Neutrinos transmit message through solid rock

Beamline used to code the word 'neutrino' as pulses of particles.

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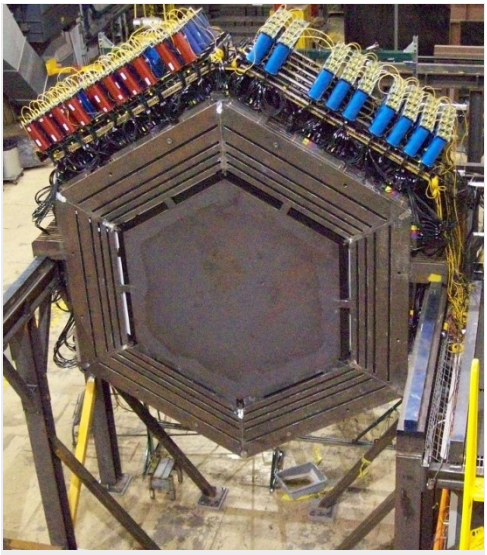
First there was the telegraph, then there was the wireless radio, fibre optics and now… neutrinos? Yes, the scions of physics have successfully transmitted a message from a particle accelerator to an underground detector using the ghostly particles.

Unfortunately, this newest medium is completely useless (for now, anyway).

Neutrinos are electrically neutral, almost massless particles produced in nuclear reactions. The only way to detect them is to use huge, extraordinarily sensitive instruments that are shielded deep underground from other sources of radioactive interference.

Physicists have been happily building such detectors for years because neutrinos are pretty interesting little guys. Contrary to theoretical expectations, they appear to have a tiny mass, and nailing down the mass relationships between neutrinos is helping to inform the current theories of particle physics. Other recent studies have suggested neutrinos may travel faster than the speed of light, but according to the latest coverage, this seems unlikely.



MINERvA

Physicists have transmitted the word 'neutrino' through 210 metres of rock.

For about as long as people have studied neutrinos, there's been a possibility of using them for communication. Because neutrinos can pass through virtually anything, they could be used to communicate between different locations deep underground, or under the sea. Submarines, for example, could use neutrinos to speak to their commanders on the surface.

Neutrino communication wouldn't be easy mind you. Because most neutrinos rarely interact, your detector (or antenna in the case of a receiver) would have to be super-massive. Moreover, most submarines run on nuclear power, which produces copious amounts of neutrinos that might interfere with communication.

But now at least we know it's possible. The scientists used the 170-ton MINERvA detector as their receiver. Their transmitter was the NuMI beamline, part of the accelerator system at Fermilab. Sending neutrino pulses using NuMI, the team was able to communicate to MINERvA through 210 metres of solid rock. As their first message, they spelled out the word "neutrino".

This is great news if you happen to have an underground bunker geographically aligned with a world-class particle accelerator (and a few hundred tons of carbon, iron, lead, helium, water and plastic lying around). But for the rest of us, it's unlikely too mean much. The message was communicated at a staggeringly low bit rate of 0.1 bits/sec. It took over two hours to send eight characters in 'neutrino.'

The authors themselves said it best: "Significant improvements in neutrino beams and detectors are required for 'practical' application."

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