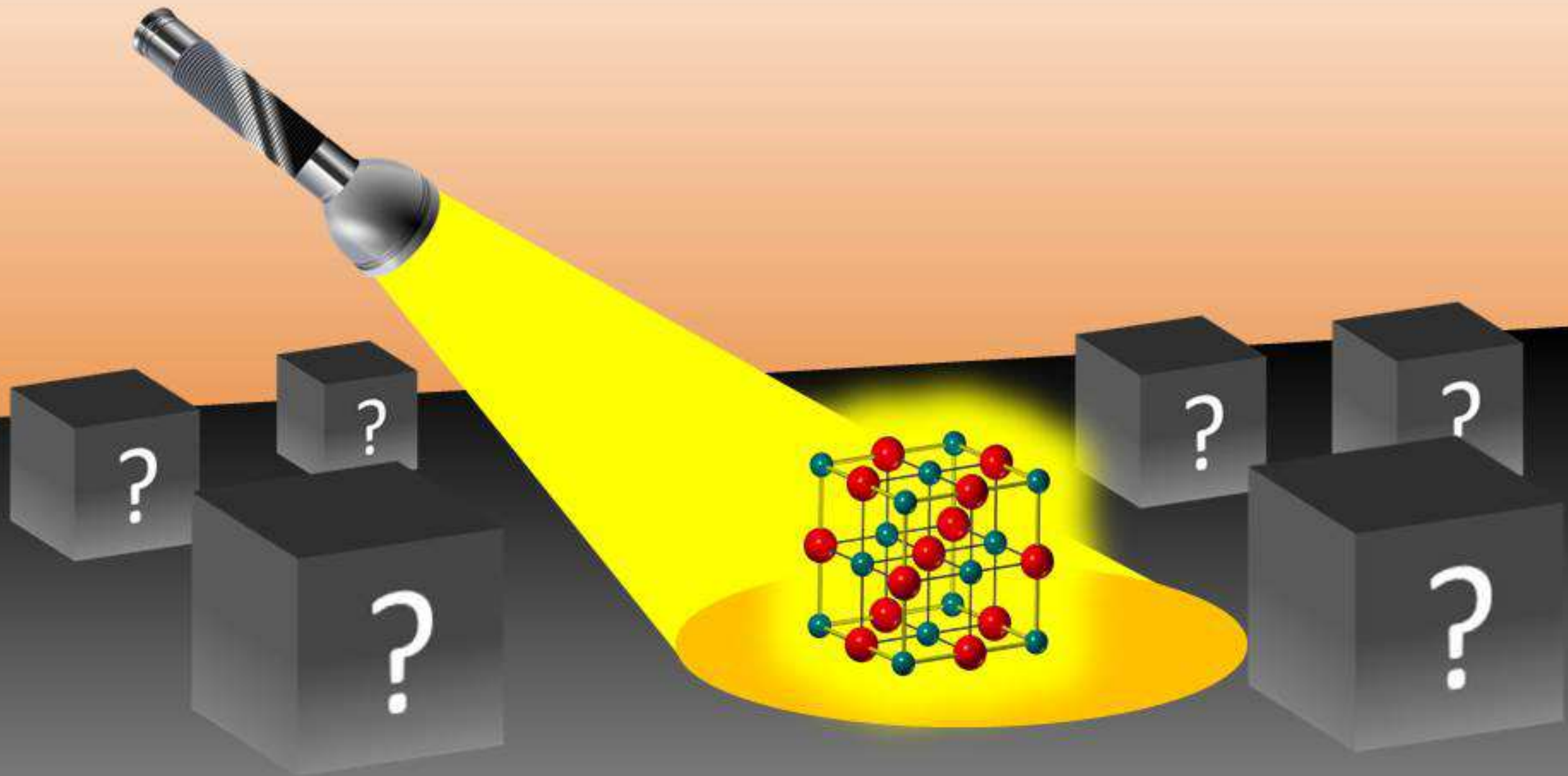


Illuminiamo la materia

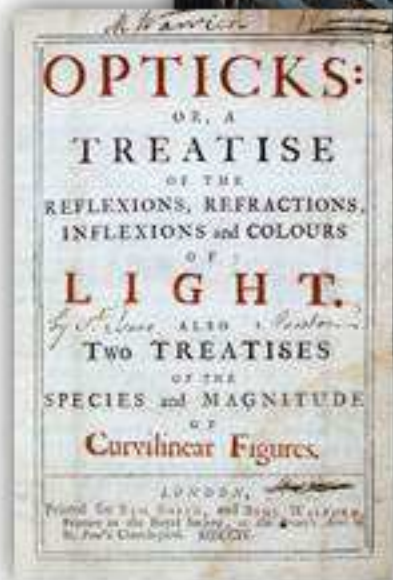
la **luce** come strumento di indagine



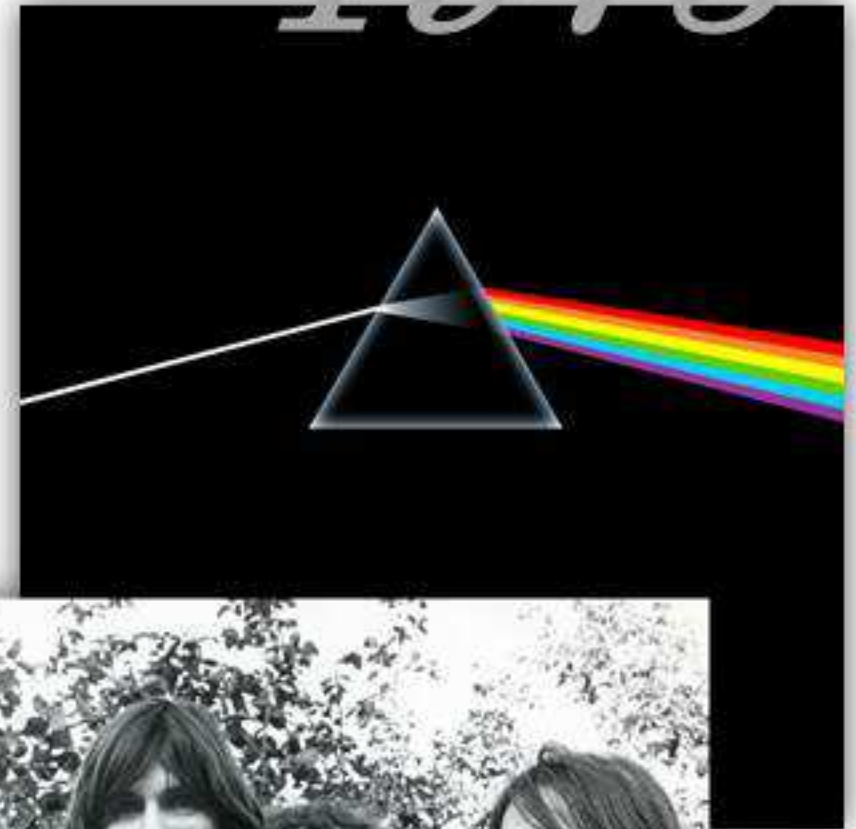
Cos'è la luce?

