

Dipartimento di Scienze Fisiche, Informatiche e Matematiche

Un'ottica differente

Dalla ricerca alla scuola e all'industria



NanoLab Educational nanoscience



NANOLAB è un progetto didattico di UNIMORE finalizzato ad integrare le **nanoscienze** nel curriculum della scuola superiore.

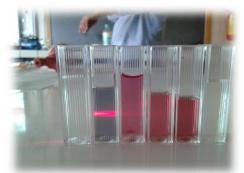


www.nanolab.unimore.it



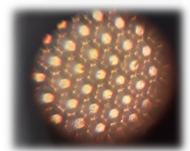




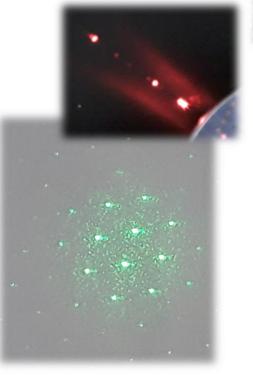












Perché le nanoscience

Le nanoscienze sono uno dei settori che sta maggiormente contribuendo all'innovazione tecnologica.

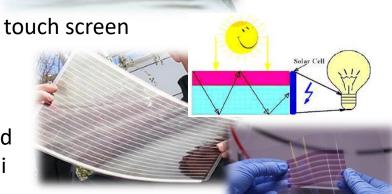


Autopulenti

Fotovoltaico ad alte prestazioni

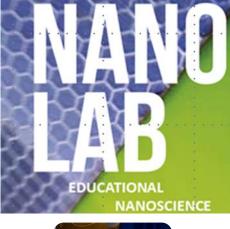




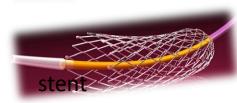


Muscoli

artificiali



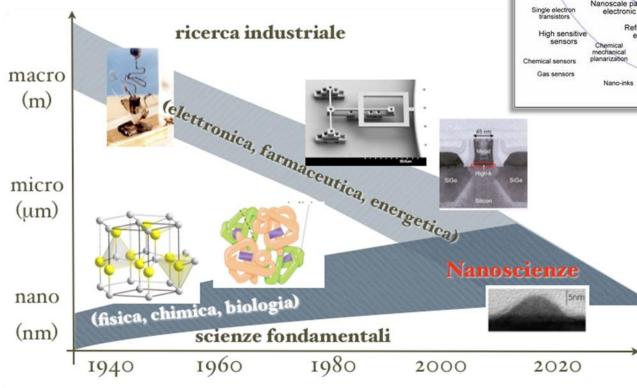






Nanoscienze

Per "definizione" sono riferite a sistemi e particelle di dimensioni comprese tra 1 e 100 nanometri



APPLICATIONS OF NANOPARTICLES Dental ceramics Heat retaining Electroconducting Natural / synthetic Bio-composites Molecular tagging Paint-on Hydrogen solar cells storage Controlled release Lithium ion materials battery Dye sensitised lectrodes Cancer therapy solar cells **TEXTILES** Hydrogen production Drug delivery additive catalyst BIOMEDICAL RENEWABLE Fuel cell catalysts Automotive contrast Antibacterial catalysts Environmental catalysts HEALTH CARE Pollutant **ENVIRONMENT UV** protection scavengers Waste water treatment Nutraceutical Pollution monitoring FOOD **ELECTRONICS** Quantum AGRICULTURE computers Food High density INDUSTRIAL processing catalysts data storage Food Ferro High powe packaging Nanoscale patterning of Functional Industrial electronic circuits Catalysts Refractive index Reinforced hermal-conductive ceramics liquid Self-cleaning building surface conductive Nano-phosphors polymer films

Integrano
competenze di
Fisica Chimica
Ingegneria Medicina
e Biologia.



