Colloquium Monday, July 24, 2017

***Relativity Matters*: The Acceleration Frontier**

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I remind how properties of moving bodies while "undone" by coordinate transformations can have real physical consequences. This leads to improved understanding of the behavior of material finite size bodies moving with speed approaching that of light, i.e. clarification of the meaning of Lorentz-FitzGerald body contraction. Next, we study acceleration, and recognize the unique role of "inertial" observers in Einstein's Special Relativity. In general, accelerated and inertial frames of reference are not equivalent. The exceptional context of gravity force described by "general relativity" is recognized. I characterize what means weak and strong acceleration and show in the context of both, relativistic nuclear collisions and laser-relativistic particle collision experiments that we reach required "strong" conditions. Looking closer at the Lorentz-force we see the lack of consistency in electromagnetic forces when critical strength acceleration is reached.