Secondo Newton...ed i Pink Floyd

1973

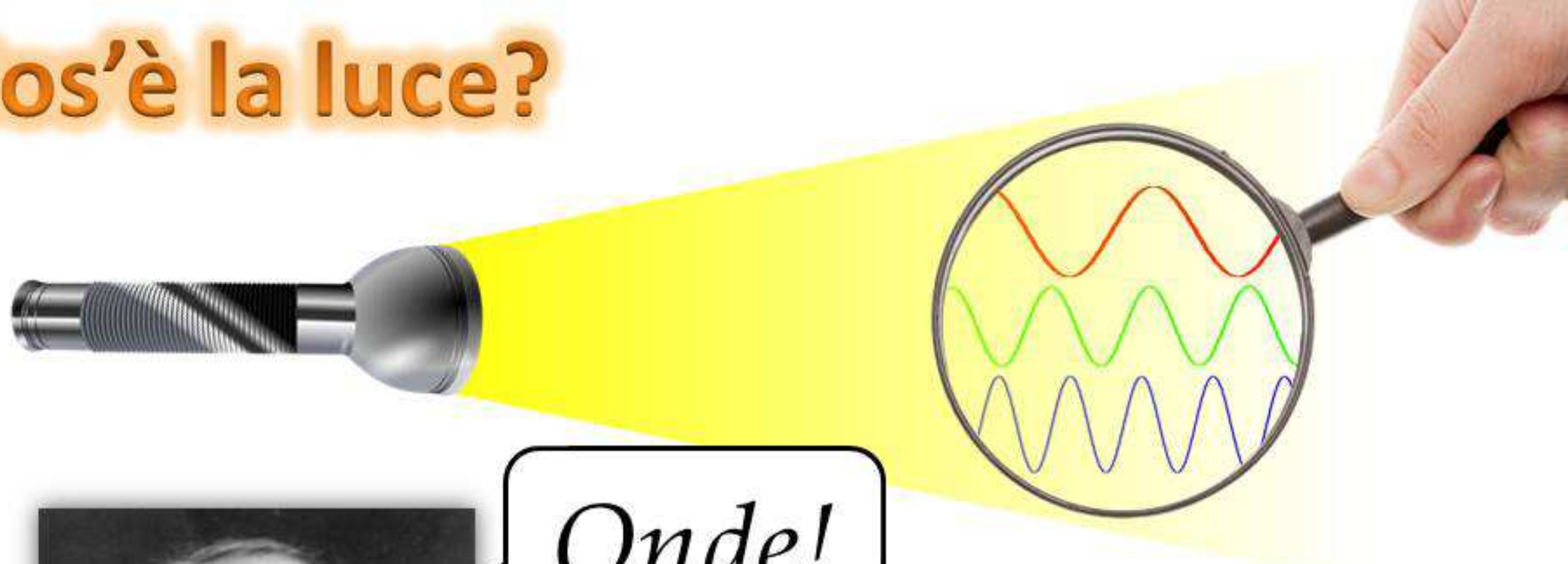


1704

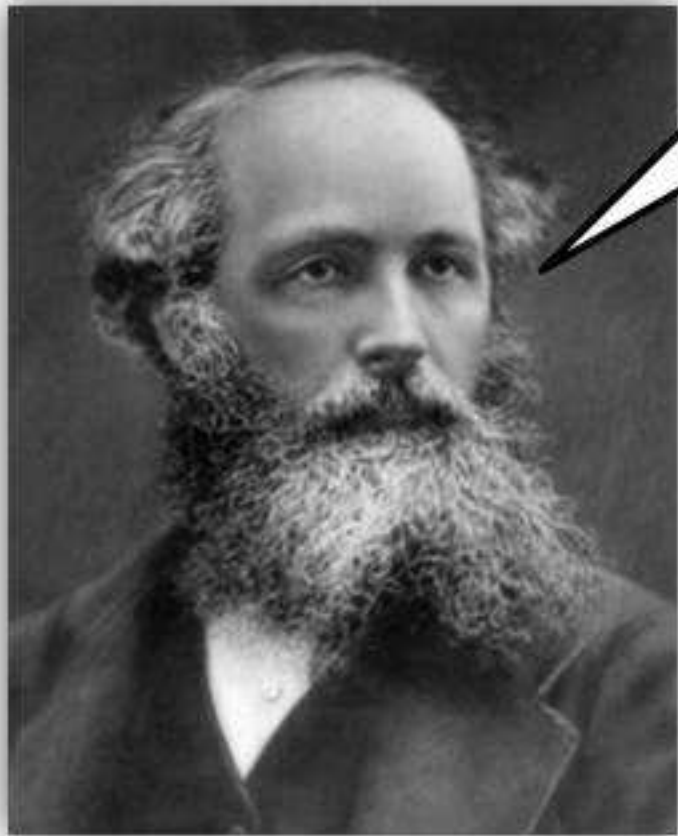


Pink Floyd (1965-)

Cos'è la luce?



Onde!

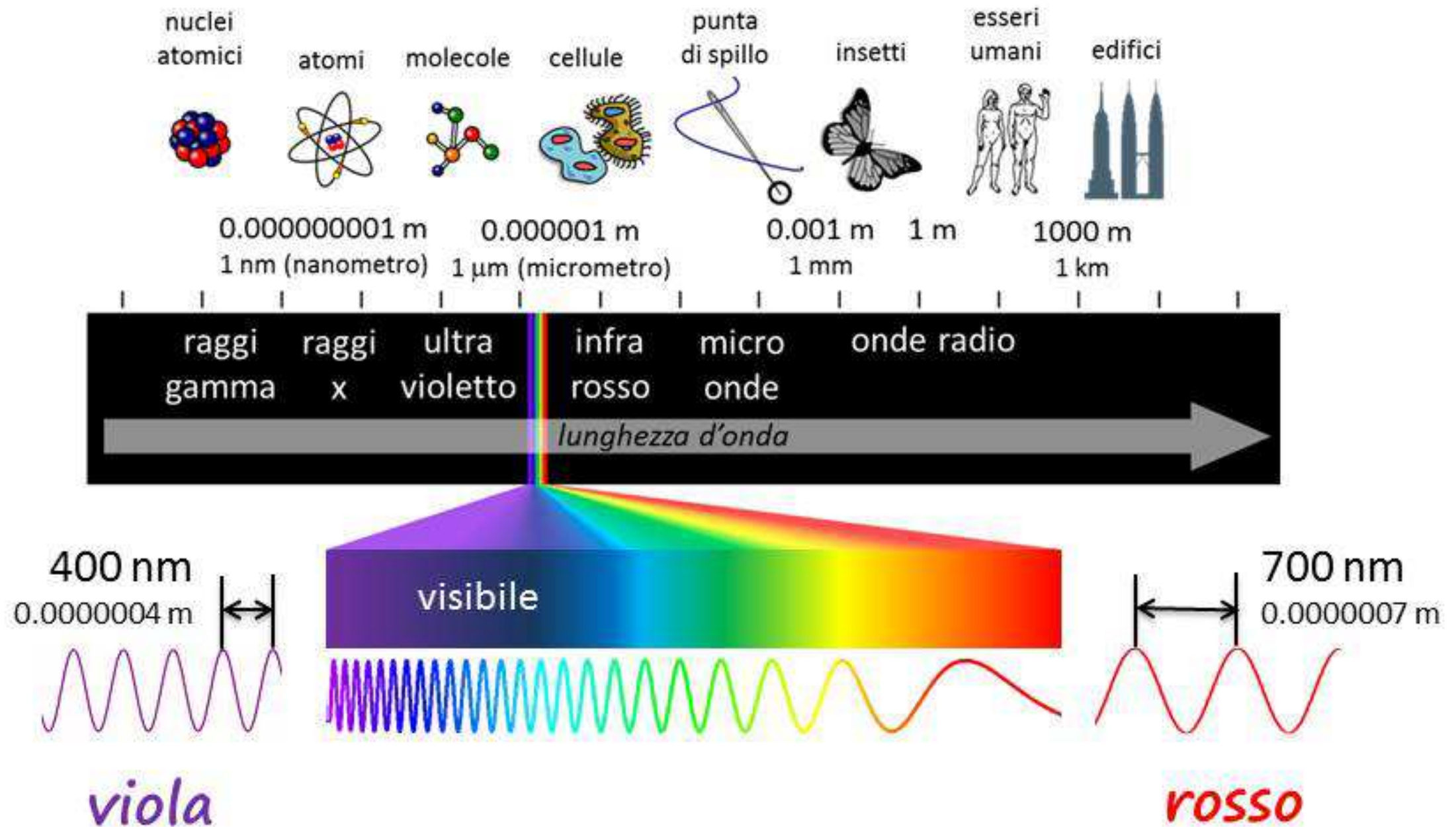


*James C. Maxwell
(1831-1879)*

*luce = onde
elettromagnetiche*

Cos'è la luce?

Lo spettro elettromagnetico



Un semplice esperimento

...per "vedere" la luce infrarossa

invisibile ad occhio nudo



*dispositivo che
emette luce
infrarossa
(940 – 950 nm)*

visibile con videocamera

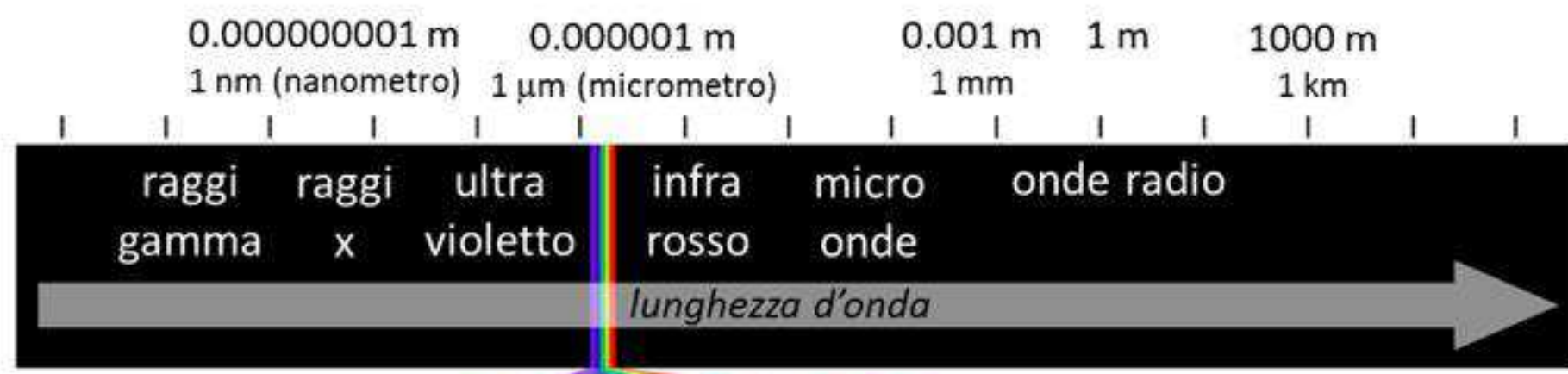


"Luce" ed energia



"Luce" ed energia

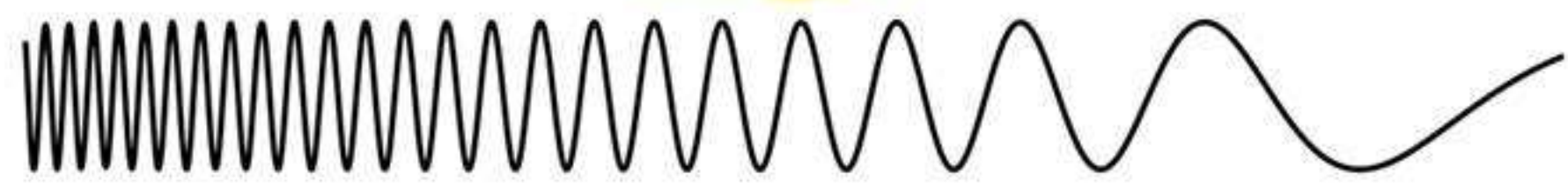
energia $E = C \cdot \frac{1}{\lambda}$ costante lunghezza d'onda