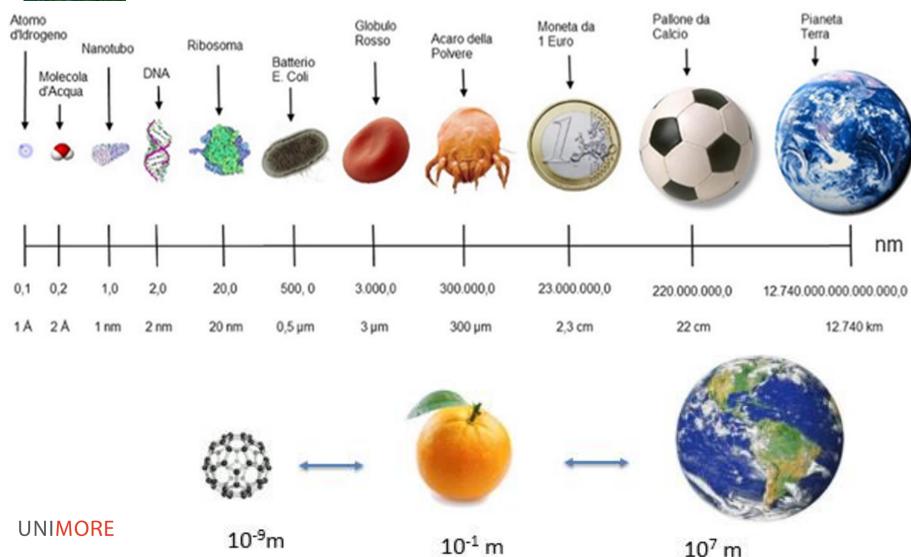


nano = 10 ⁻⁹ 1 nm=10 ⁻⁹ m

Nanometro

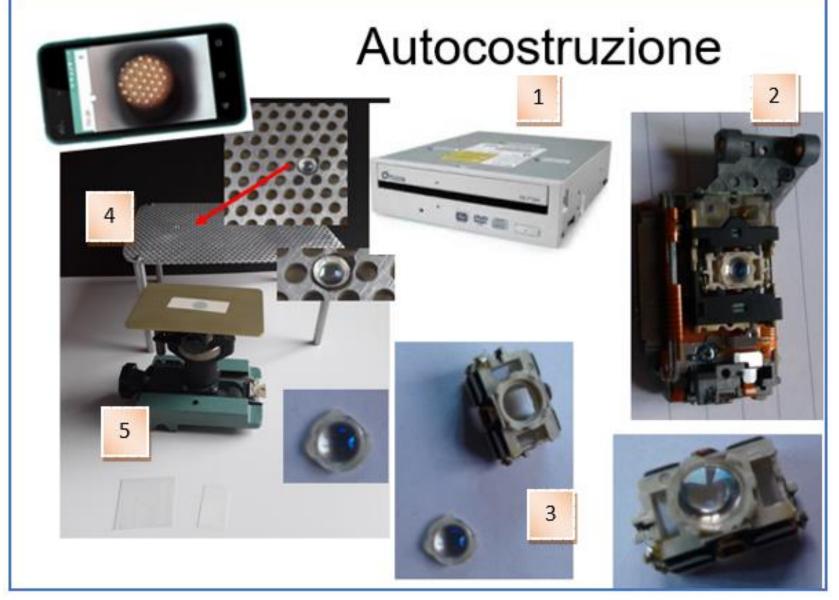


1 mm diviso in un milione di parti

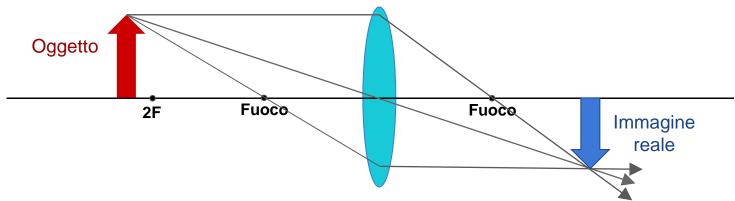


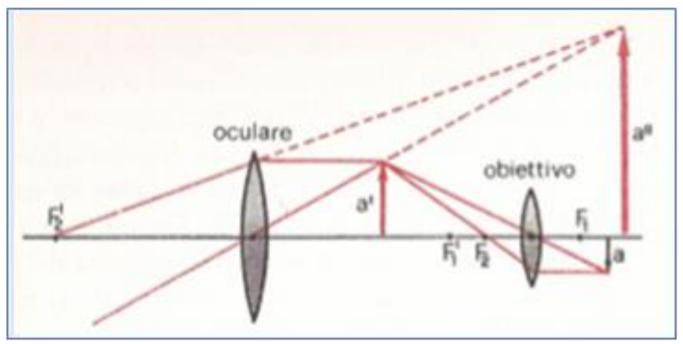
Microscopio con lo smartphone





Ottica geometrica



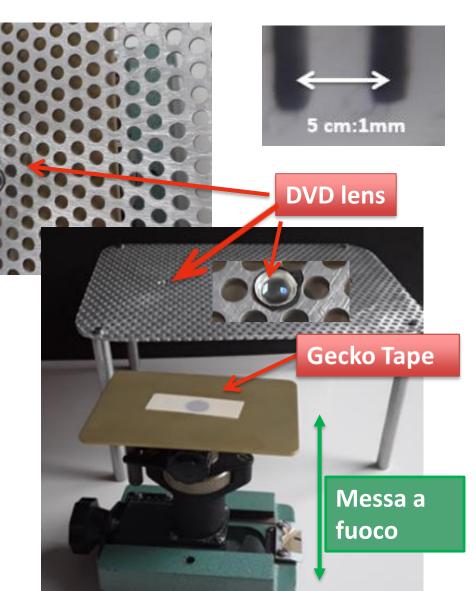


Costruzione di un microscopio con lo smartphone





Teoria, ricerca di soluzioni, realizzazione pratica, misure



Studio con la diffrazione



