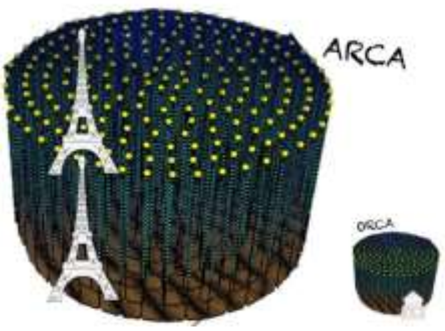
HOW CAN WE DETECT NEUTRINOS?

What have we learnt so far? We know that:

- **neutrinos can come from almost everywhere**
- **there are MANY neutrinos flying around us**

This should make it easy to see them, right? Unfortunately, it is not… Remember we said the neutrinos only interact weakly with the matter around us! This means that we need gigantic neutrino detectors to be able to see some of them.

Take for example our detectors: KM3NeT/ORCA (*Oscillation Research with Cosmics in the Abyss*) is as tall as a building of 60 floors (so, presumably: way taller than your house!), while KM3NeT/ARCA (*Astroparticle Research with Cosmics in the Abyss*) reaches more than twice the height of the Eiffel Tower and will occupy a surface equivalent to hundreds of soccer fields. Impressive, right? Such large devices are needed to increase our chance to catch some neutrinos.



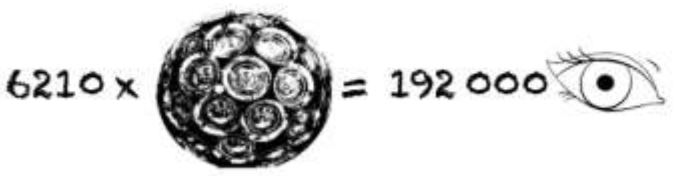
But how do we do to catch them? We have to wait for a neutrino to collide with the matter surrounding our detectors. If the neutrino encounters, for example, a proton, it can disappear to produce a charged particle that we know well, e.g. an electron. Neutrinos of different flavours could produce a muon or a tau, which can be seen as sort of heavy electrons. These charged particles can go very fast, faster than the light in the water (remember: light in water is slower than light in vacuum!), and when this occurs they will produce a blue light called Cherenkov radiation.

In view of making sure we can catch a neutrino, our detectors are equipped with thousands of sensors that can detect this Cherenkov radiation.

In total, our KM3NeT detectors will have more than 2,000 sensors each. arranged on structures standing upright from the sea bottom for hundreds of meters. We plan to have a total of 6,210 sensors working for us in the deep sea, and each of them will be equipped with 31 devices called photomultipliers – the eyes of the sensor that can see the Cherenkov light.

Can you imagine 190,000 'eyes' that will continuously look for hints of neutrino interaction in the darkest abysses of the Mediterranean Sea?

SPACE TECHNOLOGY AND EDUCATION PRIVATE LIMITED
WZ-19, Asalatpur, A-3 Block, Janakpuri, New Delhi-110058. Phone: +91-11-45086320, 25522193
Fax: +91-11-25532193. E-mail: getintouch@space-india.com, Website: www.space-india.com,
www.universeintheschool.com



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