più energia

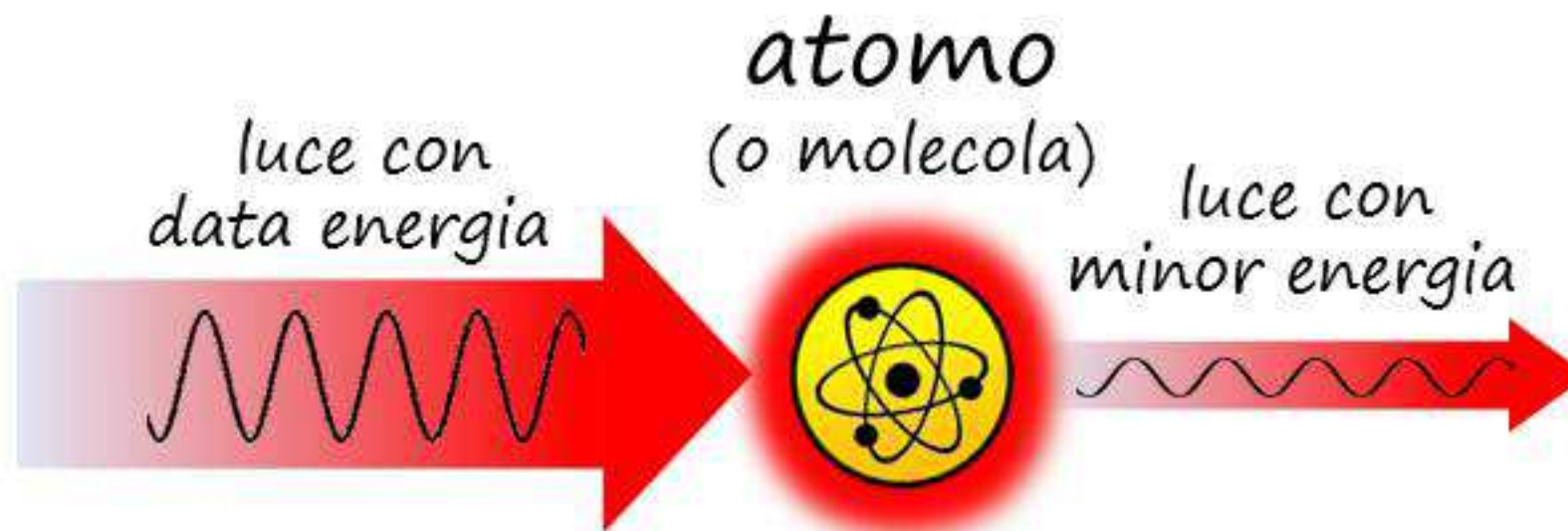
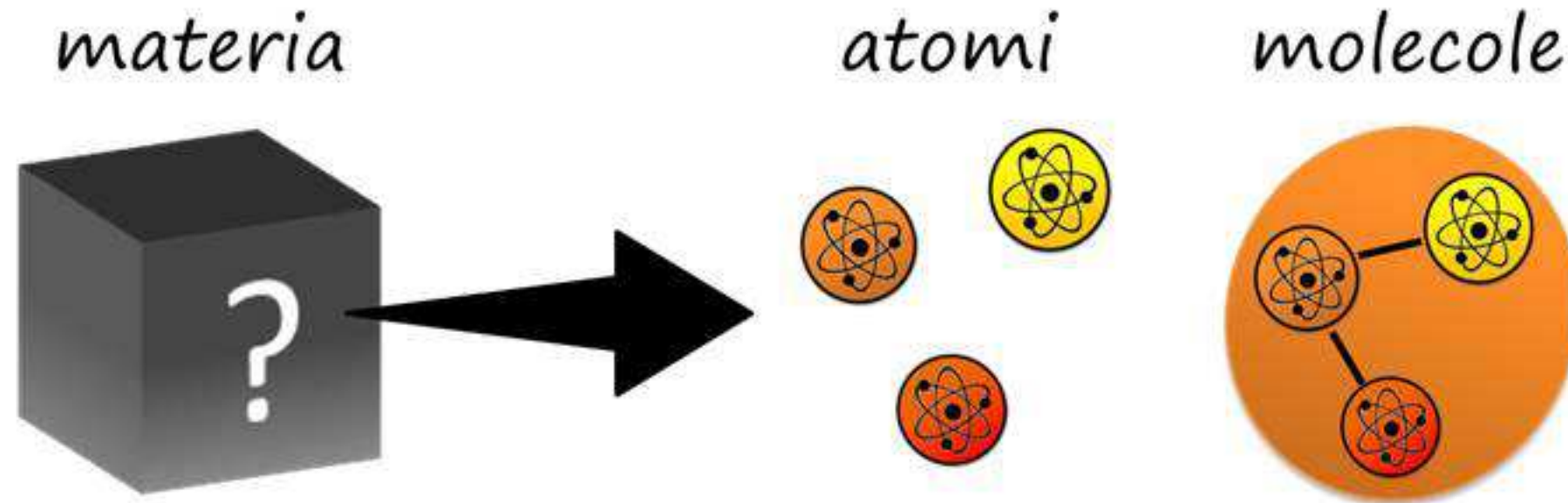


meno energia



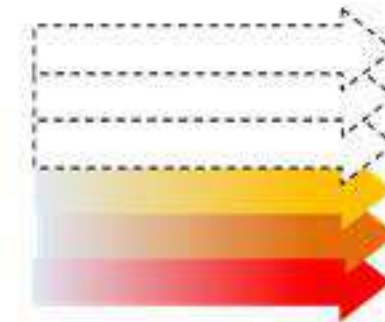
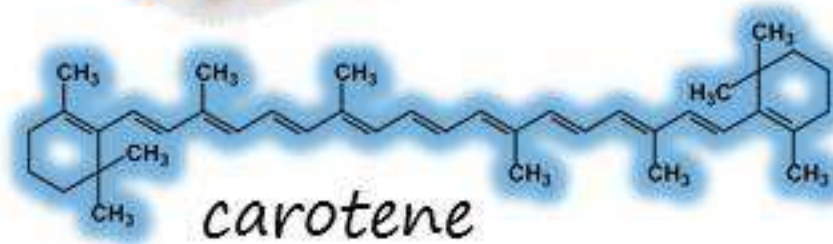
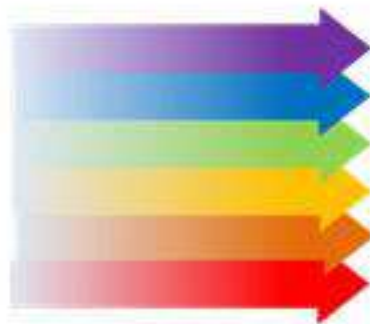
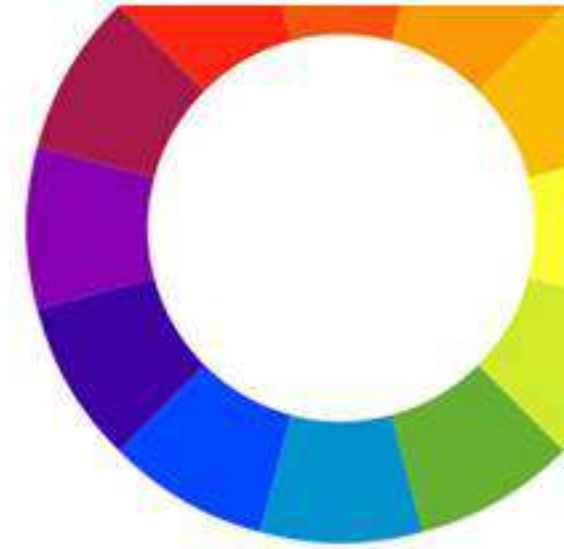
La spettroscopia

