



Learning Objectives

- To be able to identify and characterize both natural and artificial sources of light

What do these things have in common? How are they different?



- ● ●

11. 2: Sources of Light



Luminous

- Objects that produce and emit their own light are **luminous**
- For example:

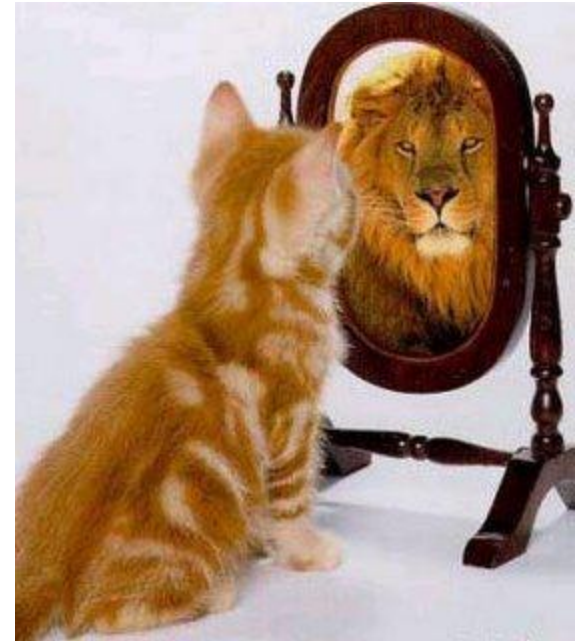
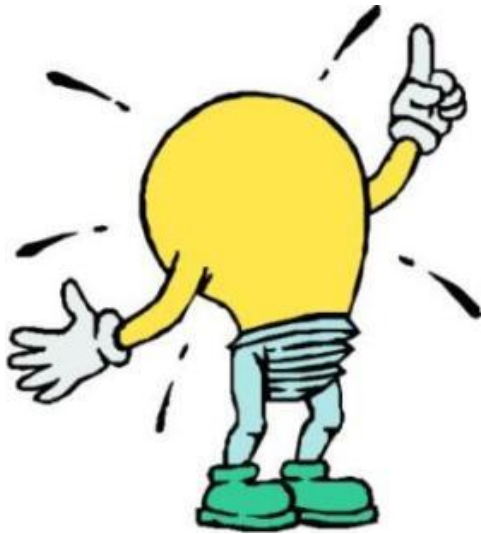


Non-Luminous

- Objects that do not produce their own light
- Most objects are non-luminous



Luminous or Non-Luminous?





Light from luminous sources



- Incandescence
- Electric Discharge
- Phosphorescence
- Fluorescence
- Chemiluminescence
- Bioluminescence
- Triboluminescence
- Light emitting diodes (LED)



Make a table....

Source of Light	How it is produced	Advantages	Disadvantages	Examples

Incandescence

How produced	Advantages	Disadvantages	Examples
very high temperature	Cheap	Very inefficient	 

- ● ● **Centennial Light Bulb:**



the world's longest lasting light bulb!

How long has this bulb been burning?




Planned Obsolescence in Economics?

Electric Discharge

How produced	Advantages	Disadvantages	Examples
An electric current is passed through a gas	Coloured light can be produced	The light is not very bright	 

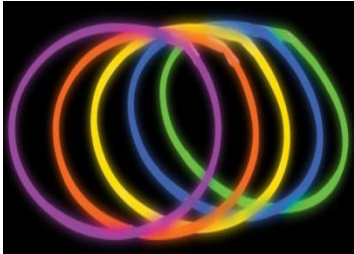

Fluorescence

How produced	Advantages	Disadvantages	Examples
UV light is converted to visible light <i>immediately</i>	More efficient and longer lasting than incandescent	Contain hazardous substances (Hg vapour) and are more expensive	 The image shows two types of fluorescent light bulbs. The top one is a compact fluorescent light (CFL) bulb, which is a small, spiral-shaped bulb with a white base and a screw-in base. The bottom one is a linear fluorescent tube (LFT), which is a long, thin, cylindrical tube with a white coating and metal end caps.


