

OPTICAL PROPERTIES OF PARTICLES

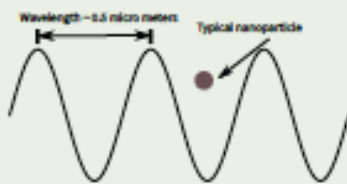


Light

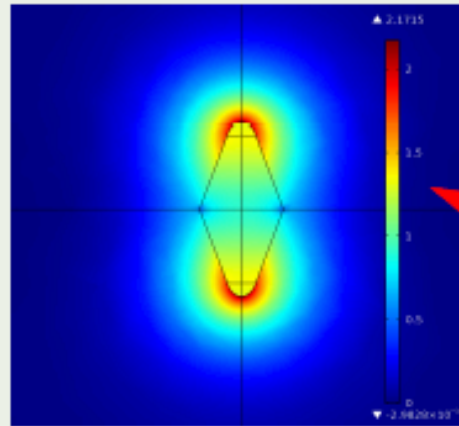
Light is made of oscillating electric and magnetic fields.



The colour of the light is determined by the wavelength

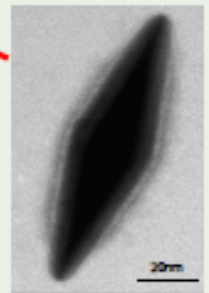


What are optical properties?



- How does light of different colours interact with particles?
- How much light is scattered?
- How much light is absorbed?
- What direction does the light scatter in?

We use computer simulations to answer these questions.



Useful for nanoscience

Gold nanoparticles reflect green light

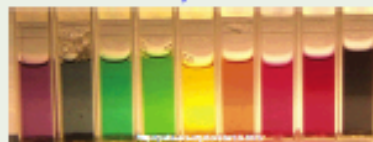
The Lycurgus Cup, circa AD 300



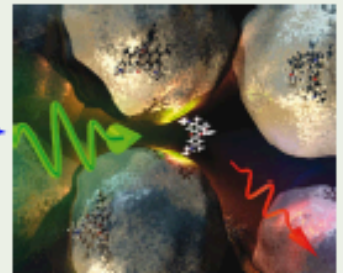
This cup has coloured glass in it that reflects light differently to how it allows light through it. This causes the colour to be different depending on whether the light is in front of (left) or behind (right) the cup. The colour is due to really small particles of gold and silver in the glass.

Gold nanoparticles absorb green light

Nanoparticles have interesting optical properties.



Different sized particles react differently to different colours of light



Nano-particles can allow detection of single molecules using the technique of surface-enhanced Raman Spectroscopy

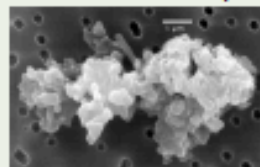
Useful for astronomy and climate science

How far away is this galaxy?

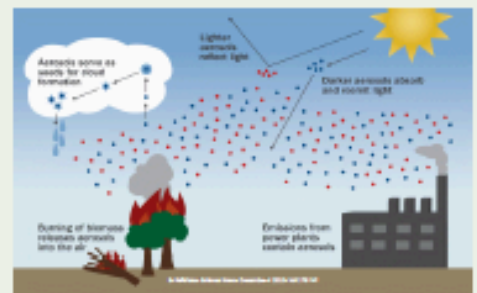


In order to measure the distance to distant galaxies, we measure how bright certain types of stars are. BUT, the space between these stars and us has dust in it, so the light becomes dimmer. If we didn't take the light scattering into account we would think the galaxies are further away than they are!

This dust is found in space



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The effects that aerosols in the atmosphere have on light scattering are important in order to understand climate change. Modelling how light is scattered by particles can help us understand this behaviour.