Scambi di energia tra luce e materia

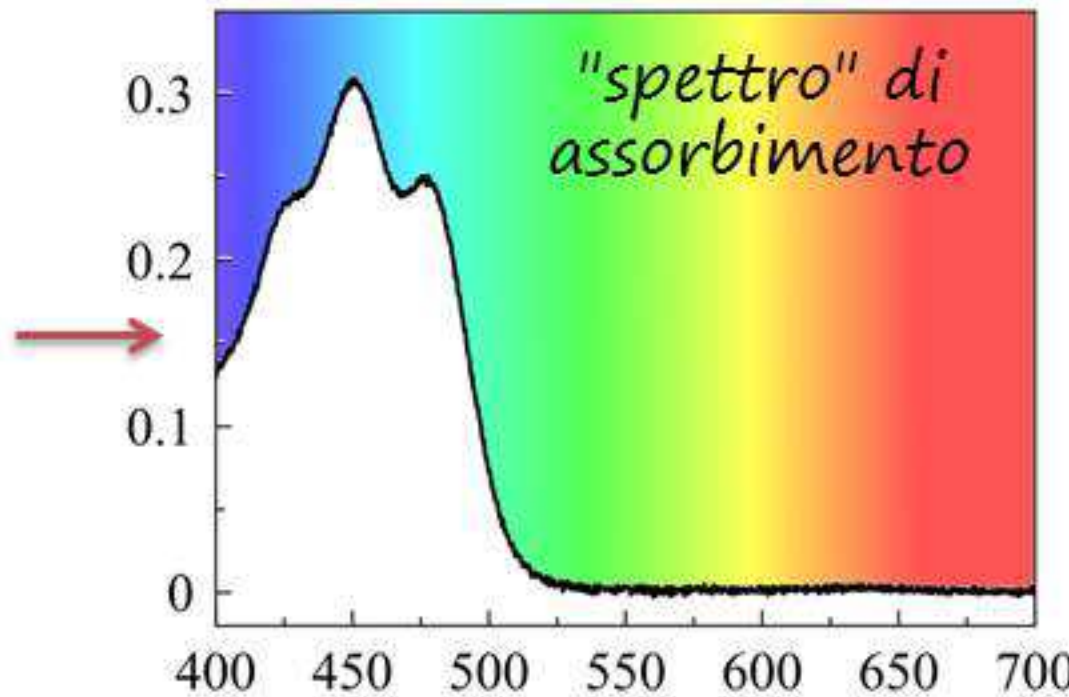


Colori

la materia sottrae energia alla luce



quantità di luce
"assorbita"
dalla materia



colore
(lunghezza d'onda
espressa in nm)

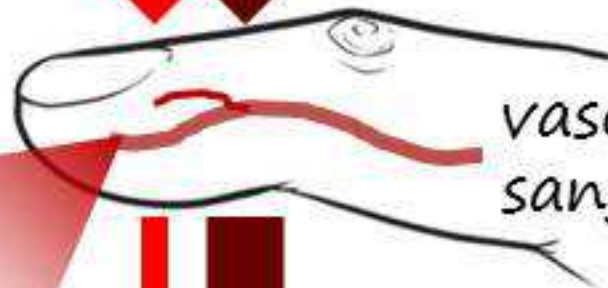
Applicazioni

L' esempio dell' ossimetro



emoglobina

globuli rossi

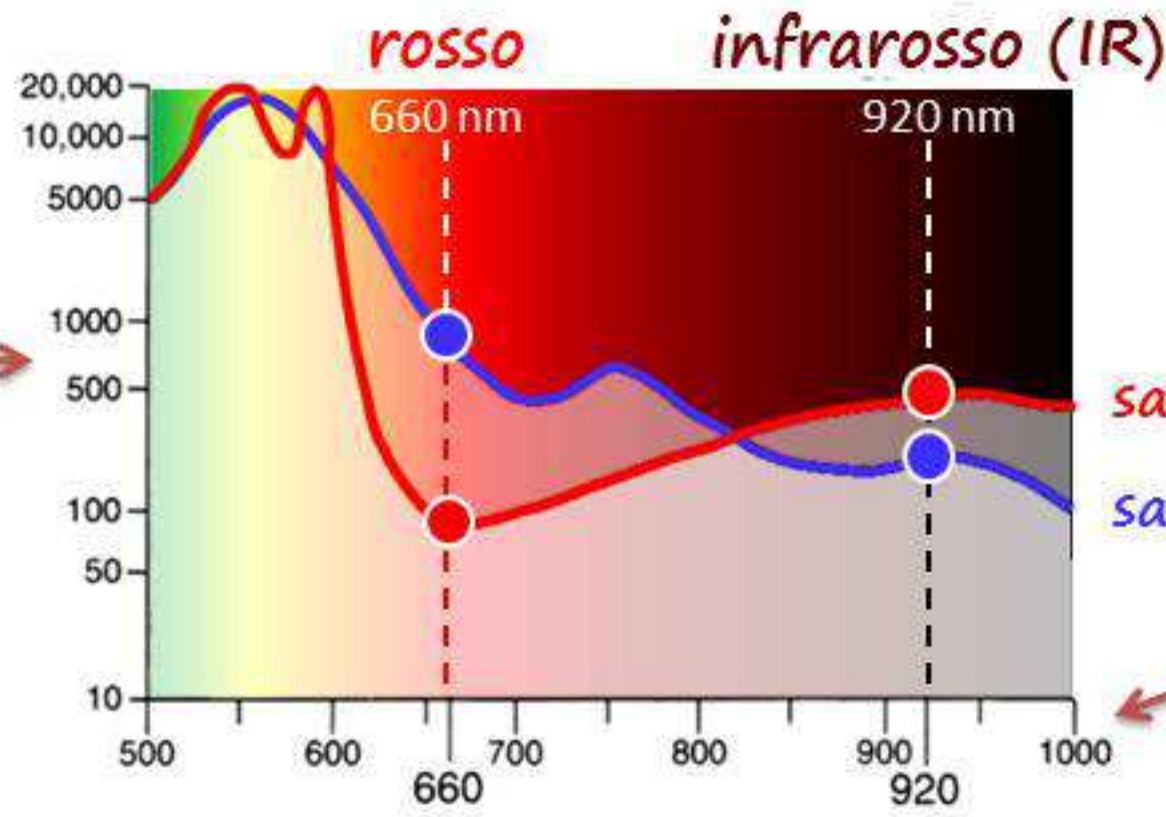


vaso sanguigno

"ossimetro"



quantità di luce "assorbita" dalla materia

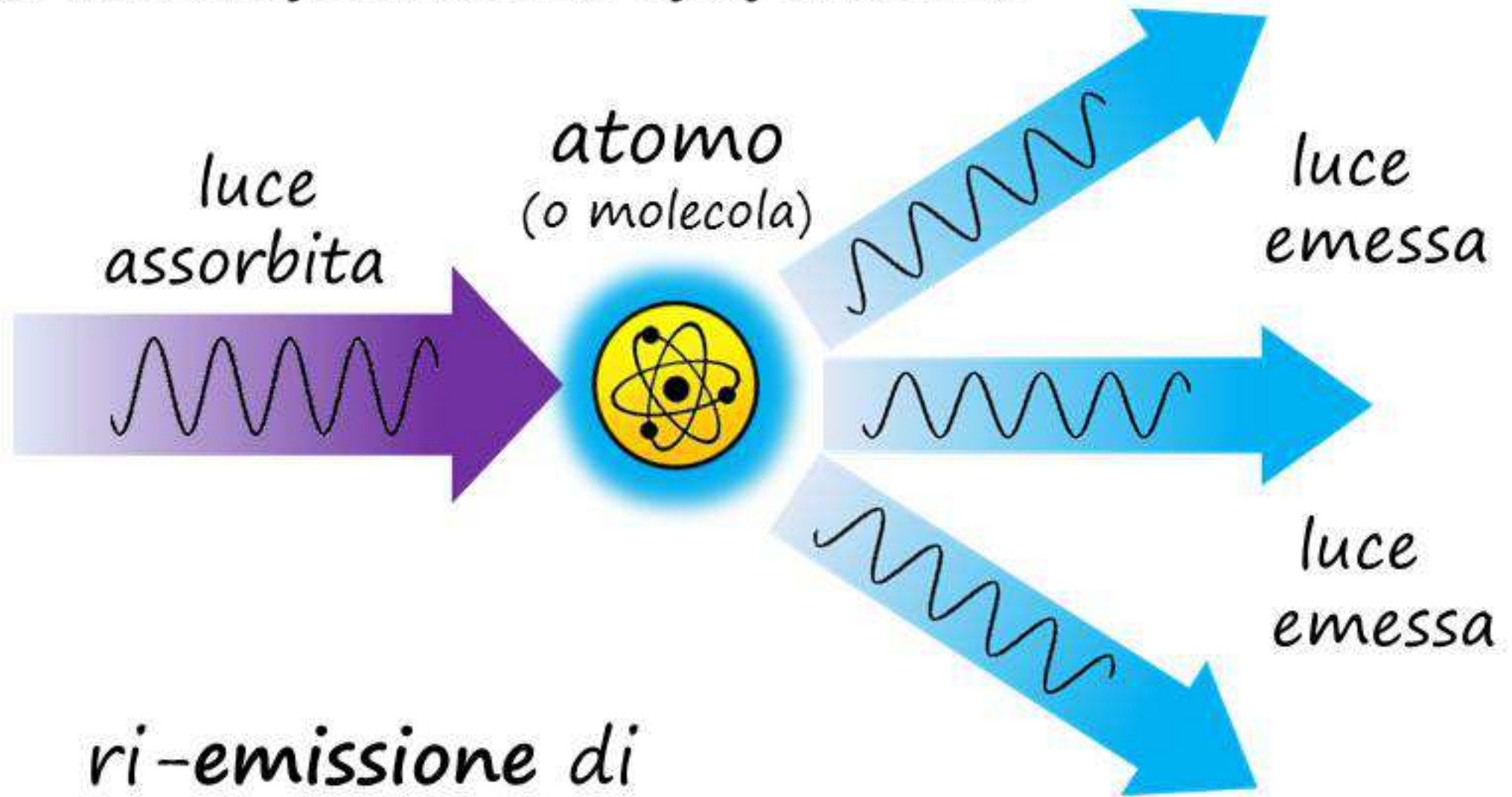


sangue con ossigeno
sangue senza ossigeno

colore (lunghezza d'onda espressa in nm)

