

SPECIAL RELATIVITY IN NON-INERTIAL REFERENCE SYSTEMS

In this work, space-time will be studied taking into account a geometric structure of affine space, which can be identified with \mathbb{R}^4 space. The focus will be on the development of non-inertial reference systems, also called observers, and the description of the effects that can be physically measured by them. Therefore, in addition to discussing concepts such as world line, the concepts of simultaneity and local frame will be introduced. A relativistic approach to kinematics will also be taken, focusing on the measurements made by observers.

The study of non-inertial reference systems has been divided into two separate cases. On the one hand, uniformly accelerated observers have been defined, with which the trajectory of photons as seen by these observers has been calculated, and the phenomenon of redshift has been studied. Then, uniformly rotating and co-rotating observers have been defined to determine the synchronization processes that can be carried out by the latter.

The results showed, on the one hand, that the physical properties of photons, such as their rectilinear world line and the conservation of their energy, do not hold for a uniformly accelerated observer. On the other hand, it was found that a synchronization process is possible for co-rotating observers at a local level, but not at a global level.

Author: Mr MONTES PALMA, Angel Oswaldo (Universidad Nacional de Ingeniería)

Presenter: Mr MONTES PALMA, Angel Oswaldo (Universidad Nacional de Ingeniería)