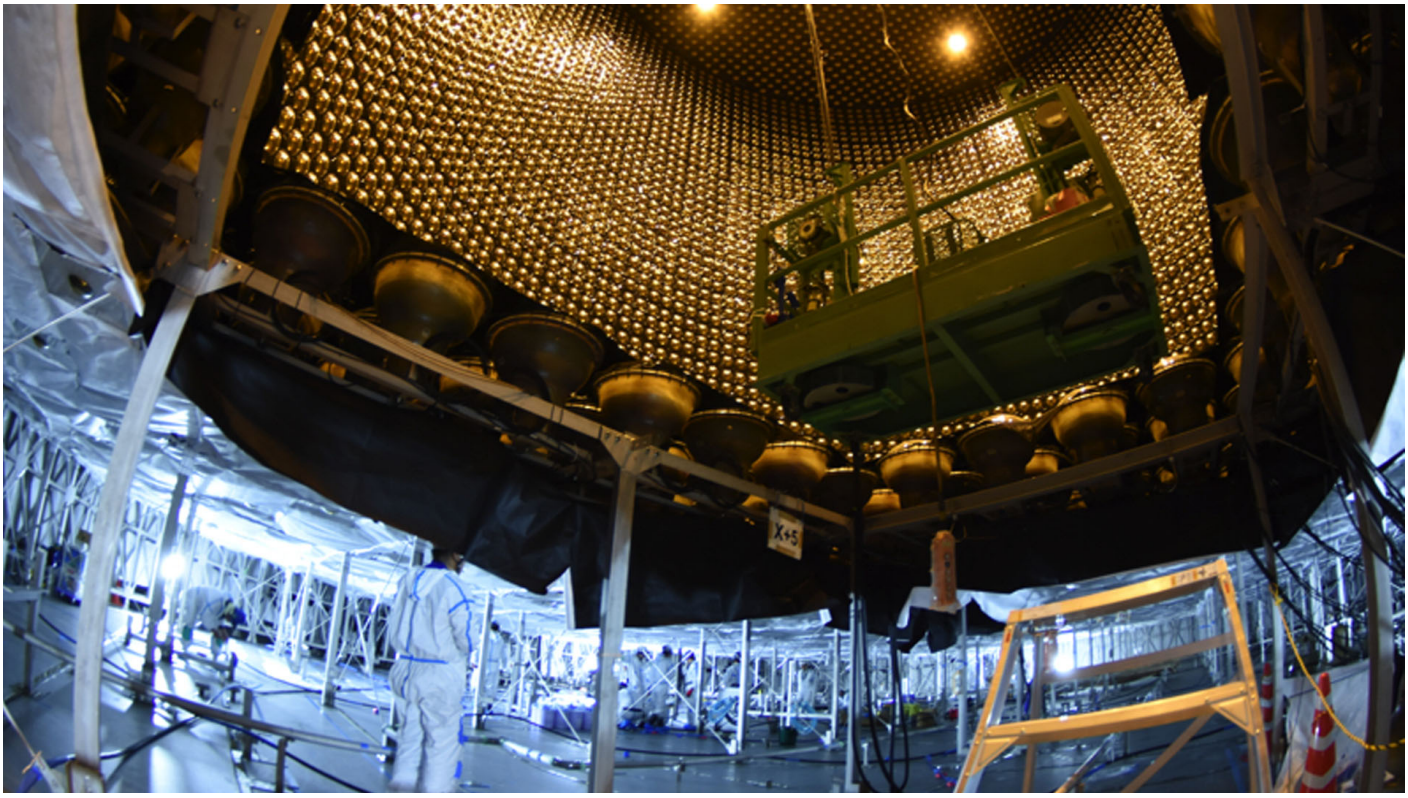
Tec collaborates in international project with 2 Nobel Prizes already