Fotoluminescenza

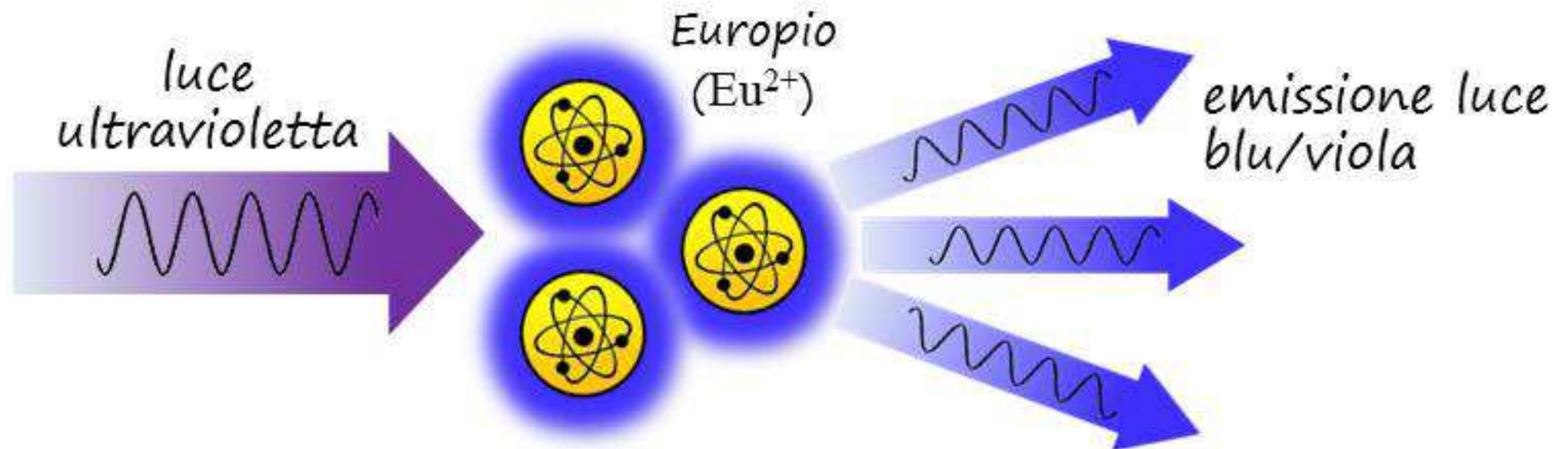
Luce dalla materia: *fluorescenza* e *fosforescenza*



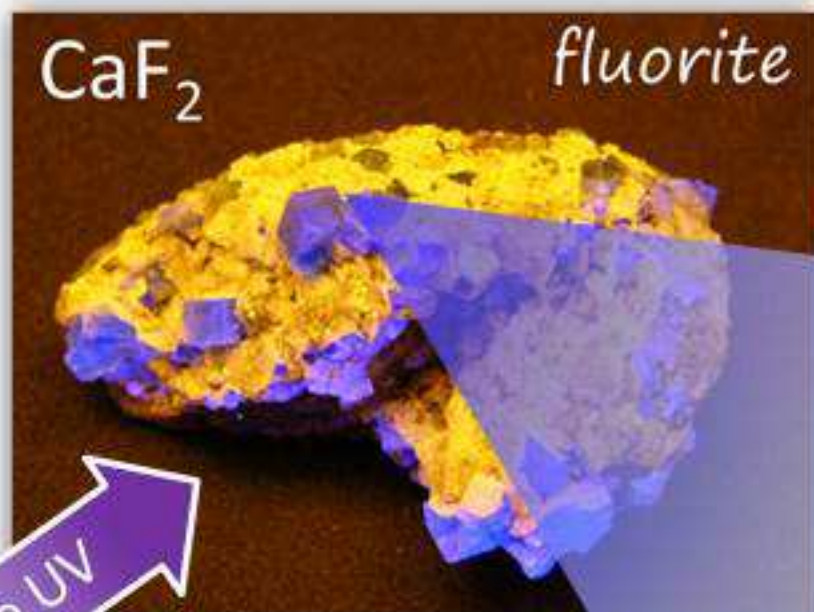
*ri-emissione di
energia assorbita
sotto forma di luce*

Fotoluminescenza

La fluorescenza: un esempio

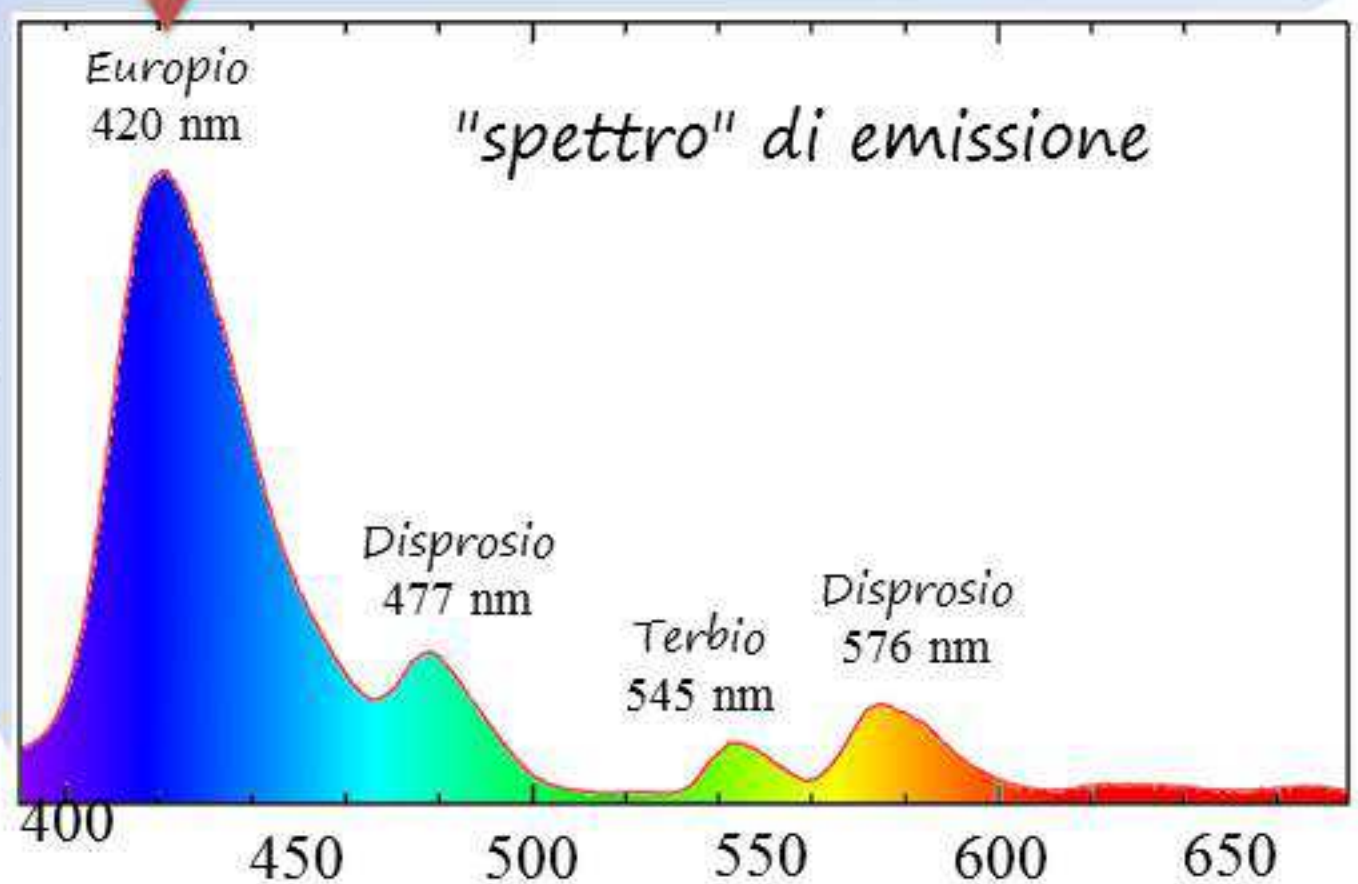
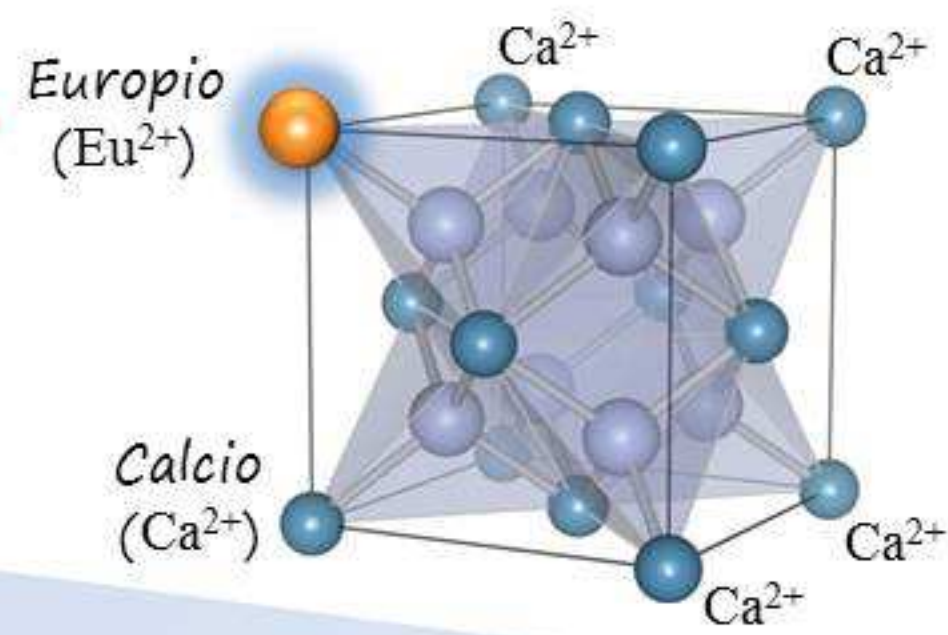