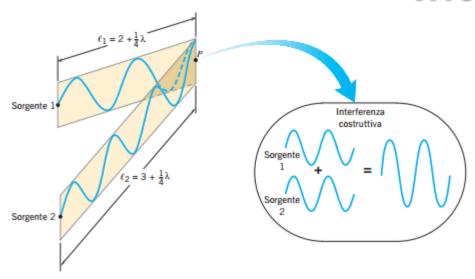


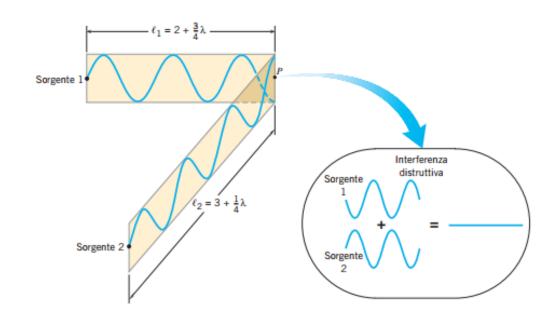


Teoria, esperimenti, elaborazione dati, Ricerca di soluzioni

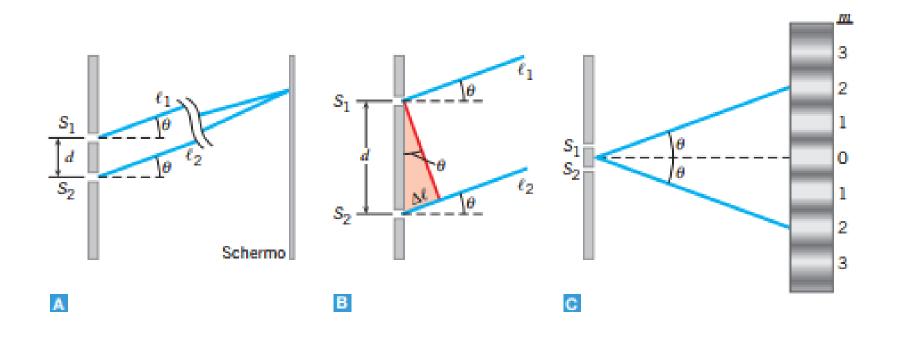
Interferenza







Differenza di cammino ottico



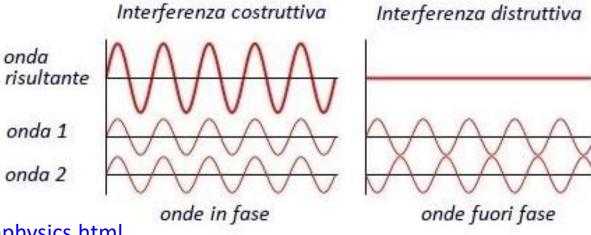
30/03/2019

Interferenza

Sovrapposizione, in un punto dello spazio, si due o più onde.

http://phet.colorado.edu/

http://www.falstad.com/mathphysics.html



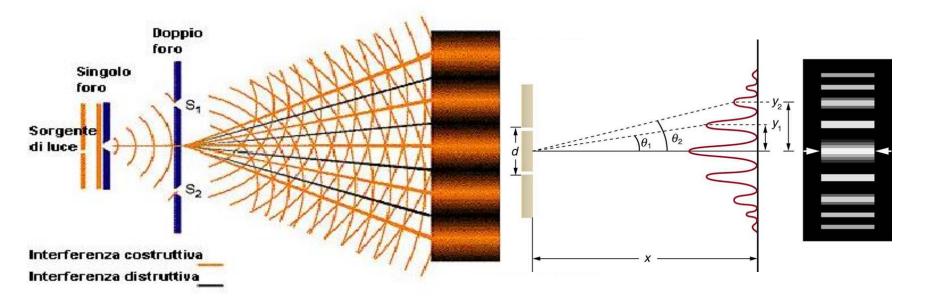
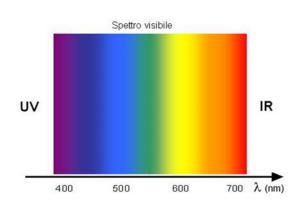


