# "Relativity" in a Carbon Network: The Strange World of Electrons in Graphene”

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**Abstract:**

Graphene, a single layer of graphite, represents a remarkable new environment for electrons in a solid state system. The effective theory in this system is one of massless particles, so that electrons move inside it at constant speed, albeit one much slower than that of light. In this talk I will discuss some of the properties that have made the laboratory realization of this material so exciting, with particular emphasis on some analogies with relativistic quantum systems that lead to unique electron transport behaviors. Among these is the analog of "Coulomb implosion," a phenomenon which in real relativistic quantum mechanics limits the charge on a nucleus, and at one time was a possible candidate for explaining the mass of the electron in nature.

While this is no longer considered a viable mechanism for electron mass in a vacuum, Coulomb implosion may impart an effective mass to electrons in graphene under certain circumstances, and lead to a new type of Bose-Einstein condensation in this purely electronic system.