Fotoluminescenza



luce UV

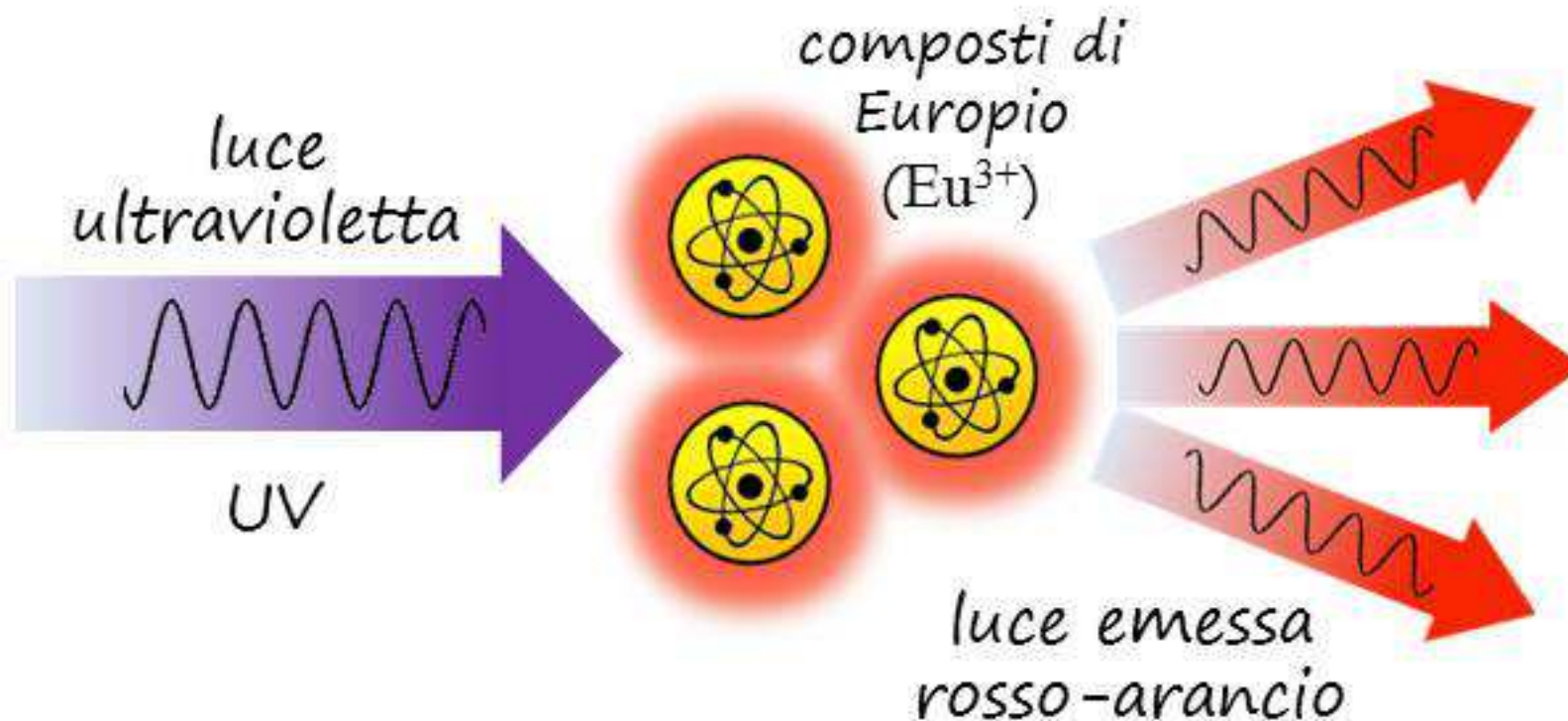
quantità di luce
"emessa"
dalla materia



colore
(lunghezza d'onda
espressa in nm)

