The Concept of Time

The single most misleading concept in physics is that of time.

Although time is a concept that has proven useful to study and predict the behaviour of physical systems (not to mention how, on the human level, it has become an essential concept to organize, synchronize and regulate our activities and interactions) it remains just that; a concept.

Time is a relational concept that allows us to compare events with periodic systems; in other words, clocks. But time has no more effect on reality than the clocks that are used to measure it. In fact, when you think of it, clocks don't really measure time. Clocks count the number of recurrence of a particular state. For instance, the number of times the pendulum of a clock will go back to a given initial position following a series of causality linked internal states. So clocks do not measure time, they count recurrent states or events.

If clocks do not measure time, what does?

That answer is nothing can. There has never been a measurement of time and none will ever be possible since time is non-physical. Neither has there been or ever will be a measurement of a physical effect of time on reality. Experiments have shown that rates of atomic clocks are affected by speed and gravity, but these are slowing down of clocks and not a slowing of time.

Yet, as useful the concept of time may be, it is not, as generally believed, essential to modeling reality. In fact, taking the concept of time out of our descriptions of reality solves a number of problems.

For instance mass, momentum, speed and energy are intrinsic properties thus different observers will measure the same mass, speed, momentum and energy regardless of the frame of reference they use.

And if time does not exist, neither does time dilation. Time dilation and the implied assumption of space continuum are essential to explain the constancy of the speed of light in special relativity. But neither is necessary in QGC since the constancy of the speed of light follows naturally from the discreteness of space.

Finally, if time does not exist, then although the unification of space (a representation of space to be precise) and time (which is a relational concept) into mathematical space-time provides a useful framework in which we can study the evolution of a system, physical space-time makes no sense.

Time Distance Equivalence

As explained earlier, time is a useful concept but it is not physical and introduces a number of problems when it comes to describing reality.

However, time can be advantageously replaced by a physical definition of duration. For example, the duration of an event may be defined as the absolute distance a photon simultaneous travels during the event. The absolute distance is understood as the number $preons^{(-)}$ between two positions.

Also, if t_a is the duration as defined above of a change in position over a distance d_a then $\frac{d_a}{t_a}$ provides a physical equivalent of the conventional, classical speed. Furthermore since $\frac{d_a}{t_a} = \frac{v_a}{c}$ where v_a is the intrinsic speed of a then $v_a = \frac{d_a}{d_c} c$. Therefore, from a physical definition of duration, we can calculate the intrinsic speed of a. Also, since $v_a = \frac{\left\| \vec{P}_a \right\|}{m_a}$, we can derive the intrinsic momentum of a once we deduce its mass from its gravitational acceleration due to gravitational interaction with a body of known mass.

There is however, which will be discussed in a later section, is in experimentally obtaining the absolute distances and intrinsic properties in the first place, including the value of c in fundamental units. This will be discussed explained in detail in the section Calculating and Converting QGD's Constants and Units.