Working in Relativistic Positioning Systems: the precision of location

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ABSTRACT

Relativistic Positioning Systems (RPSs) are the sole known locating systems allowing to construct, in any space-time, primary *physical* coordinate systems. The fundamental concepts of the theory of RPSs are already known, but its implementation needs further development ([1-5]). The basic ingredient of the theory is a set of four emitters broadcasting their proper times (emission coordinates). In this talk, the main RPSs topics are presented. In particular, for a basic RPS in a flat space-time, we are interested in the precision with which it is able to locate space-time events. It appears that this precision is related to the Jacobian, $\mathcal{J}$, of the transformation from emission to inertial coordinates. We stress in detail how the value of $\mathcal{J}$ is related to the uncertainties in the determination of the position at every event. This result is interesting in current navigation satellite systems. For instance, among the visible satellite tetrads for a user, that which provides the more precise user position is the one having the maximum value of $\mathcal{J}$.

References

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