Phosphorescence

How produced	Advantages	Disadvantages	Examples
Absorption of UV light followed by emission of visible light over a period of time	Glow-in-the-dark watches, clock faces, T-Shirts, toys, novelty items)	Not very bright and slowly fade	 

Chemiluminescence

How produced	Advantages	Disadvantages	Examples
Chemical reaction	Portable, durable, inexpensive Can be used when electricity would be unsafe	Single use	 

Bioluminescence

How produced	Advantages	Disadvantages	Examples
Chemical reaction in a living organism	Attract mates Lure prey Scare predators	Limited applications	







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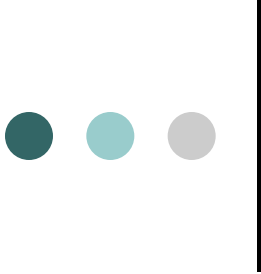
Triboluminescence

How produced	Advantages	Disadvantages	Examples
From the friction of scratching crystals	??	??	 

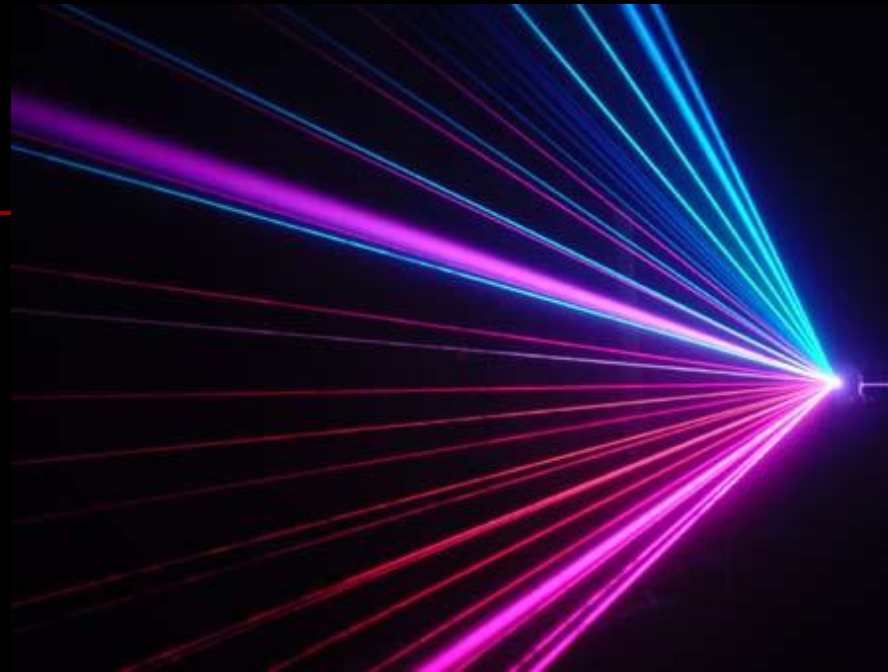
Light Emitting Diodes

How produced	Advantages	Disadvantages	Examples
Electric current passes through a semi-conductor	<p>Very efficient</p> <p>Durable (50 000 hours)</p> <p>Don't get hot</p> <p>Dimmable</p> <p>Slow-failure</p>	<p>Most expensive</p> <p><i>in terms of light bulbs</i></p>	



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1. What is the definition of a luminous object?
 2. Which of the following objects are luminous? Stars, the moon, hot toaster filament, planets, desk lamp.
 3. Classify the following according to the process by which they emit light:
 - Red-hot stove burner
 - Glow-worm
 - A lit match
 - Classroom lights
 - Warning lights on car dashboards
 - Canada Day glow sticks

The Laser: A Special Type of Light



- LASER: Light Amplification by Stimulated Emission of Radiation”
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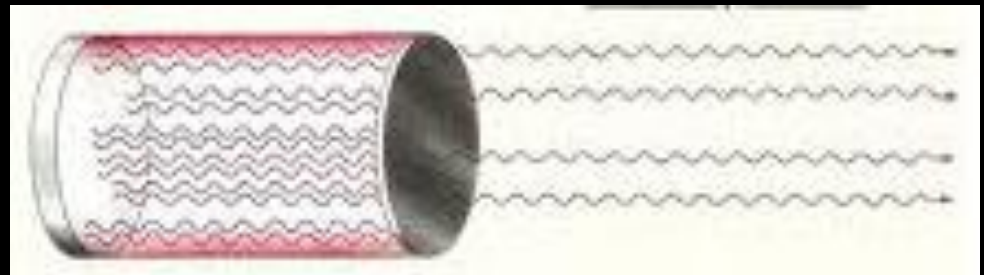
Light Bulbs

- Made up of waves of many different energy levels.



