

PH1530: Relativity

Learning Outcomes:

After this course you are expected to:

- Understand what is meant by the terms frame of reference, rest frame, center of mass frame.
- List Einstein's postulates of special relativity.
- Define the terms proper time and time dilation.
- Know the formula for time dilation and be able to apply it.
- Explain what is meant by the twin paradox.
- Define the terms proper length and length contraction.
- Know the formula for length contraction and be able to apply it.
- Know the Lorentz transformations and be able to apply them.
- Be able to transform velocities between different frames of reference.
- Be able to show that the speed of light (c) is invariant.
- Know the relativistic formulae for momentum and energy.
- Know what is meant by a Lorentz invariant quantity.
- Know the formula $E^2 - c^2 p^2 = m^2 c^4$
- Know what is meant by the term threshold energy and be able to calculate it.

Reading:

All references refer to Young and Freedman, 'University Physics with Modern Physics', 11th Edition.

(Optional problems on the material in these chapters can be found at the end of the relevant chapter).

- Chapter 37 excluding sections 37.6 and 37.9