

# Particle Mass without a Higgs Mechanism

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**Abstract.** We will present a particle model which explains the particle mass without reference to the Higgs model. It uses the simple and fundamental physical fact that any extended object necessarily exhibits inertial behaviour. This is caused by the finiteness of the speed of light at which the binding forces between the particle's constituents propagate. This model allows the mass of an individual particle to be determined with high precision. The particle model also supports an explanation of relativity, Special Relativity as well as General Relativity, following the Lorentzian way. Lorentzian Relativity assumes an ether in the sense that there is a fixed frame of reference. One advantage of this approach to relativity is that relativistic phenomena can be deduced from physical facts that are anyway known; no extra principles are necessary. The other advantage is that rather than using Riemannian geometry to handle a four-dimensional curved space, only the familiar Euclidean geometry is needed. However, with reference to gravity the problem arises that the mechanism presented for (inertial) mass has no relation to gravity (which is also true of the Higgs mechanism). On the other hand, we know the weak equivalence principle, i.e. the perfect equivalence of inertia and gravity. We will show that General Relativity following Lorentz can give us a solution for this problem and may thereby change our understanding of gravity. This specific understanding has the potential to solve the problem of Dark Matter, as well as other issues.