1. **If a space traveler was 50 years old when he left his galaxy in 2007, how old would he be if he returned in 2025 if he had traveled at a rate of 2.8 x 10^8 m/s.**

From the time dilation equation, we can write the following.

Thus, the age of men after returning to his galaxy would be (50 + 6.46) = 56.46 years old.

1. **Using the Internet, find the location of a particle accelerator. In several paragraphs describe its size, what particles are being accelerated, how they are being accelerated, what their target is, how the particles are detected and what subatomic particles have been discovered at the site. Be sure to cite your sources.**

[Introduction to the LHC]

The Large Hadron Collider, generally known as the LHC, is a well-known particle accelerator. This particle accelerator, which is housed at CERN, the European Organization for Nuclear Research, is the world's most powerful instrument. The accelerator permits protons or ions to be pushed to speeds approaching those of light. It also marks 27 kilometers in circumference, making it the world’s biggest accelerator to date. The accelerator's operation is intriguing.

[Particle Collisions]

The CERN accelerator complex is made up of a variety of high-energy equipment that work together to perform their functions. These machines store the energy in the particles, allowing the ions to accelerate as they go through the machine thanks to the energy obtained from previous devices. Using donut-shaped electromagnets, energy is transmitted to charged particles such as protons and electrons, as well as nuclei of lead, argon, or xenon atoms, to electrically propel the particles. Two particle beams are launched in opposing directions within the accelerator so that they might clash afterwards. The beam pipes that send the beams in opposing directions such that the two particles clash at the yellow target point are known as ultrahigh vacuums. The magnetic field created by superconducting electromagnets, which provides a centripetal force for the particles, allows the particles to stay inside the accelerator's path.

In addition, the electromagnets all work together to compress the ions closer together, reducing the likelihood of collisions. To prevent other materials and chemicals from producing resistance to the passage of the particles, the electromagnets are kept at a temperature of around 271.3°C. Particles' chances of lowering their energy become extremely slim, allowing collisions with higher energy.

[The purpose of particle collisions and its example]

The purpose of such particle collisions is to generate enormous particles such as the Higgs boson, which was found by the accelerator in 2012. This enables scientists to apply *E = mc*, one of Einstein's equations. The energy released as a result of the two collisions is "converted into matter in the form of new particles," which are the biggest energy-containing particles known to have existed in the early Universe. Due to the brief duration of emission and decay into lighter particles, high-energy particles cannot be seen with human eyes. Because the energy output and particle characteristics cannot be directly detected, various detectors are utilized to monitor them before and after the impact. The CERN is a research facility where scientists study and detect subatomic particles.

The idea is simple: the detectors recognize the traces left in the accelerator by the particles. The detectors collect information about the particles as they gain energy, such as their mass and charge. The momentum of the particles is then calculated as the particles travel in a straight line, which is really a curve owing to the magnetic field. The detectors are employed when the computations have been completed. The patterns of small electrical pulses are recorded and identified by tracking equipment. The patterns will then be designed to make the particle's pattern and path visible. Another instrument is a calorimeter, which monitors how much energy a particle loses as it travels through it. After a collision, the gadget absorbs the particles, acquiring their energy, allowing researchers to quantify the energy of electrons and photons as they interact with charged particles in a substance.

It was formerly thought that humanity would never be able to reach a point where stuff on Earth could travel at the speed of light.

[Conclusion]

These current physics technologies are the means by which people on Earth may learn more about space and the Universe, and so generate new theories and thoughts about the universe.

Works Cited 추가할 것 (Lee 참고해서)