Jiangmen Underground Neutrino Observatory (JUNO)

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Jiangmen Underground Neutrino Observatory (JUNO) Latest News

The Jiangmen Underground Neutrino Observatory (JUNO) collaboration in China recently published its first results, including measurements on how often particles called neutrinos from nuclear reactors change their flavour, or type, as they travel.

About Jiangmen Underground Neutrino Observatory (JUNO)

- It is a large **underground neutrino detector** located near the city of Kaiping in the southern Guangdong province of **China**.
- It is the product of an **international collaboration** involving **74 institutions from Asia, Europe, and America,** and has some 700 members.
- It is **led by the Chinese Academy of Sciences (CAS)** via the Institute of High Energy Physics (IHEP).
- It is the **second neutrino experiment in China, after** the **Daya Bay Reactor Neutrino Experiment.**
- It is located **53 km from two nuclear power plants** in **Taishan and Yangjiang.**
- The primary JUNO scientific **goal** is the **determination of the neutrino mass ordering (NMO).**

    - This can be **inferred by measuring** the **oscillation pattern of electron anti-neutrinos emitted by nuclear power plants.**
- To do this, the facility has an 80 m high and 50 m diameter **experimental hall** located 700 m **underground**.
- Its main feature is a **35 m radius spherical neutrino detector, containing 20,000 tonnes of liquid scintillator.**
- It is the **world's largest and highest-precision liquid scintillator detector.**
- Juno is designed to have a scientific **lifespan** of up to **30 years.**
- JUNO is also **one of three next-generation neutrino experiments,** the other two being the **Hyper-Kamiokande in Japan** and the **Deep Underground Neutrino Experiment in the US.**

What are Neutrinos?

- Neutrinos, often called '**ghost particles'**, are **elementary particles** that belong to the **lepton family** of particles.
- Since neutrinos have **very little interaction with matter**, their **detection is very difficult.**
- They have **no electrical charge** and have a **very small mass** (less than one millionth of the mass of the electron), and their **speed** is **nearly equal to the speed of light.**
- First predicted in 1930, they weren't **discovered** in experiments until **1956**.
- **Of the four fundamental forces in the universe**, neutrinos only **interact with two — gravity and the weak force.**
- **Source**: Neutrinos come from **all kinds** of different sources and are **often the product of heavy particles turning into lighter one**s, a process called "**decay**."
- They are the **most common particles in the universe.**
- Approximately 100 trillion neutrinos pass completely harmlessly through your body every second.
- Neutrinos play crucial roles in the standard model of particle physics, in stellar physics and black holes, and even in cosmology and the nature of the Big Bang.

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