3%A3o\\_em\\_Fios](http://davinci.if.ufrgs.br/wiki/index.php/Difra%C3%A7%C3%A3o_em_Fios).
- <http://www.df.ufscar.br/optica09-21.pdf>
- <http://www.if.ufrgs.br/tex/fis01044/Exper8.pdf>
- [http://plato.if.usp.br/~fap2293d/LAB2293\\_2009E7T.pdf](http://plato.if.usp.br/~fap2293d/LAB2293_2009E7T.pdf)
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- <http://hyperlearningspace.weebly.com/grade-11-physics/wave-interference>
- <http://ptdocz.com/doc/1172425/f%C3%ADsica-iv-experimental-roteiro-das-experi%C3%A4ncias-1-semester>
- <https://slideplayer.com/slide/3866263/> (material sobre ondas de elétrons)