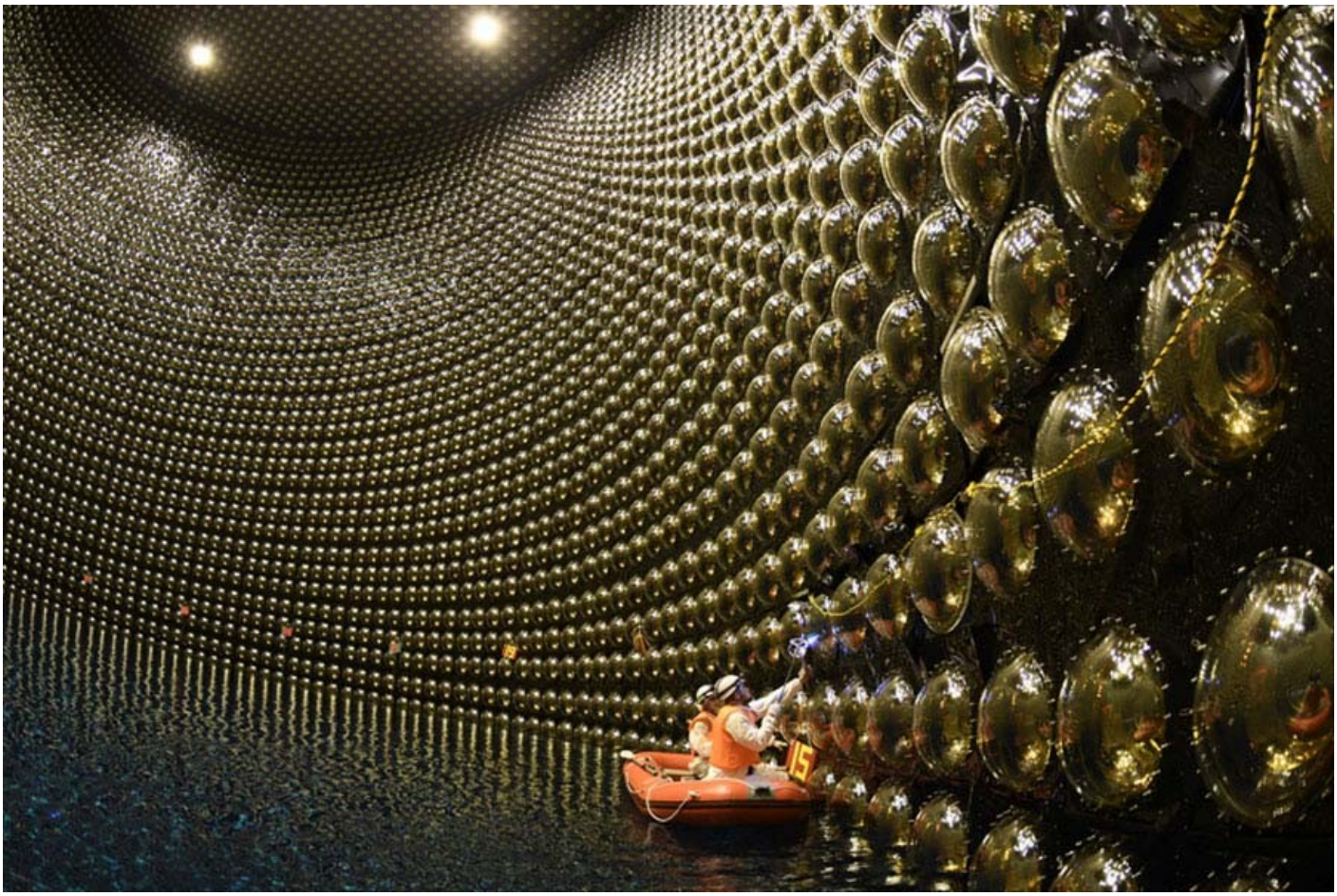


The **School of Engineering and Sciences (EIC)** at **Tecnológico de Monterrey** is collaborating on a project that, by 2027**, will be the largest neutrino observatory ever built.**

This is the **Hyper Kamiokande**, a colossal underground structure whose predecessors (**Kamiokande** and **Super Kamiokande**) have had a huge impact on Physics and **have been awarded two Nobel Prizes**.

