Understanding Mass

Many physical entities that make up what is interpreted as the constituents of the matter of the universe, such as protons and electrons, have been given a physical property of mass. This physical property of mass can be interpreted as the resistance of a physical entity to have its motion changed. That is to undergo an acceleration to change its velocity, be its direction, magnitude, or both direction and magnitude.

Consider that entities that have a mass.

Changing the motion of an entity is a change in the physical state of that entity.(Understanding Energy)

To change the physical state of an entity requires an interaction with another physical entity. Such interactions involve an exchange of energy of a common like property between entities.(Understanding Energy)

A greater mass results in a greater resistance to change the physical state of an entity, and a need for a greater effort to change that entities motion than that of an entity of a lower property of mass.

Such a greater effort translates into the need of a higher interaction of exchange of energy between two interacting entities to change the motion of such an entity as that of changing the motion of an entity considered as having a lower mass.

A change in the motion of an entity can be considered as a change in that entities frame of reference in reference to the totality of the physical system in which that entity exists. This can be interpreted as the property of mass is the resistance of an entity to change from one frame of reference to another frame of reference. In conjunction with that a change in motion or reference frame is a change of physical state for that entity, and from this change of physical state, the mass of an entity can be interpreted as a resistance of an entity to change its physical state within a system of entities.

This resistance of an entity to change its physical state of motion can be thought of as a kind of friction of resistance. This then leads to the question as to a friction against what ? And if such a friction of resistance is present, under what circumstances ?

To answer this, a set of different possible circumstances need to be explored.

Consider the scenario that interacting entities have no mass or resistance to changing their physical state of motion.

Scenario I:

If it is considered that an interaction is that of like two billiard balls where the surfaces of some field that makes up the entities in space interact, and are elastic, then the following can be considered to apply.

The motion or physical state of an entity can change with no effort or energy applied, or if an energy of interaction is required, only the smallest amount would be needed to attain a change of physical state. Such a scenario can be considered as entities that exist in a physical system that has zero friction. Such a scenario of a frictionless system could have an instantaneous mode of interaction. At the location where an interaction of two entities first occurs, no matter how small or large, that interaction would encounter zero friction of resistance to change the physical state of the interacting entities, and they would interact instantaneously without any interval of delay. In the case of motion between two entities interacting via their electromagnetic fields, as soon as there is a contact of interaction between their electromagnetic fields, no matter at what distance, the interaction would be instantaneous throughout each entity in its entirety, as would be a change in the motion of the entities.

Scenario II:

If it is considered that this interaction is that of like two pulses of wave forms, such as sound or waves of water, where the two entities are considered to be the wave pulses themselves, then the interaction of these wave forms constitutes the interaction of two entities that are constructed of the deformation of some form of medium. In the case of electromagnetic waves, which by all observation, is how the interaction of matter is conducted, this medium can be considered to be space itself, if space is considered to be a medium of an electromagnetic field.

Fluctuations of this field, that is space, can be considered to be the electromagnetic waves of a wave model of matter. Any interactions of the electromagnetic waves can thus be considered as the interactions of space itself being displaced in form of transverse nature of interaction, and, or, in a compression form of interaction.

Such an interaction of wave forms of an electromagnetic nature would be instantaneous in the region of space where such electromagnetic wave forms overlap. Such interactions, at least from the perspective of observation at the low energies that most of space exists in, have these electromagnetic waves passing through each other and do not interact in such a manner as to change their motion or physical state. Such wave interactions would also indicate that space as a medium of electromagnetic waves can have the energy transmitted in any region of itself in multiple directions simultaneously.

Consider the scenario that at least one interacting entity has mass or resistance to changing their physical state of motion.

Scenario III:

If it is considered that an interaction between two entities is like that of two billiard balls where the interaction between them is on some surface of space, and that the interaction is not conveyed throughout the entities instantaneously, and the effect of this interaction does not change the physical state of the entities until this interaction is complete, this interval, or period of interaction completeness can be considered as a resistance to a change of physical state. If a change of physical state is the motion of an entity, then a resistance to change in motion can be considered to be a mass of the entity.

Scenario IV:

If interactions between entities is considered to be that of an exchange of energies, then a resistance to an interaction can be considered as not a resistance to an exchange of energy, but that the energy interaction and outcome of that interaction is a result of the differences in the levels of energies of the entities involved.

If it is considered that interactions of exchanges of energies is performed across a boundary of a gradient of energy levels, then a resistance of interaction of energy exchange may be a resistance of energies to cross that energy gradient boundary.

Such a resistance may be directly as adding energy to an entity. An entity of a given high energy magnitude is resistant to change its physical state to an interaction of with that of an entity of much lower energy magnitude as the lower energy entity has to overcome a high energy gradient to add its energy to the existing entity energy state. For this interaction of exchange to occur,