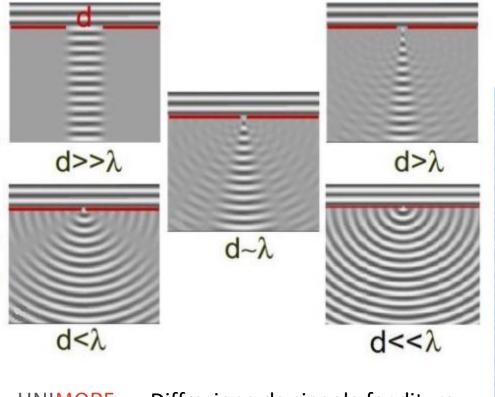
Figure: https://arcobaleno.wikispaces.com/Diffrazione+ed+interferenza

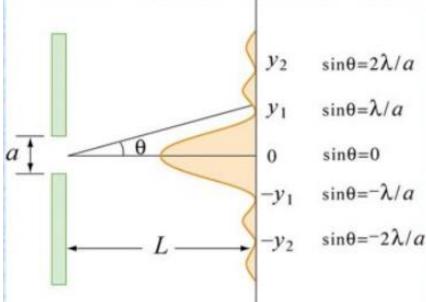
Diffrazione



C'è diffrazione quando un'onda colpisce ostacoli o fenditure di dimensioni comparabili alla sua lunghezza d'onda







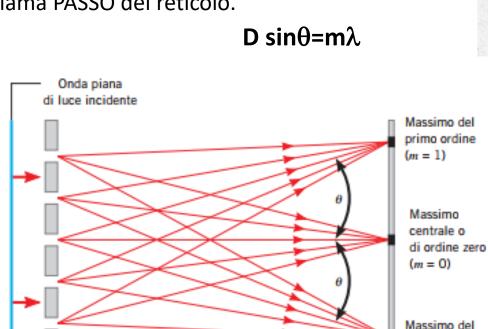
UNIMORE Diffrazione da singola fenditura

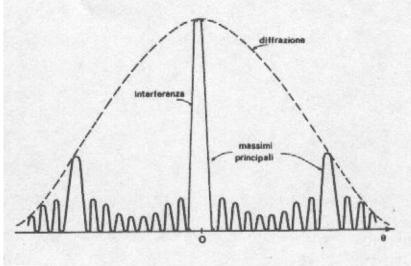
Reticolo di Diffrazione

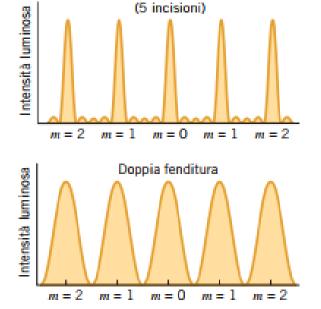
Un reticolo di diffrazione consiste in una lastra su cui sono praticate numerose incisioni parallele equispaziate e molto vicine fra loro

La distanza D tra due fenditure adiacenti si chiama PASSO del reticolo.

Reticolo di diffrazione





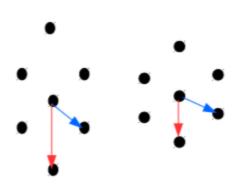


Reticolo

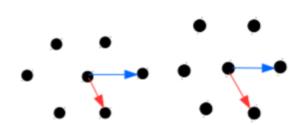
30/03/2019

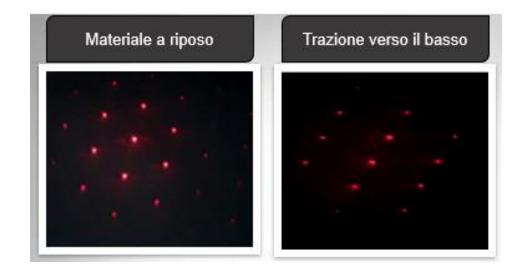
primo ordine (m = 1)

Reticoli flessibili









Thanks for your attention!



Contributi



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Corso di laurea in fisica



