

Proper Time, Coordinate Time, and the Spacetime Interval

Physics II: Modern Physics
College of the Atlantic

1. Anastajia and Beowulf synchronize their watches on earth. Call this event P. Anastajia then hops in her spaceship and flies to Neptune and back. Upon Anastajia's return, she and Beowulf compare the time on their watches. Call this moment of comparison event Q.
 - (a) Whose watch(es) measure the spacetime interval between events P and Q?
 - (b) Whose watch(es) measure a coordinate time interval between events P and Q?
 - (c) Whose watch(es) measure a proper time between events P and Q?
 - (d) Whose watch measures a shorter time interval between P and Q?

2. Anastajia and Beowulf operate synchronized clocks at two points on the earth's surface. Charlotte rides a train that travels at a constant speed in a straight line between these two points. Let the event of her departure from Ana's clock be event A and her arrival at Beowulf's clock be event B. Deon, on the other hand, pilots a plane that takes a complicated three-dimensional path between these two points, but leaves Ana's clock at the same time as Charlotte and arrives at Beowulf's clock just as Charlotte does.
 - (a) Which clock registers the largest time interval between the events?
 - (b) Which clock registers the largest time interval between the events?