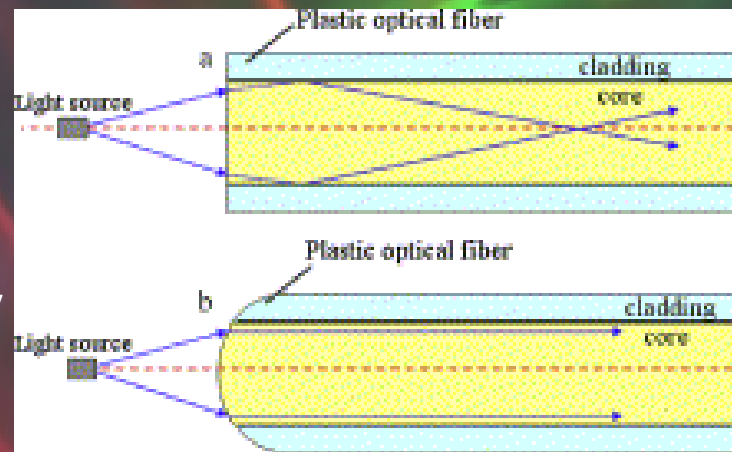


Photonics and spectral analysis

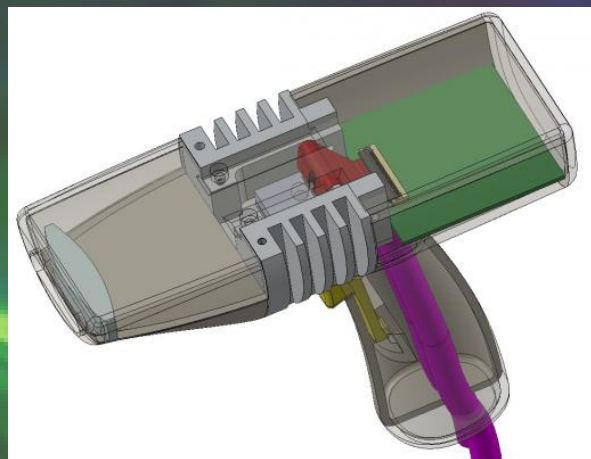
By Lucilla, Francesca, Camilla, Janne, Virginie and Sophie

What is photonics?

Photonics is the science of light involving the properties of detection, generation and manipulation of photons. Photonics uses light sources, the light goes through transparent medium. Sometimes **glass fiber** or **plastic optical fiber** are used to get the light in a specific direction. In the end the photons are detected by photodetectors.



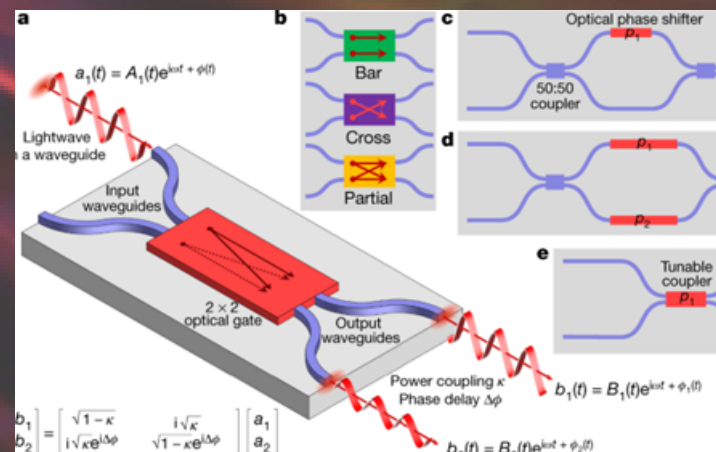
Detection of cardiovascular diseases



To detect cardiovascular diseases we can use a light gun. It measures the stiffness of the blood vessels using a **laser**. This laser bounces the light off the skin just above an artery. The reflected laser beam is analysed and a **Doppler shift** occurs. Based on the speed at which a blood pressure wave moves through the arteries, you can measure how stiff the aortic wall is.

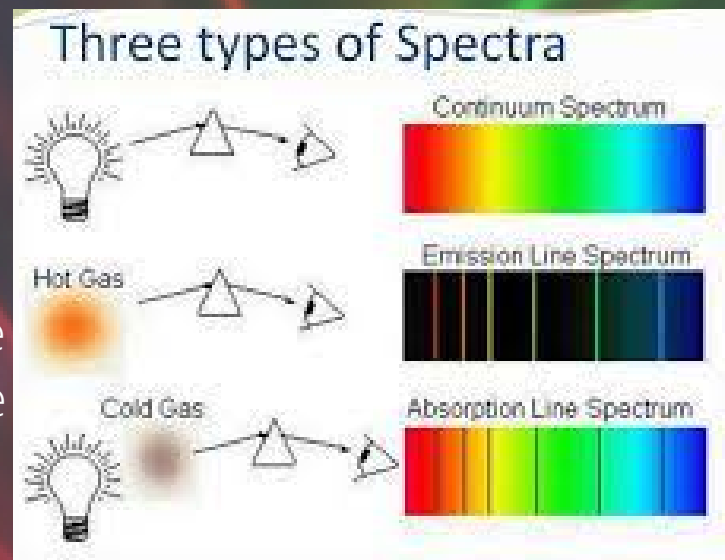
Photonic Integrated Circuit

A **photonic integrated circuit** is like a regular integrated circuit, but instead of electricity, it uses **light**. A PIC is much **faster and smaller** than a regular integrated circuit. Photonic integrated circuits are used in the biomedical sector, fiber-optic communications,...



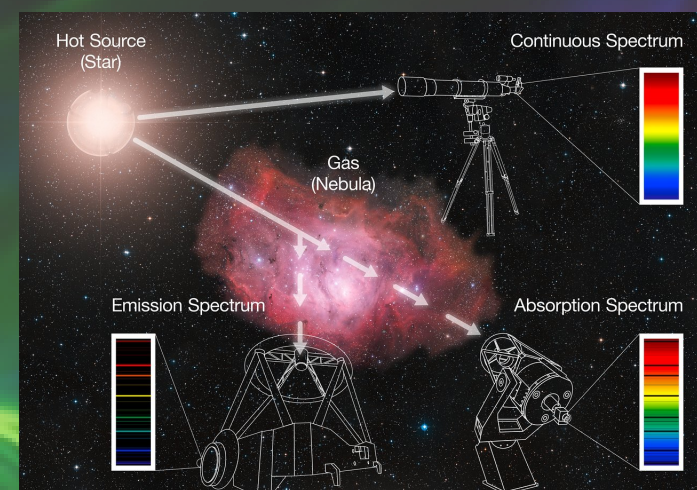
What is spectral analysis?

The study of the composition of matter by the analysis of the spectra of electromagnetic waves emitted or absorbed by it is called **spectral analysis**. It's possible to see the 2 different kinds of spectra in the image on the right. The lines, coloured in the emission spectrum and black in the absorption spectrum, correspond to **different wavelengths** of the elements analyzed



Application in astronomy

Thanks to the spectra, scientists can discover **properties** of any **celestial body** that emits or absorbs light (how hot, big and far from us they are, their motion, mass and chemical composition). The instrument used by scientists in these researches is the **spectroscope**.



Application for polluted air

Spectral analysis is used for discovering the different gasses which are present in the atmosphere. For this purpose, different techniques can be used in which **infrared** are involved. The reported procedure use **one machine**: it **emits infrared** and some of these are **reflected** and **captured** by the same device. The wave frequencies are analyzed and the gas is individuuated.

