Relativistic (Minkowski's) Interval Encyclopedia Article

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Relativistic (Minkowski's) Interval

The relativistic interval is a quantity used to denote the distance between two events in four-dimensional **space-time**. Similar to the distance between two points in **space**, which is unchanged by relabeling the origin of the coordinate system or rotating it around, the relativistic interval is invariant under **Lorentz transformations**. It is defined by the equation I = c2 ()t2 - ()x2 . In this equation, ()t is the **time** between two events, and ()x is the distance between two events. Unlike a distance, which is always positive, the interval may be positive, negative, or zero.

Depending on the value of the interval, pairs of events fall into three categories. If the interval is negative, the distance between the two events is larger than the distance **light** can travel in time (Delta)t. In this case, a Lorentz transformation can be done so that an observer sees the two events occur simultaneously, so the events are called "space-like." If the interval is positive, a Lorentz transformation can be done so that the two events appear to occur at the same point in space but at different times, so the events are called "time-like." If the interval is zero, the only way the two events can communicate is by a light signal, so the events are called "light-like."