LABORATORY FOR ELEMENTARY-PARTICLE PHYSICS (LEPP)

Theory Seminar

Patrick Fox

Fermilab

All anomaly-free U(1) theories

In order to be well-behaved at high energies, gauge theories must be free of gauge anomalies. Furthermore, if the fermions are chiral the cancellation of anomalies requires careful assignment of the fermion charges under the gauge group. For a U(1) theory the (integer) charges of the fermions must satisfy a cubic equation. Generating consistent chiral theories is a challenging endeavor. I will describe the recently discovered solution to this Diophantine cubic equation which provides a parametrization of the charges in terms of integers, and prove that this is the most general solution. I will present some extensions to theories with multiple U(1) gauge symmetries, including a discussion of the smallest number of fermions necessary to have a consistent chiral theory.

Wednesday, Nov. 6, 2019
2:00pm
401 Physical Sciences Building

LEPP, the Cornell University Laboratory for Elementary-Particle Physics, and CHESS resources have merged and a new lab, (CLASSE), has formed. LEPP's primary source of support is the National Science Foundation. Visit us at www.lepp.cornell.edu