

# Time Dilation

Physics

Moving clocks run slow, and the experiments that show it.

**A clock moving relative to an observer ticks slower by the Lorentz factor.**

$$\Delta t = \gamma \Delta t_0$$

**Muons from the atmosphere**

They should decay first.

**Reach the ground**

**Atomic clocks flown around**

Confirmed in 1971.

**Measurably behind**

**GPS satellites**

Or navigation drifts.

**Corrected daily**

## THE COMMON MISTAKE

✗ **Asking which clock is really slow**

✓ **Each observes the other's as slow**

There is no preferred frame. The symmetry only breaks when one observer accelerates to return.

**GPS would accumulate about 10 km of error per day without relativistic correction. This is engineering, not philosophy.**