Fotoluminescenza

metodo
anti-contraffazione



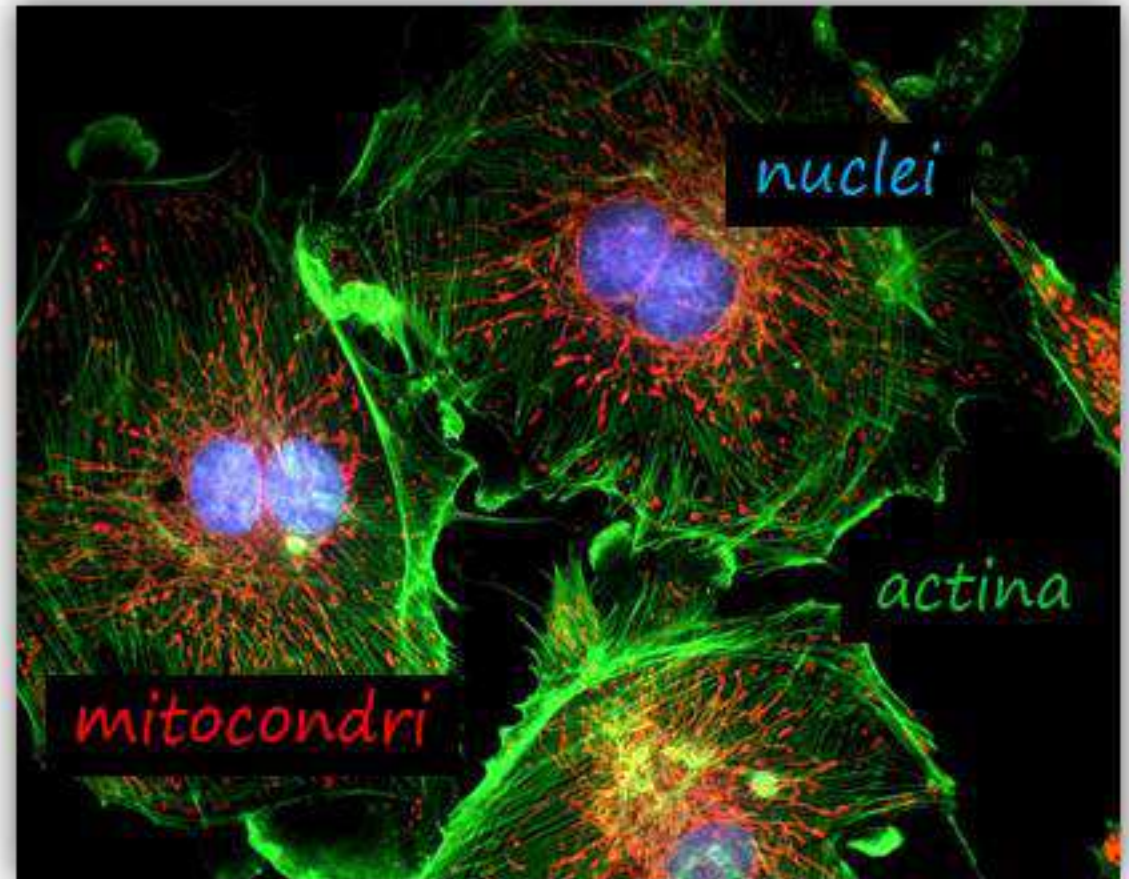
Fotoluminescenza



impronte
digitali

rende **VISIBILE**
ciò che normalmente
non lo è

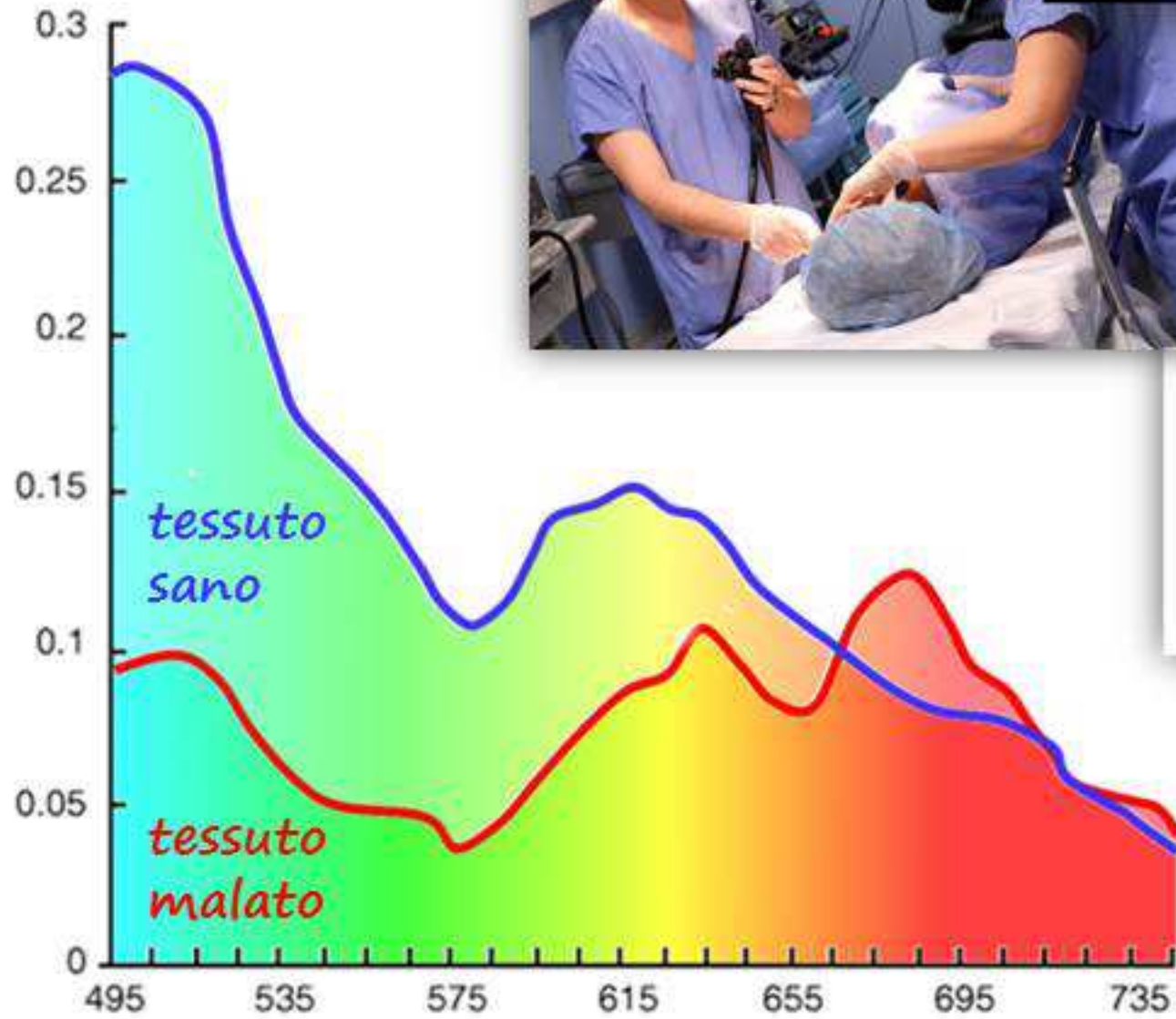
cellule
(strutture
cellulari)



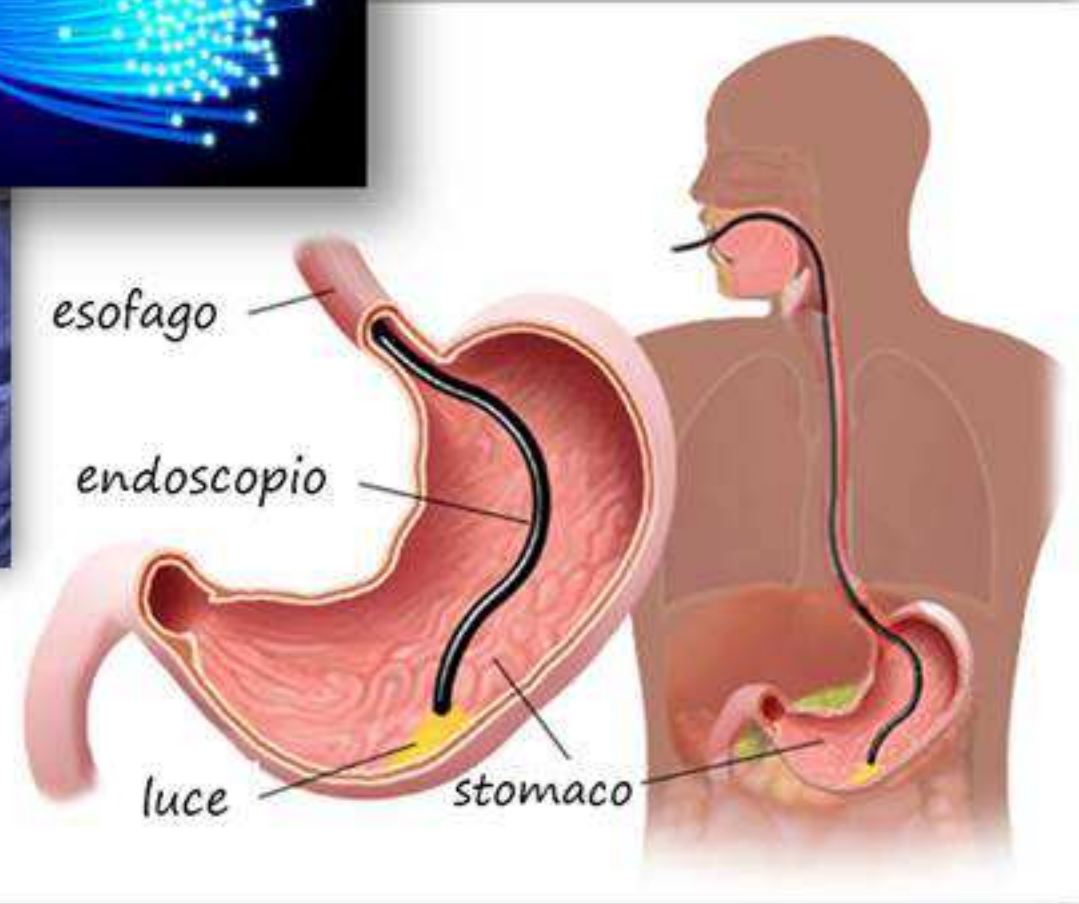
Fotoluminescenza

Applicazioni in medicina

quantità di luce
"emessa"
dal tessuto



endoscopia a
fluorescenza



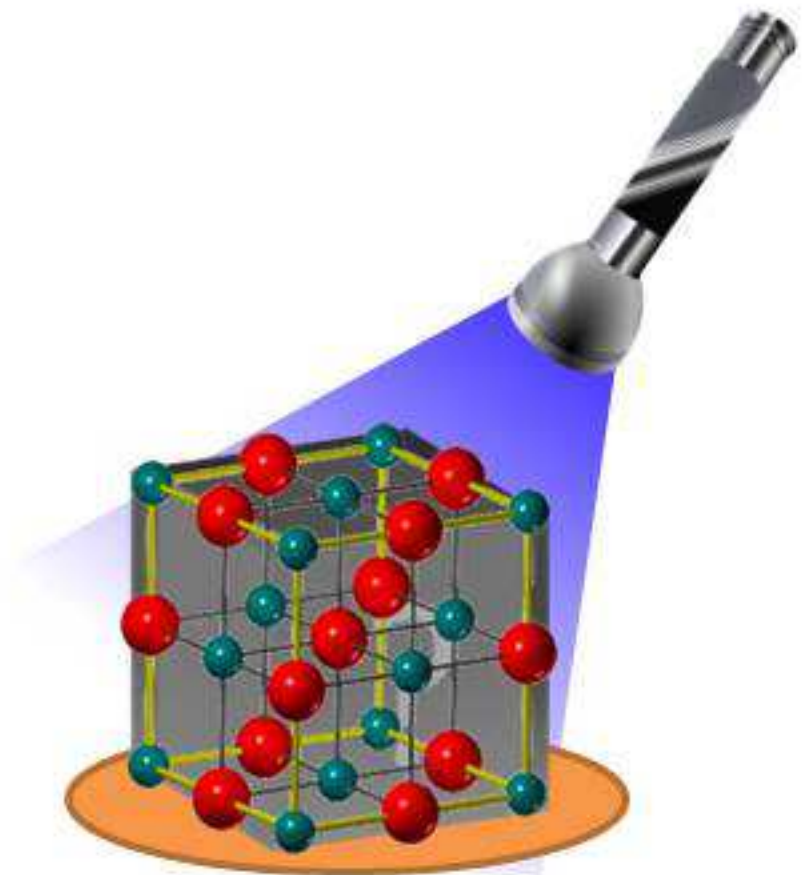
colore
(lunghezza d'onda
espressa in nm)

L'interazione tra luce e materia...

