## Tarea 10 Física del Electrón

lunes, 21 de Octubre 2019

- 1. Demuestre que, usando la transformacion de Lorentz, que la ecuación de onda para una onda Electro-Magnetica es invariante.
- 2. An airplane travels at a constant speed v for a distance of 3000 km as measured by a stationary observer. The pilot measures the flight time to be  $\Delta t$  and the stationary observer measures the flight time to be  $\Delta t'$ . (a) Which time interval is longer? (b) If  $|\Delta t \Delta t'| = 4$  ns, determine the speed of the airplane.
- 3. In the laboratory frame a particle with the speed v = 0.99c travels a distance of 1 mm before spontaneously decaying. What is the proper lifetime of the particle?
- 4. (a) The muon  $(\mu^{\pm})$  has a proper lifetime of 2.2  $\mu$ s. If a  $\mu$  has a speed of 0.99*c*, what is the average distance that it travels before decaying? (b) The charged pion  $(\pi^{\pm})$  has a proper lifetime of 26 ns. If a  $\pi$  has a speed of 0.99*c*, what is the average distance that it travels before decaying?
- 5. Determina la masa de un protón con la energía máxima del LHC.
- 6. Determina  $\gamma$  para un coche de la Fórmula 1 al final de una recta.
- 7. Read Measurement of the neutrino velocity with the OPERA detector in the CNGS beam. arXiv:1109.4897v1 [hep-ex]. Discuss the implications of the result reported in this paper would be correct. Also discuss where the measurement could be wrong.