

Improved Time-Keeping for Neutrino Time-of-Flight Measurements

Measurement of the particle time of flight involves knowing the transit distance traveled and knowing the transit time. The transit time in turn depends upon time-keeping and time-stamping devices located at widely separated detectors which mark the start and finish location for the transit. The MINOS experiment has recently upgraded the time-keeping and time-stamping devices to improve upon the neutrino time of flight measurement reported in 2007. The new system provides the ability to constantly measure, monitor and record the delays, phases and stability of the time-stamping devices. A procedure for "loop" calibration of time-keeping devices is also utilized.

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