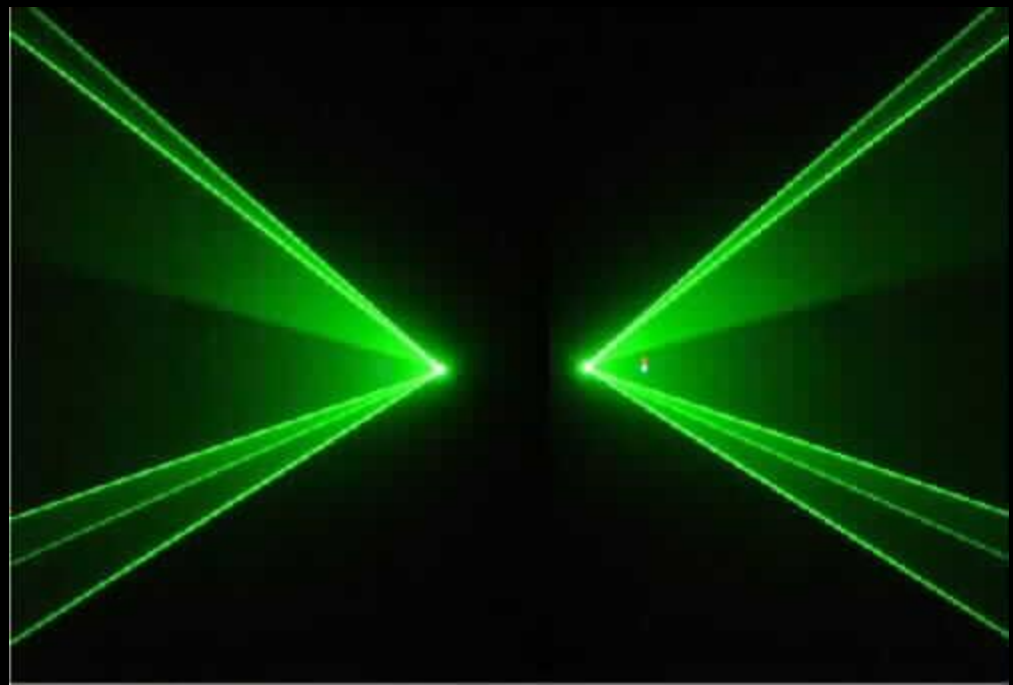
But a laser light.....