Alejandro Kadsumi Tomatani, **EIC** professor at the **Tec's** Guadalajara campus, explained that it is only the third detector of **"Cherenkov radiation"**.

It is in construction, **inside the Tochibora mine**, eight kilometers from the **Kamioka Observatory** in **Japan**.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Both the **Hyper Kamiokande** and its predecessors are **capable of detecting neutrinos** which mainly come from the atmosphere, the sun, and supernova explosions in **any part of the galaxy**.

Kadsumi Tomatani noted that neutrinos are **elemental particles capable of passing through any type of matter**, so they are very difficult to detect, to the extent of being considered **“ghost particles”**.

The principle of the **Hyper Kamiokande** is very similar to that of its predecessors: **a gigantic drum-shaped container** flooded with ultra-pure water, buried deep in the earth and **equipped with thousands of light sensors.**

However, this time the size and volume of the container **are considerably larger** (five times larger than the **Super Kamiokande**), with a structure up to **78 meters high by 74 meters wide.**


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The physicist from the **Tehttps://tec.mx/enc's** Guadalajara campus shared that this structure is capable of **storing more than 260,000 tons of water** and will be equipped with **40,000 photomultiplier tube (PMT) photosensors**; the cost of construction will be around **600 million euros**.

"Being buried 650 meters underground, the rock above serves as a filter that removes polluting particles, which allows us to detect only neutrinos," **said the professor**.

https://www.youtube.com/watch?time_continue=229&v=JFOE3D2z7LM&feature=emb_logo

The detection of cosmic neutrinos, for which Professor **Masatoshi Koshiba** was awarded the **Nobel Prize** in Physics in 2002, was made possible thanks to the **Kamiokande** project.

Later, in 2015, Professor **Takaaki Kajita** and Professor **Arthur B. MacDonald** were awarded the **Nobel Prize** in Physics for discovering that neutrinos have mass, **through quantum oscillations** measured in the **Super Kamiokande**.

With the **Hyper Kamiokande**, the ambitions go further, since scientists **want to use this project to solve a fundamental physics problem** related to the **violation of charge-parity (CP) symmetry**.

“Through observation the universe, we can see that there is more matter than antimatter in it. This is one of the great mysteries of physics,” said Professor **Alejandro Kadsumi**.

How will the Tec collaborate in the Hyper Kamiokande project?

Tecnológico de Monterrey is one of three **educational institutions in Mexico** which will collaborate in the **Hyper Kamiokande** project when the collaboration has been formalized.

In total, there are **79 institutions around the world, from 13 different countries**, which are contributing to the overall project in some way.

Alejandro Kadsumi Tomatani, the physicist from the **School of Engineering and Sciences**, and his team **will work on the software aspect of the project** and will make use of the technological capabilities of a **“super computer”** located on the **Guadalajara campus.**

“We’re trying to understand one of the greatest mysteries in physics.”

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The **“NVIDIA-DGX-1”** is **capable of distinguishing neutrinos** by using *“machine learning”*, a branch of artificial intelligence whose objective is **to develop algorithms to train a computer** so that it can **identify certain patterns** in pictures.

According to the professor at the **Tec's** Guadalajara campus, it is the **first machine specialized in data processing and deep learning** to be acquired by a Latin American university.

"The computer allows us to classify neutrinos by the "flavor" of their properties," explained **Alejandro Kadsumi.**

With the information generated by the computer, it will be possible **to predict potential scenarios which can be shared with different areas** of the **Hyper Kamiokande project,** led by Professor **Masato Shiozawa** and researcher **Francesca Di Lodovico**.

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