Credit: NASA/JPL-Caltech/R. Hurt (SSC/Caltech)

When Particle Physicists Become Cosmic Engineers

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BREAKTHROUGH LISTEN
JUNE 23, 2025

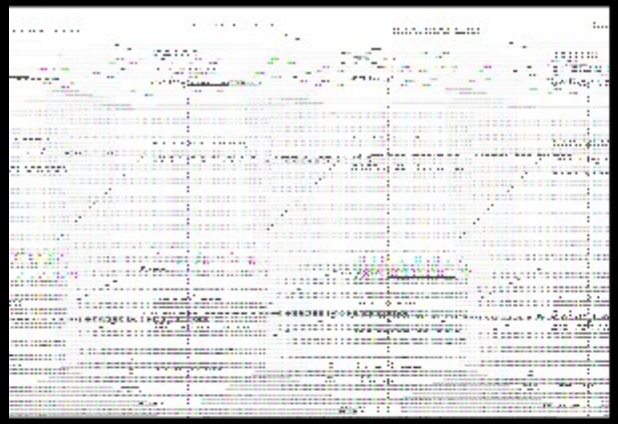

Xevatron
Sun
Orion Spur
Perseus Arm
Credit: NASA/JPL-Caltech/R. Hurt (SSC/Caltech)

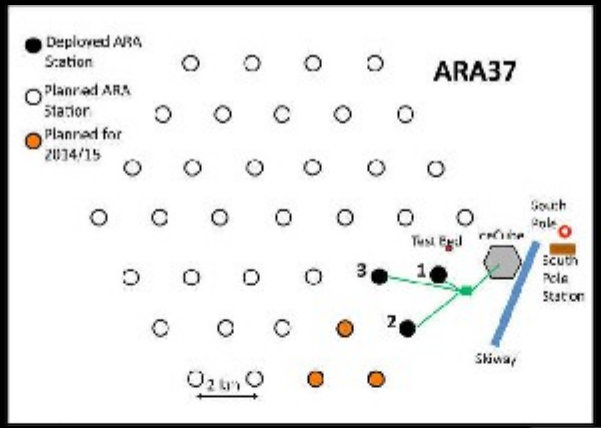
THE INEVITABILITY OF NEUTRINO POLLUTION

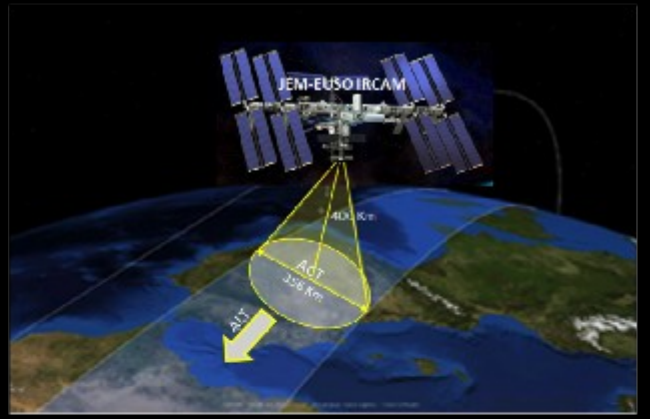
Interaction	Natural cross section
Hadronic	2000 mbarn
Weak nuclear	1e-7 mbarn
Planck	1e-38 mbarn

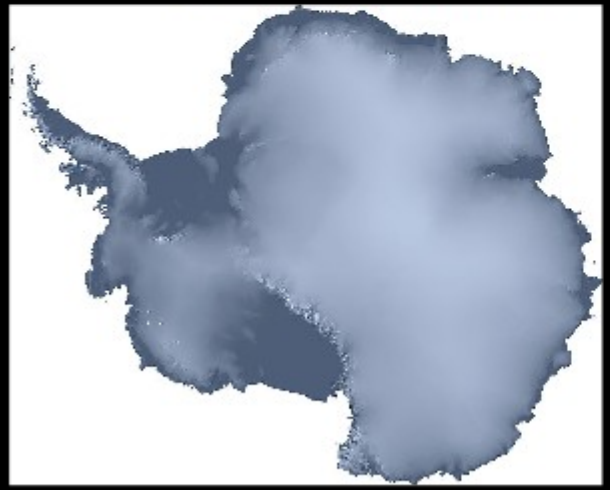
Don't just need large accelerator – need lots of energy to be converted into high-energy events

Neutrinos are inevitable waste product



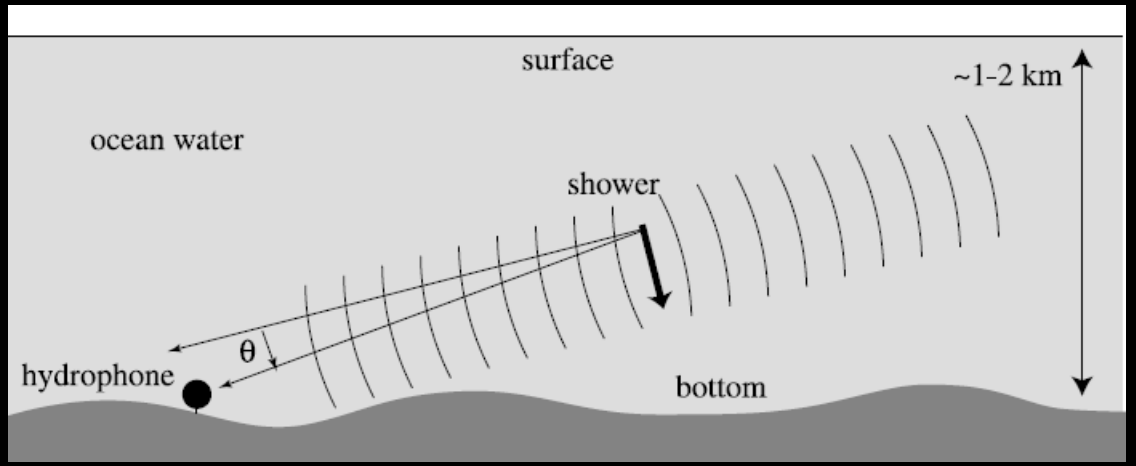






Credit: IceCube Collaboration; ARA; JEM-EUSO ACT; NASA Earth Observatory; Wikipedia / Gregory H. Revera; NASA / Robert Simmon / Manit Jentoft-Nilsen

ACOUSTIC NEUTRINO DETECTION



Limited by absorption at 10 kHz and beaming

- Energy absorption at ~4 km
- Acoustic "pancake" – ~1° thickness
- Need ~100 million detectors to cover Earth

Credit: Lehtinen et al. (2002)

PALEODETECTORS

Credit: OptoMechEngineer via Wikimedia Commons [NASA Lunar Sample 60015]

Paleodetectors look for traces of high-energy events in geological record

- Proton decay
- Dark matter interactions
- Nearby supernovae
- Cosmic rays

Still need to go through a lot of rocks