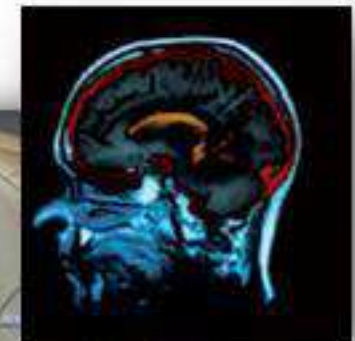
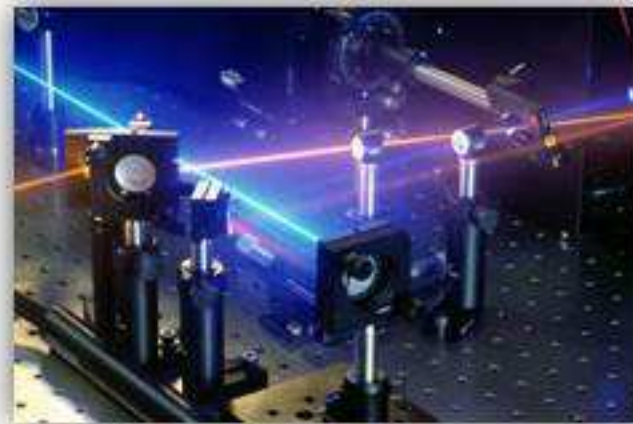
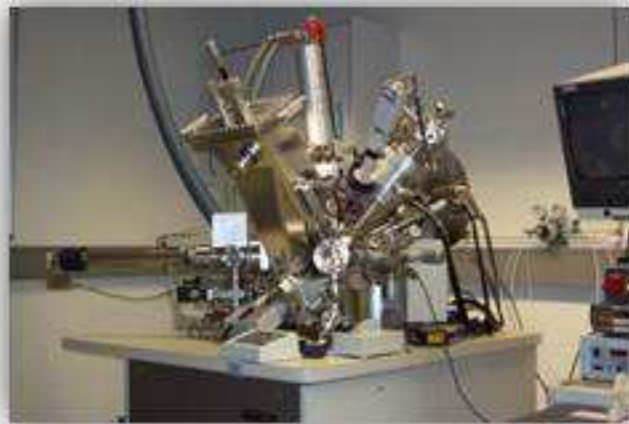
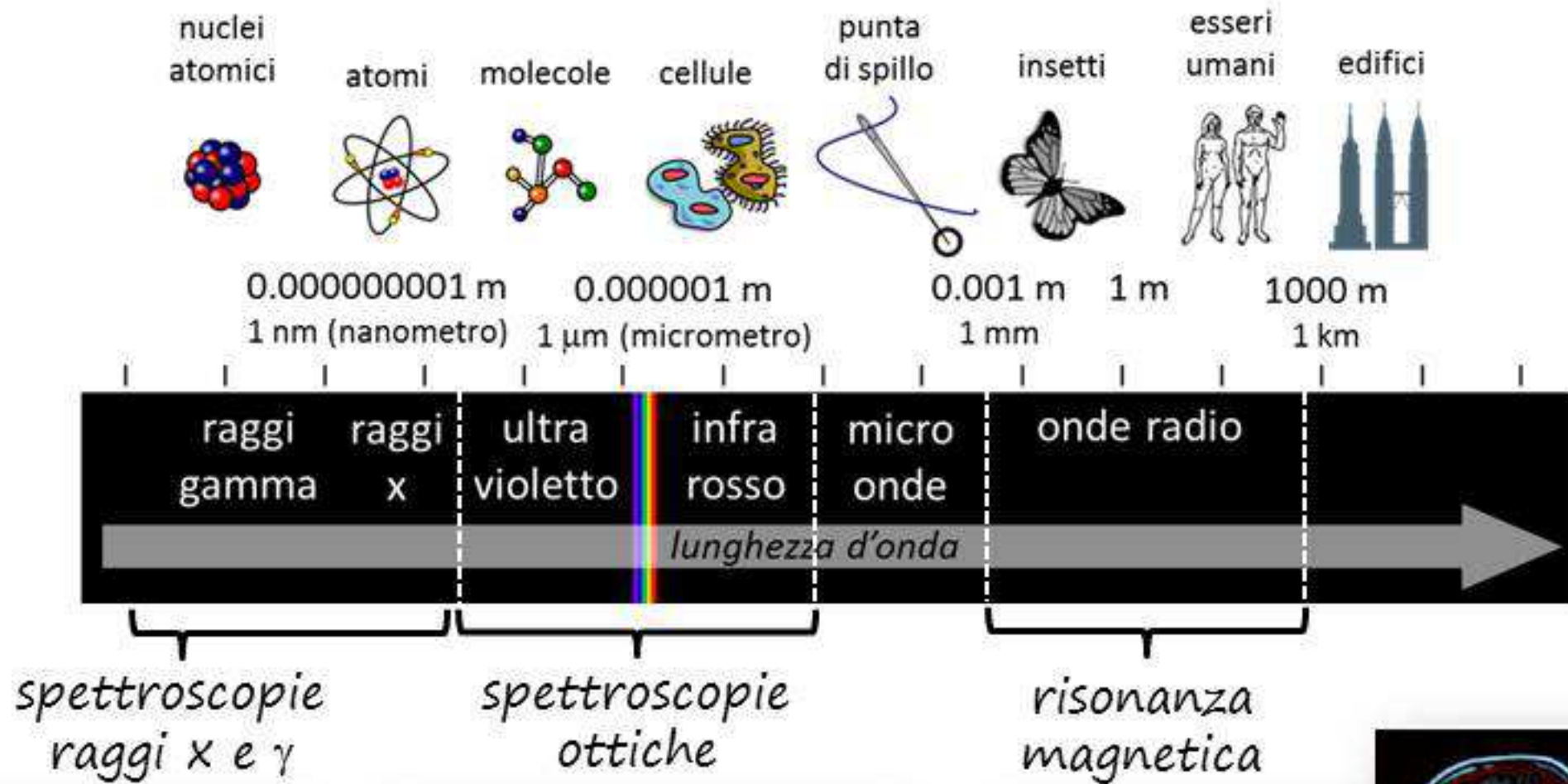
rende possibile
la **VISUALIZZAZIONE**
(IMAGING)
di componenti invisibili
di un campione



rende possibile
l'**IDENTIFICAZIONE**
(ANALISI)
di un campione
(a livello atomico-molecolare)

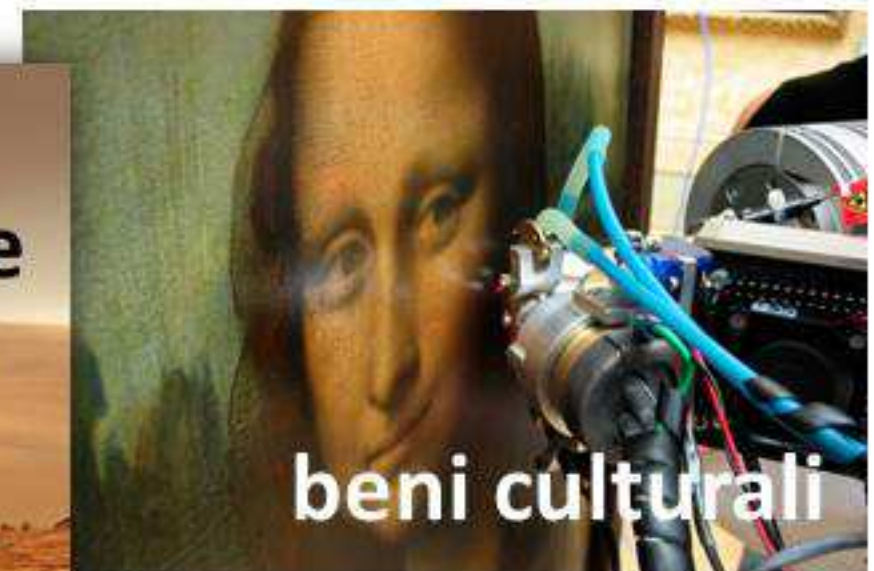


Ad ogni luce la sua spettroscopia



Spettroscopia ottica

Tra Scienza e Tecnologia



Un quesito finale

Secondo voi...

**...quali possibili applicazioni
basate sulla spettroscopia,
nei prossimi dieci anni,
potrebbero cambiare la nostra vita?**