On absolute clocks and rulers

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ABSOLUTE CLOCKS AND RULERS

To motivate absolute gravity[1], I think it is useful to consider the difference between the standard clocks and rulers of special and general relativity, and the absolute clocks and rulers of absolute gravity. Absolute clocks and rulers are standard clocks and rulers that have been corrected for the effects of motion and gravity.

General relativity uses standard clocks and rulers to measure proper times and distances. One has to be careful about the definition of "standard", though. For example, a pendulum is a kind of clock that cannot be a standard clock because a pendulum stops working in a falling elevator. A pendulum is an acceleration clock; it relies on mechanical and/or gravitational acceleration to keep ticking.

By standard clock or ruler, what is usually meant is an electromagnetic clock or ruler. That is, a clock or ruler whose timekeeping or size are based on classical or quantum electromagnetic effects such as electron transitions, or atomic repulsion, or on the flexing of a wind-up spring.

But standard clocks and rulers are more than just electromagnetic clocks and rulers. They both must be corrected for undesirable effects, such as temperature.

Consider two thermally uncorrected electromagnetic clocks and two thermally uncorrected electromagnetic rulers. Place one of each in a hot oven, and one of each in a cold refrigerator. After a while they will probably measure different times and lengths. If you didn't know about thermal effects, you might conclude that household appliances curve space and time.

Similarly, standard clocks and rulers in different circumstances are found to measure different times and lengths. If you take two standard clocks and keep one in your lab while sending the other around the Earth, they will measure different times when brought back together. General relativity concludes that motion and gravity curve space and time.

Absolute gravity instead concludes that standard clocks and rulers are uncorrected for motion and gravity.

An absolute clock and ruler can conceptually be created from a standard clock and ruler by adding a pendulum and an omnidirectional microwave antenna. The standard clock and ruler measure proper time and proper length. The pendulum measures the combined effects of the local mechanical and gravitational accelerations. The omnidirectional microwave antenna measures the local red/blue shift with respect to the cosmic microwave background radiation, giving the local velocity and mechanical acceleration. The difference between the acceleration measured by the pendulum (combined mechanical and gravitational acceleration) and by the microwave antenna (mechanical acceleration only) gives the gravitational acceleration. This provides sufficient information to correct the standard clock and ruler for motion and gravity.

Using absolute clocks, two events are simultaneous if they occur at the same absolute time. Photons do not move at a constant absolute velocity; they slow down in gravitational fields.

Using absolute rulers, the circumference of a circle is always 2π times the radius.

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[1] Parker, D. B., "General Relativity in Absolute Space and Time", 2022, preprint, https://pgu.org