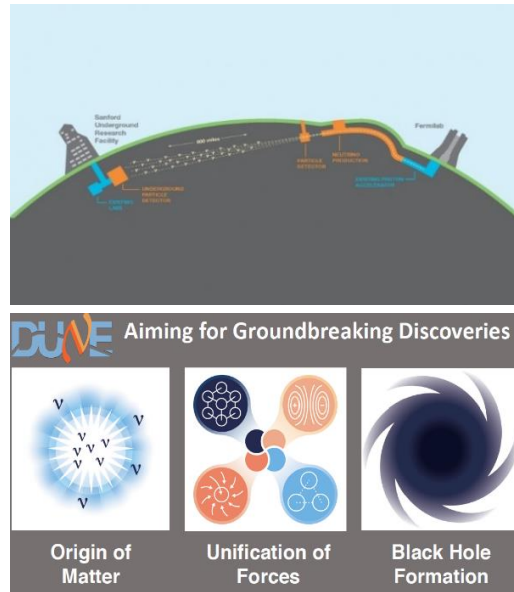


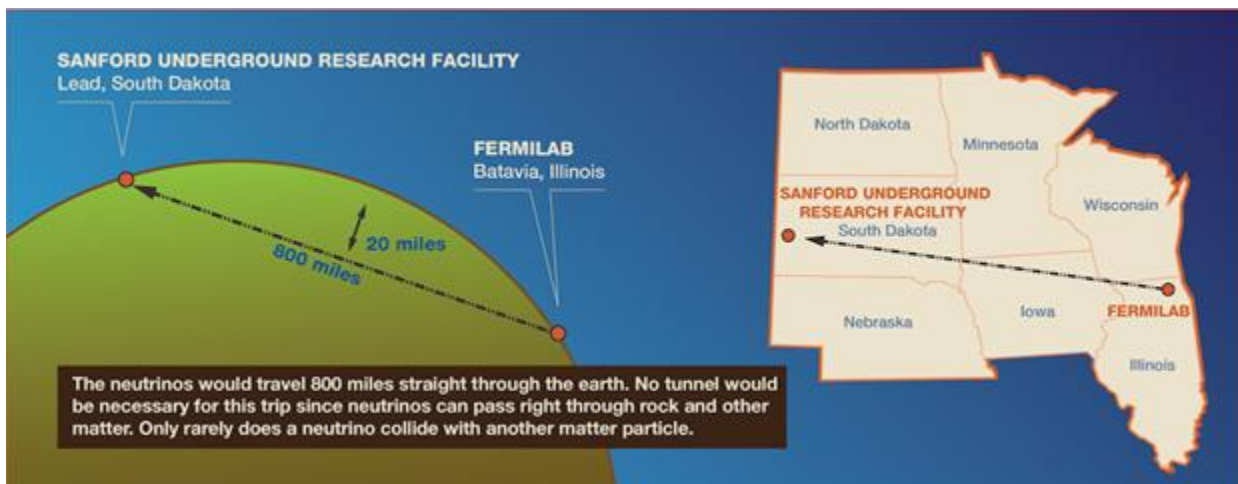
How fast do neutrinos travel?

Neutrinos are the lightest particles with mass, and they interact with regular matter extremely rarely. These properties allow neutrinos to travel in any medium at almost the speed of light, the fastest speed possible in the universe. Physicists think, neutrinos hold the key to many unanswered questions about our universe. The Deep Underground Neutrino Experiment (DUNE) hosted by Fermilab will send an intense beam of neutrinos through the Earth to Sanford Lab, South Dakota in effort to collect data that could solve the mystery of the origins of matter. Can you guess how long will it take for FNAL neutrinos to travel through the Earth from Fermilab to South Dakota? Make your guess, then do this activity and check how close your guess was to the correct answer.



Materials: Google maps, a calculator.

Activity: Use the Google maps and find out how many kms are from Fermilab to Sanford Lab. Assume that neutrinos travel at nearly the speed of light (300,000 km/sec) on a straight line through the Earth. Use the distance, time and speed relationship (distance = speed x time) and calculate the time it will take for FNAL neutrinos to travel from Fermilab to Sanford Lab. Compare your guess with the number you've calculated.



Questions to ask: How long would it take to travel from Fermilab to Sanford Lab on a car? on a plane? Would it be possible for photons (light particles) to travel the same distance through the Earth as fast as neutrinos? If not, why?

Useful links: https://ed.fnal.gov/lsc_exhibits/list.html

<https://twitter.com/FermilabEd/status/1242451101288300546>

Answer key

About 0.004 seconds.