- Emits electromagnetic waves of exactly the same energy levels

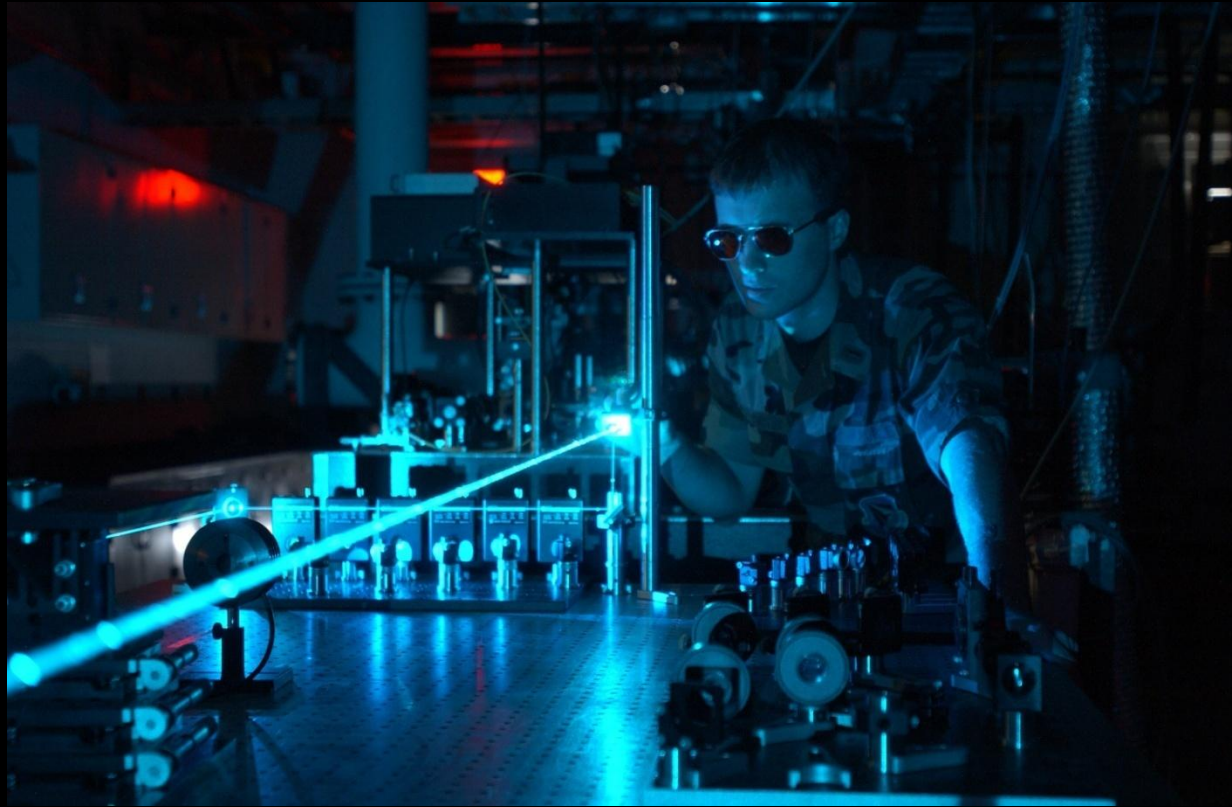


So?

- This results in laser light being a very pure colour and...



- It is also very intense (EM waves travel in exactly the same direction, in unison)
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So?



- A laser beam can travel great distances without spreading out.

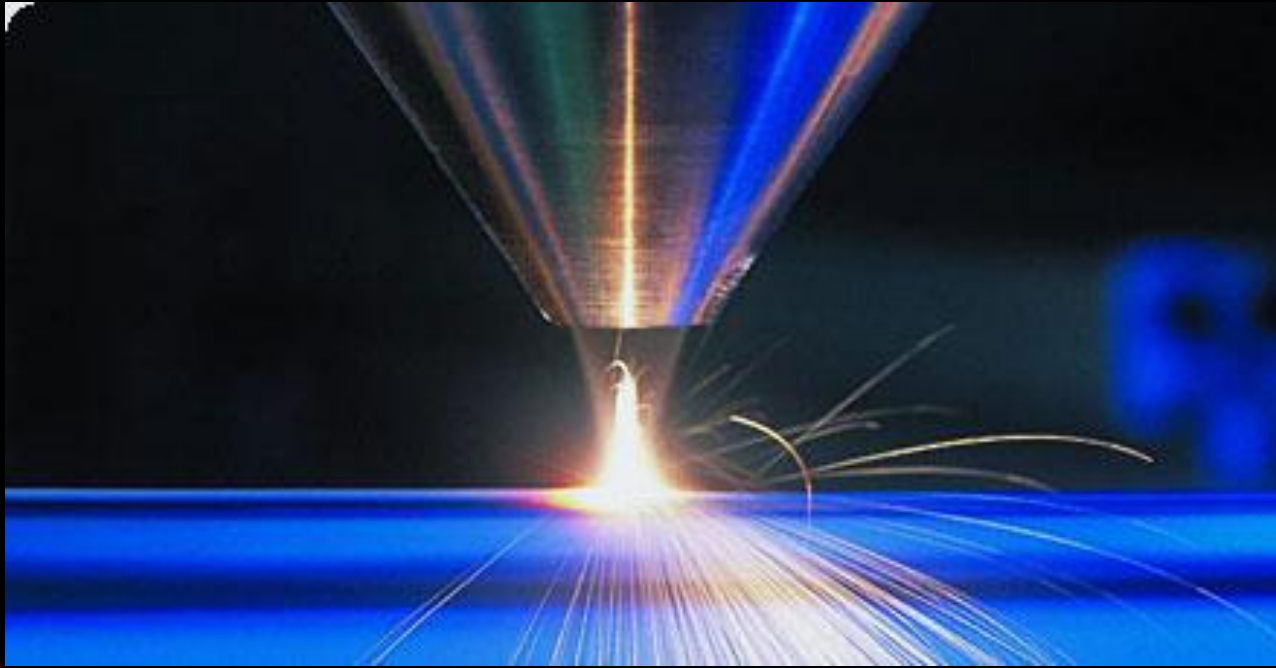
In summary: Laser light is

- Pure in colour
- Very intense
- Concentrated in one narrow beam

Very Useful!

Applications of laser light:

- Industrial (cutting / boring / welding)



Applications of laser light:

- Medical (eyes, skin, tissue)



Before

After



Applications of laser light:

- Measurement



Applications of laser light:

- Entertainment



Applications of laser light: security



Laser Larry says
to do this:



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